補足資料：　R lavaanコード（Table 1）

論文: 宇佐美慧（2022）. 個人内関係の推測と統計モデル―ランダム切片交差遅延パネルモデルを巡って―

**１、分析の前に**

\*本文中の分析例で利用したデータについてはICPSR (Inter-university Consortium for Political and Social Research)のwebサイト (<https://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/36282>)から入手可能。

\* lavaanパッケージの事前インストールが必要。インストールをするにはRを開いて、以下を入力する。

install.packages("lavaan", dependencies = TRUE)

\*データファイル (以下では"DATA")の事前読み込みも必要。

**２、分析の実行**

本資料2ページ以降に記載の、各統計モデルのためのlavaanコード（例えば、測定時点数*T*=6で自己回帰係数・交差遅延係数と残差（共）分散が時不変条件の場合のRI-CLPMのコードである"RICLPMT6"）を読み込んでから分析する。以下は、RI-CLPM(時不変条件、*T*=6の場合)による分析を実行するためのコード例。

require("lavaan") #lavaanパッケージの呼び出し

fit<-cfa(RICLPMT6, data=DATA, missing='fiml')　 #"DATA"がデータファイル名

summary(fit, fit.measures = TRUE) #fit.measuresは各種適合度指標の算出を実行

ここで、"fiml"は、欠測メカニズムがランダムな欠測(missing at random: MAR)であることを仮定した完全情報最尤推定法による分析を意味する。分析結果は5ページ以降に示す。他の統計モデルによる分析を実行する場合は"RICLPMT6"部分のみ適宜書き換える。なお、因子分析や回帰分析などの様々な統計モデルに関するlavaanの実行例や分析結果の読み取りについては以下を参照（英語）。

<https://lavaan.ugent.be/tutorial/index.html>

**３、lavaanコード**

\*以下では、*T*=6の場合のCLPM(2式による表現), RI-CLPM(3式), predetermined-RICLPM, DPM(10式による表現)のlavaanコード（時不変条件、時変条件別）計8種類を示している。

\*mu：集団平均、beta：自己回帰係数、gamma：交差遅延係数、omega：残差（共）分散、

phi:最初の時点(*t* =1)の(共)分散、tau:特性因子(*I*)または累積因子(*A*)の(共)分散をそれぞれ表す。

\*"\*1"は平均や切片、"=~"は共通因子と対応する変数および因子負荷（重み）、"~"は回帰式、"~~"は(共)分散をそれぞれ表す。<https://lavaan.ugent.be/tutorial/index.html>を参照。

\*このコードでは偏差を"FF"で表す。例えば本文中の変数の偏差は、ここでは"FFy1"と表記している。

\*CLPMと比較した際の、各モデルに含まれる特有のコード部分は赤色で示している。

**#CLPM(T=6) （時不変条件、2式による表現）**

CLPMT6 <- '

x1~mux1\*1; y1~muy1\*1; x2~mux2\*1; y2~muy2\*1; x3~mux3\*1; y3~muy3\*1; x4~mux4\*1; y4~muy4\*1; x5~mux5\*1; y5~muy5\*1; x6~mux6\*1; y6~muy6\*1

x1~~0\*x1; y1~~0\*y1; x2~~0\*x2; y2~~0\*y2; x3~~0\*x3; y3~~0\*y3; x4~~0\*x4; y4~~0\*y4; x5~~0\*x5; y5~~0\*y5; x6~~0\*x6; y6~~0\*y6;

FFx1~0\*1;FFy1~0\*1; FFx1~~phix\*FFx1; FFy1~~phiy\*FFy1; FFx1~~phixy\*FFy1;

FFy2~ betay\*FFy1+gammay\*FFx1; FFx2~ betax\*FFx1+gammax\*FFy1

FFy3~ betay\*FFy2+gammay\*FFx2; FFx3~ betax\*FFx2+gammax\*FFy2

FFy4~ betay\*FFy3+gammay\*FFx3; FFx4~ betax\*FFx3+gammax\*FFy3

FFy5~ betay\*FFy4+gammay\*FFx4; FFx5~ betax\*FFx4+gammax\*FFy4

FFy6~ betay\*FFy5+gammay\*FFx5; FFx6~ betax\*FFx5+gammax\*FFy5

FFx2~~Omegax\*FFx2; FFx3~~Omegax\*FFx3; FFx4~~Omegax\*FFx4; FFx5~~Omegax\*FFx5; FFx6~~Omegax\*FFx6

FFy2~~Omegay\*FFy2; FFy3~~Omegay\*FFy3; FFy4~~Omegay\*FFy4; FFy5~~Omegay\*FFy5; FFy6~~Omegay\*FFy6

FFx2~~Omegaxy\*FFy2; FFx3~~Omegaxy\*FFy3; FFx4~~Omegaxy\*FFy4; FFx5~~Omegaxy\*FFy5; FFx6~~Omegaxy\*FFy6

FFy1 =~ 1\*y1; FFy2 =~ 1\*y2; FFy3 =~ 1\*y3; FFy4 =~ 1\*y4; FFy5 =~ 1\*y5; FFy6 =~ 1\*y6

FFx1 =~ 1\*x1; FFx2 =~ 1\*x2; FFx3 =~ 1\*x3; FFx4 =~ 1\*x4; FFx5 =~ 1\*x5; FFx6 =~ 1\*x6

'

**#CLPM2(T=6)（時変条件、2式による表現）**

CLPM2T6 <- '

x1~mux1\*1; y1~muy1\*1; x2~mux2\*1; y2~muy2\*1; x3~mux3\*1; y3~muy3\*1; x4~mux4\*1; y4~muy4\*1; x5~mux5\*1; y5~muy5\*1; x6~mux6\*1; y6~muy6\*1

x1~~0\*x1; y1~~0\*y1; x2~~0\*x2; y2~~0\*y2; x3~~0\*x3; y3~~0\*y3; x4~~0\*x4; y4~~0\*y4; x5~~0\*x5; y5~~0\*y5; x6~~0\*x6; y6~~0\*y6;

FFx1~0\*1;FFy1~0\*1; FFx1~~phix\*FFx1; FFy1~~phiy\*FFy1; FFx1~~phixy\*FFy1;

FFy2~ betay2\*FFy1+gammay2\*FFx1; FFx2~ betax2\*FFx1+gammax2\*FFy1

FFy3~ betay3\*FFy2+gammay3\*FFx2; FFx3~ betax3\*FFx2+gammax3\*FFy2

FFy4~ betay4\*FFy3+gammay4\*FFx3; FFx4~ betax4\*FFx3+gammax4\*FFy3

FFy5~ betay5\*FFy4+gammay5\*FFx4; FFx5~ betax5\*FFx4+gammax5\*FFy4

FFy6~ betay6\*FFy5+gammay6\*FFx5; FFx6~ betax6\*FFx5+gammax6\*FFy5

FFx2~~Omegax2\*FFx2; FFx3~~Omegax3\*FFx3; FFx4~~Omegax4\*FFx4; FFx5~~Omegax5\*FFx5; FFx6~~Omegax6\*FFx6

FFy2~~Omegay2\*FFy2; FFy3~~Omegay3\*FFy3; FFy4~~Omegay4\*FFy4; FFy5~~Omegay5\*FFy5; FFy6~~Omegay6\*FFy6

FFx2~~Omegaxy2\*FFy2; FFx3~~Omegaxy3\*FFy3; FFx4~~Omegaxy4\*FFy4; FFx5~~Omegaxy5\*FFy5; FFx6~~Omegaxy6\*FFy6

FFy1 =~ 1\*y1; FFy2 =~ 1\*y2; FFy3 =~ 1\*y3; FFy4 =~ 1\*y4; FFy5 =~ 1\*y5; FFy6 =~ 1\*y6

FFx1 =~ 1\*x1; FFx2 =~ 1\*x2; FFx3 =~ 1\*x3; FFx4 =~ 1\*x4; FFx5 =~ 1\*x5; FFx6 =~ 1\*x6

'

**#RI-CLPM(T=6)　（時不変条件、3式）**

RICLPMT6 <- '

x1~mux1\*1; y1~muy1\*1; x2~mux2\*1; y2~muy2\*1; x3~mux3\*1; y3~muy3\*1; x4~mux4\*1; y4~muy4\*1; x5~mux5\*1; y5~muy5\*1; x6~mux6\*1; y6~muy6\*1

x1~~0\*x1; y1~~0\*y1; x2~~0\*x2; y2~~0\*y2; x3~~0\*x3; y3~~0\*y3; x4~~0\*x4; y4~~0\*y4; x5~~0\*x5; y5~~0\*y5; x6~~0\*x6; y6~~0\*y6;

Ix~~0\*FFx1; Ix~~0\*FFy1; Iy~~0\*FFx1; Iy~~0\*FFy1;

Ix=~1\*x1+1\*x2+1\*x3+1\*x4+1\*x5+1\*x6; Iy=~1\*y1+1\*y2+1\*y3+1\*y4+1\*y5+1\*y6

Ix~0\*1; Iy~0\*1; Ix~~taux\*Ix; Iy~~tauy\*Iy; Ix~~tauxy\*Iy

FFx1~0\*1;FFy1~0\*1; FFx1~~phix\*FFx1; FFy1~~phiy\*FFy1; FFx1~~phixy\*FFy1;

FFy2~ betay\*FFy1+gammay\*FFx1; FFx2~ betax\*FFx1+gammax\*FFy1

FFy3~ betay\*FFy2+gammay\*FFx2; FFx3~ betax\*FFx2+gammax\*FFy2

FFy4~ betay\*FFy3+gammay\*FFx3; FFx4~ betax\*FFx3+gammax\*FFy3

FFy5~ betay\*FFy4+gammay\*FFx4; FFx5~ betax\*FFx4+gammax\*FFy4

FFy6~ betay\*FFy5+gammay\*FFx5; FFx6~ betax\*FFx5+gammax\*FFy5

FFx2~~Omegax\*FFx2; FFx3~~Omegax\*FFx3; FFx4~~Omegax\*FFx4; FFx5~~Omegax\*FFx5; FFx6~~Omegax\*FFx6

FFy2~~Omegay\*FFy2; FFy3~~Omegay\*FFy3; FFy4~~Omegay\*FFy4; FFy5~~Omegay\*FFy5; FFy6~~Omegay\*FFy6

FFx2~~Omegaxy\*FFy2; FFx3~~Omegaxy\*FFy3; FFx4~~Omegaxy\*FFy4; FFx5~~Omegaxy\*FFy5; FFx6~~Omegaxy\*FFy6

FFy1 =~ 1\*y1; FFy2 =~ 1\*y2; FFy3 =~ 1\*y3; FFy4 =~ 1\*y4; FFy5 =~ 1\*y5; FFy6 =~ 1\*y6

FFx1 =~ 1\*x1; FFx2 =~ 1\*x2; FFx3 =~ 1\*x3; FFx4 =~ 1\*x4; FFx5 =~ 1\*x5; FFx6 =~ 1\*x6

'

**#RI-CLPM2(T=6) （時変条件、3式）**

RICLPM2T6 <- '

x1~mux1\*1; y1~muy1\*1; x2~mux2\*1; y2~muy2\*1; x3~mux3\*1; y3~muy3\*1; x4~mux4\*1; y4~muy4\*1; x5~mux5\*1; y5~muy5\*1; x6~mux6\*1; y6~muy6\*1

x1~~0\*x1; y1~~0\*y1; x2~~0\*x2; y2~~0\*y2; x3~~0\*x3; y3~~0\*y3; x4~~0\*x4; y4~~0\*y4; x5~~0\*x5; y5~~0\*y5; x6~~0\*x6; y6~~0\*y6;

Ix~~0\*FFx1; Ix~~0\*FFy1; Iy~~0\*FFx1; Iy~~0\*FFy1;

Ix=~1\*x1+1\*x2+1\*x3+1\*x4+1\*x5+1\*x6; Iy=~1\*y1+1\*y2+1\*y3+1\*y4+1\*y5+1\*y6

Ix~0\*1; Iy~0\*1; Ix~~taux\*Ix; Iy~~tauy\*Iy; Ix~~tauxy\*Iy

FFx1~0\*1;FFy1~0\*1; FFx1~~phix\*FFx1; FFy1~~phiy\*FFy1; FFx1~~phixy\*FFy1;

FFy2~ betay2\*FFy1+gammay2\*FFx1; FFx2~ betax2\*FFx1+gammax2\*FFy1

FFy3~ betay3\*FFy2+gammay3\*FFx2; FFx3~ betax3\*FFx2+gammax3\*FFy2

FFy4~ betay4\*FFy3+gammay4\*FFx3; FFx4~ betax4\*FFx3+gammax4\*FFy3

FFy5~ betay5\*FFy4+gammay5\*FFx4; FFx5~ betax5\*FFx4+gammax5\*FFy4

FFy6~ betay6\*FFy5+gammay6\*FFx5; FFx6~ betax6\*FFx5+gammax6\*FFy5

FFx2~~Omegax2\*FFx2; FFx3~~Omegax3\*FFx3; FFx4~~Omegax4\*FFx4; FFx5~~Omegax5\*FFx5; FFx6~~Omegax6\*FFx6;

FFy2~~Omegay2\*FFy2; FFy3~~Omegay3\*FFy3; FFy4~~Omegay4\*FFy4; FFy5~~Omegay5\*FFy5; FFy6~~Omegay6\*FFy6

FFx2~~Omegaxy2\*FFy2; FFx3~~Omegaxy3\*FFy3; FFx4~~Omegaxy4\*FFy4; FFx5~~Omegaxy5\*FFy5; FFx6~~Omegaxy6\*FFy6

FFy1 =~ 1\*y1; FFy2 =~ 1\*y2; FFy3 =~ 1\*y3; FFy4 =~ 1\*y4; FFy5 =~ 1\*y5; FFy6 =~ 1\*y6

FFx1 =~ 1\*x1; FFx2 =~ 1\*x2; FFx3 =~ 1\*x3; FFx4 =~ 1\*x4; FFx5 =~ 1\*x5; FFx6 =~ 1\*x6

'

**#predeterminedRI-CLPM(T=6) （時不変条件）**

predeterminedRICLPMT6 <- '

x1~mux1\*1; y1~muy1\*1; x2~mux2\*1; y2~muy2\*1; x3~mux3\*1; y3~muy3\*1; x4~mux4\*1; y4~muy4\*1; x5~mux5\*1; y5~muy5\*1; x6~mux6\*1; y6~muy6\*1

x1~~0\*x1; y1~~0\*y1; x2~~0\*x2; y2~~0\*y2; x3~~0\*x3; y3~~0\*y3; x4~~0\*x4; y4~~0\*y4; x5~~0\*x5; y5~~0\*y5; x6~~0\*x6; y6~~0\*y6;

Ix=~1\*x1+1\*x2+1\*x3+1\*x4+1\*x5+1\*x6; Iy=~1\*y1+1\*y2+1\*y3+1\*y4+1\*y5+1\*y6

Ix~0\*1; Iy~0\*1; Ix~~taux\*Ix; Iy~~tauy\*Iy; Ix~~tauxy\*Iy

FFx1~0\*1;FFy1~0\*1; FFx1~~phix\*FFx1; FFy1~~phiy\*FFy1; FFx1~~phixy\*FFy1;

FFy2~ betay\*FFy1+gammay\*FFx1; FFx2~ betax\*FFx1+gammax\*FFy1

FFy3~ betay\*FFy2+gammay\*FFx2; FFx3~ betax\*FFx2+gammax\*FFy2

FFy4~ betay\*FFy3+gammay\*FFx3; FFx4~ betax\*FFx3+gammax\*FFy3

FFy5~ betay\*FFy4+gammay\*FFx4; FFx5~ betax\*FFx4+gammax\*FFy4

FFy6~ betay\*FFy5+gammay\*FFx5; FFx6~ betax\*FFx5+gammax\*FFy5

FFx2~~Omegax\*FFx2; FFx3~~Omegax\*FFx3; FFx4~~Omegax\*FFx4; FFx5~~Omegax\*FFx5; FFx6~~Omegax\*FFx6

FFy2~~Omegay\*FFy2; FFy3~~Omegay\*FFy3; FFy4~~Omegay\*FFy4; FFy5~~Omegay\*FFy5; FFy6~~Omegay\*FFy6

FFx2~~Omegaxy\*FFy2; FFx3~~Omegaxy\*FFy3; FFx4~~Omegaxy\*FFy4; FFx5~~Omegaxy\*FFy5; FFx6~~Omegaxy\*FFy6

FFy1 =~ 1\*y1; FFy2 =~ 1\*y2; FFy3 =~ 1\*y3; FFy4 =~ 1\*y4; FFy5 =~ 1\*y5; FFy6 =~ 1\*y6

FFx1 =~ 1\*x1; FFx2 =~ 1\*x2; FFx3 =~ 1\*x3; FFx4 =~ 1\*x4; FFx5 =~ 1\*x5; FFx6 =~ 1\*x6

'

**#predeterminedRI-CLPM2(T=6) （時変条件）**

predeterminedRICLPM2T6 <- '

x1~mux1\*1; y1~muy1\*1; x2~mux2\*1; y2~muy2\*1; x3~mux3\*1; y3~muy3\*1; x4~mux4\*1; y4~muy4\*1; x5~mux5\*1; y5~muy5\*1; x6~mux6\*1; y6~muy6\*1

x1~~0\*x1; y1~~0\*y1; x2~~0\*x2; y2~~0\*y2; x3~~0\*x3; y3~~0\*y3; x4~~0\*x4; y4~~0\*y4; x5~~0\*x5; y5~~0\*y5; x6~~0\*x6; y6~~0\*y6;

Ix=~1\*x1+1\*x2+1\*x3+1\*x4+1\*x5+1\*x6; Iy=~1\*y1+1\*y2+1\*y3+1\*y4+1\*y5+1\*y6

Ix~0\*1; Iy~0\*1; Ix~~taux\*Ix; Iy~~tauy\*Iy; Ix~~tauxy\*Iy

FFx1~0\*1;FFy1~0\*1; FFx1~~phix\*FFx1; FFy1~~phiy\*FFy1; FFx1~~phixy\*FFy1;

FFy2~ betay2\*FFy1+gammay2\*FFx1; FFx2~ betax2\*FFx1+gammax2\*FFy1

FFy3~ betay3\*FFy2+gammay3\*FFx2; FFx3~ betax3\*FFx2+gammax3\*FFy2

FFy4~ betay4\*FFy3+gammay4\*FFx3; FFx4~ betax4\*FFx3+gammax4\*FFy3

FFy5~ betay5\*FFy4+gammay5\*FFx4; FFx5~ betax5\*FFx4+gammax5\*FFy4

FFy6~ betay6\*FFy5+gammay6\*FFx5; FFx6~ betax6\*FFx5+gammax6\*FFy5

FFx2~~Omegax2\*FFx2; FFx3~~Omegax3\*FFx3; FFx4~~Omegax4\*FFx4; FFx5~~Omegax5\*FFx5; FFx6~~Omegax6\*FFx6;

FFy2~~Omegay2\*FFy2; FFy3~~Omegay3\*FFy3; FFy4~~Omegay4\*FFy4; FFy5~~Omegay5\*FFy5; FFy6~~Omegay6\*FFy6

FFx2~~Omegaxy2\*FFy2; FFx3~~Omegaxy3\*FFy3; FFx4~~Omegaxy4\*FFy4; FFx5~~Omegaxy5\*FFy5; FFx6~~Omegaxy6\*FFy6

FFy1 =~ 1\*y1; FFy2 =~ 1\*y2; FFy3 =~ 1\*y3; FFy4 =~ 1\*y4; FFy5 =~ 1\*y5; FFy6 =~ 1\*y6

FFx1 =~ 1\*x1; FFx2 =~ 1\*x2; FFx3 =~ 1\*x3; FFx4 =~ 1\*x4; FFx5 =~ 1\*x5; FFx6 =~ 1\*x6

'

**#DPM(T=6) （時不変条件、10式による表現）**

DPMT6 <- '

x1~mux1\*1; y1~muy1\*1; x2~mux2\*1; y2~muy2\*1; x3~mux3\*1; y3~muy3\*1; x4~mux4\*1; y4~muy4\*1; x5~mux5\*1; y5~muy5\*1; x6~mux6\*1; y6~muy6\*1

x1~~0\*x1; y1~~0\*y1; x2~~0\*x2; y2~~0\*y2; x3~~0\*x3; y3~~0\*y3; x4~~0\*x4; y4~~0\*y4; x5~~0\*x5; y5~~0\*y5; x6~~0\*x6; y6~~0\*y6;

Ax=~1\*FFx2+1\*FFx3+1\*FFx4+1\*FFx5+1\*FFx6;Ay=~1\*FFy2+1\*FFy3+1\*FFy4+1\*FFy5+1\*FFy6

Ax~0\*1; Ay~0\*1; Ax~~taux\*Ax; Ay~~tauy\*Ay; Ax~~tauxy\*Ay

FFx1~0\*1;FFy1~0\*1; FFx1~~phix\*FFx1; FFy1~~phiy\*FFy1; FFx1~~phixy\*FFy1;

FFy2~ betay\*FFy1+gammay\*FFx1; FFx2~ betax\*FFx1+gammax\*FFy1

FFy3~ betay\*FFy2+gammay\*FFx2; FFx3~ betax\*FFx2+gammax\*FFy2

FFy4~ betay\*FFy3+gammay\*FFx3; FFx4~ betax\*FFx3+gammax\*FFy3

FFy5~ betay\*FFy4+gammay\*FFx4; FFx5~ betax\*FFx4+gammax\*FFy4

FFy6~ betay\*FFy5+gammay\*FFx5; FFx6~ betax\*FFx5+gammax\*FFy5

FFx2~~Omegax\*FFx2; FFx3~~Omegax\*FFx3; FFx4~~Omegax\*FFx4; FFx5~~Omegax\*FFx5; FFx6~~Omegax\*FFx6

FFy2~~Omegay\*FFy2; FFy3~~Omegay\*FFy3; FFy4~~Omegay\*FFy4; FFy5~~Omegay\*FFy5; FFy6~~Omegay\*FFy6

FFx2~~Omegaxy\*FFy2; FFx3~~Omegaxy\*FFy3; FFx4~~Omegaxy\*FFy4; FFx5~~Omegaxy\*FFy5; FFx6~~Omegaxy\*FFy6

FFy1 =~ 1\*y1; FFy2 =~ 1\*y2; FFy3 =~ 1\*y3; FFy4 =~ 1\*y4; FFy5 =~ 1\*y5; FFy6 =~ 1\*y6

FFx1 =~ 1\*x1; FFx2 =~ 1\*x2; FFx3 =~ 1\*x3; FFx4 =~ 1\*x4; FFx5 =~ 1\*x5; FFx6 =~ 1\*x6

'

**#DPM2(T=6) （時変条件、10式による表現）**

DPM2T6 <- '

x1~mux1\*1; y1~muy1\*1; x2~mux2\*1; y2~muy2\*1; x3~mux3\*1; y3~muy3\*1; x4~mux4\*1; y4~muy4\*1; x5~mux5\*1; y5~muy5\*1; x6~mux6\*1; y6~muy6\*1

x1~~0\*x1; y1~~0\*y1; x2~~0\*x2; y2~~0\*y2; x3~~0\*x3; y3~~0\*y3; x4~~0\*x4; y4~~0\*y4; x5~~0\*x5; y5~~0\*y5; x6~~0\*x6; y6~~0\*y6;

Ax=~1\*FFx2+1\*FFx3+1\*FFx4+1\*FFx5+1\*FFx6;Ay=~1\*FFy2+1\*FFy3+1\*FFy4+1\*FFy5+1\*FFy6

Ax~0\*1; Ay~0\*1; Ax~~taux\*Ax; Ay~~tauy\*Ay; Ax~~tauxy\*Ay

FFx1~0\*1;FFy1~0\*1; FFx1~~phix\*FFx1; FFy1~~phiy\*FFy1; FFx1~~phixy\*FFy1;

FFy2~ betay2\*FFy1+gammay2\*FFx1; FFx2~ betax2\*FFx1+gammax2\*FFy1

FFy3~ betay3\*FFy2+gammay3\*FFx2; FFx3~ betax3\*FFx2+gammax3\*FFy2

FFy4~ betay4\*FFy3+gammay4\*FFx3; FFx4~ betax4\*FFx3+gammax4\*FFy3

FFy5~ betay5\*FFy4+gammay5\*FFx4; FFx5~ betax5\*FFx4+gammax5\*FFy4

FFy6~ betay6\*FFy5+gammay6\*FFx5; FFx6~ betax6\*FFx5+gammax6\*FFy5

FFx2~~Omegax2\*FFx2; FFx3~~Omegax3\*FFx3; FFx4~~Omegax4\*FFx4; FFx5~~Omegax5\*FFx5; FFx6~~Omegax6\*FFx6

FFy2~~Omegay2\*FFy2; FFy3~~Omegay3\*FFy3; FFy4~~Omegay4\*FFy4; FFy5~~Omegay5\*FFy5; FFy6~~Omegay6\*FFy6

FFx2~~Omegaxy2\*FFy2; FFx3~~Omegaxy3\*FFy3; FFx4~~Omegaxy4\*FFy4; FFx5~~Omegaxy5\*FFy5; FFx6~~Omegaxy6\*FFy6

FFy1 =~ 1\*y1; FFy2 =~ 1\*y2; FFy3 =~ 1\*y3; FFy4 =~ 1\*y4; FFy5 =~ 1\*y5; FFy6 =~ 1\*y6

FFx1 =~ 1\*x1; FFx2 =~ 1\*x2; FFx3 =~ 1\*x3; FFx4 =~ 1\*x4; FFx5 =~ 1\*x5; FFx6 =~ 1\*x6

'

**４、RICLPMT6による分析結果（論文のTable 1の結果に対応）**

lavaan 0.6-9 ended normally after 43 iterations

Estimator ML

Optimization method NLMINB

Number of model parameters 53

Number of equality constraints 28

Number of observations 4670

Number of missing patterns 154

Model Test User Model:

Test statistic 679.619

Degrees of freedom 65

P-value (Chi-square) 0.000

Model Test Baseline Model:

Test statistic 14941.247

Degrees of freedom 66

P-value 0.000

User Model versus Baseline Model:

Comparative Fit Index (CFI) 0.959

Tucker-Lewis Index (TLI) 0.958

Loglikelihood and Information Criteria:

Loglikelihood user model (H0) -36087.083

Loglikelihood unrestricted model (H1) -35747.273

Akaike (AIC) 72224.166

Bayesian (BIC) 72385.389

Sample-size adjusted Bayesian (BIC) 72305.948

Root Mean Square Error of Approximation:

RMSEA 0.045

90 Percent confidence interval - lower 0.042

90 Percent confidence interval - upper 0.048

P-value RMSEA <= 0.05 0.996

Standardized Root Mean Square Residual:

SRMR 0.066

Parameter Estimates:

Standard errors Standard

Information Observed

Observed information based on Hessian

Latent Variables:

Estimate Std.Err z-value P(>|z|)

Tx =~

x1 1.000

x2 1.000

x3 1.000

x4 1.000

x5 1.000

x6 1.000

Ty =~

y1 1.000

y2 1.000

y3 1.000

y4 1.000

y5 1.000

y6 1.000

FFy1 =~

y1 1.000

FFy2 =~

y2 1.000

FFy3 =~

y3 1.000

FFy4 =~

y4 1.000

FFy5 =~

y5 1.000

FFy6 =~

y6 1.000

FFx1 =~

x1 1.000

FFx2 =~

x2 1.000

FFx3 =~

x3 1.000

FFx4 =~

x4 1.000

FFx5 =~

x5 1.000

FFx6 =~

x6 1.000

Regressions:

Estimate Std.Err z-value P(>|z|)

FFy2 ~

FFy1 (bety) 0.700 0.012 56.303 0.000

FFx1 (gmmy) -0.005 0.022 -0.222 0.824

FFx2 ~

FFx1 (betx) 0.166 0.011 15.386 0.000

FFy1 (gmmx) -0.008 0.007 -1.149 0.250

FFy3 ~

FFy2 (bety) 0.700 0.012 56.303 0.000

FFx2 (gmmy) -0.005 0.022 -0.222 0.824

FFx3 ~

FFx2 (betx) 0.166 0.011 15.386 0.000

FFy2 (gmmx) -0.008 0.007 -1.149 0.250

FFy4 ~

FFy3 (bety) 0.700 0.012 56.303 0.000

FFx3 (gmmy) -0.005 0.022 -0.222 0.824

FFx4 ~

FFx3 (betx) 0.166 0.011 15.386 0.000

FFy3 (gmmx) -0.008 0.007 -1.149 0.250

FFy5 ~

FFy4 (bety) 0.700 0.012 56.303 0.000

FFx4 (gmmy) -0.005 0.022 -0.222 0.824

FFx5 ~

FFx4 (betx) 0.166 0.011 15.386 0.000

FFy4 (gmmx) -0.008 0.007 -1.149 0.250

FFy6 ~

FFy5 (bety) 0.700 0.012 56.303 0.000

FFx5 (gmmy) -0.005 0.022 -0.222 0.824

FFx6 ~

FFx5 (betx) 0.166 0.011 15.386 0.000

FFy5 (gmmx) -0.008 0.007 -1.149 0.250

Covariances:

Estimate Std.Err z-value P(>|z|)

Tx ~~

FFx1 0.000

FFy1 0.000

Ty ~~

FFx1 0.000

FFy1 0.000

Tx ~~

Ty (taxy) 0.052 0.009 6.070 0.000

FFy1 ~~

FFx1 (phxy) -0.016 0.013 -1.217 0.224

.FFy2 ~~

.FFx2 (Omgx) 0.011 0.004 2.651 0.008

.FFy3 ~~

.FFx3 (Omgx) 0.011 0.004 2.651 0.008

.FFy4 ~~

.FFx4 (Omgx) 0.011 0.004 2.651 0.008

.FFy5 ~~

.FFx5 (Omgx) 0.011 0.004 2.651 0.008

.FFy6 ~~

.FFx6 (Omgx) 0.011 0.004 2.651 0.008

Intercepts:

Estimate Std.Err z-value P(>|z|)

.x1 (mux1) 3.154 0.010 314.688 0.000

.y1 (muy1) 1.282 0.021 60.054 0.000

.x2 (mux2) 3.138 0.009 358.327 0.000

.y2 (muy2) 1.411 0.024 58.803 0.000

.x3 (mux3) 3.081 0.009 347.471 0.000

.y3 (muy3) 1.536 0.023 65.953 0.000

.x4 (mux4) 3.073 0.009 340.383 0.000

.y4 (muy4) 1.739 0.022 77.985 0.000

.x5 (mux5) 3.043 0.010 314.736 0.000

.y5 (muy5) 1.837 0.022 84.097 0.000

.x6 (mux6) 3.019 0.011 284.148 0.000

.y6 (muy6) 1.875 0.023 82.662 0.000

Tx 0.000

Ty 0.000

FFx1 0.000

FFy1 0.000

.FFy2 0.000

.FFy3 0.000

.FFy4 0.000

.FFy5 0.000

.FFy6 0.000

.FFx2 0.000

.FFx3 0.000

.FFx4 0.000

.FFx5 0.000

.FFx6 0.000

Variances:

Estimate Std.Err z-value P(>|z|)

.x1 0.000

.y1 0.000

.x2 0.000

.y2 0.000

.x3 0.000

.y3 0.000

.x4 0.000

.y4 0.000

.x5 0.000

.y5 0.000

.x6 0.000

.y6 0.000

Tx (taux) 0.147 0.005 32.602 0.000

Ty (tauy) 0.584 0.035 16.663 0.000

FFx1 (phix) 0.253 0.007 35.350 0.000

FFy1 (phiy) 0.026 0.029 0.914 0.361

.FFx2 (Omgx) 0.192 0.002 79.316 0.000

.FFx3 (Omgx) 0.192 0.002 79.316 0.000

.FFx4 (Omgx) 0.192 0.002 79.316 0.000

.FFx5 (Omgx) 0.192 0.002 79.316 0.000

.FFx6 (Omgx) 0.192 0.002 79.316 0.000

.FFy2 (Omgy) 0.693 0.010 70.391 0.000

.FFy3 (Omgy) 0.693 0.010 70.391 0.000

.FFy4 (Omgy) 0.693 0.010 70.391 0.000

.FFy5 (Omgy) 0.693 0.010 70.391 0.000

.FFy6 (Omgy) 0.693 0.010 70.391 0.000