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# SEM

## Linear Structural Equations Models with Arbitrary Nonlinear Parameter Restrictions

Version 0.4

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so please cite the author and  
send me a message  
if you are using it  
or if you find bugs

### Model 1: stochastic regressors xi

```
eta = beta.eta + gamma.xi + zeta
y   = lambdaeta.eta + epsilon
x   = lambdaxi.xi + delta

Free parameters:

    {{beta,gamma,muexi,sigmaxi,sigmazeta},
     {lambdaeta,lambdaxi,sigmaepsilon,sigmadelta}}=

System[Theta,ThetaFix];
```

### Model 2: deterministic regressors xi

```
eta = beta.eta + gamma.xi + zeta
y   = lambdaeta.eta + taueta.xi + epsilon

Free parameters:

    {{beta,gamma,sigmazeta},
     {lambdaeta,taueta,sigmaepsilon}}=

System[Theta,ThetaFix];
```

## Remarks

--The second model is more general, since eta --> (eta,xi) includes stochastic

--The LISREL model with structured means is a special case:

```
{eta,xi} = {{Beta,Gamma},{0,0}}.{eta,xi} + {alpha,kappa} + {zeta1,zeta2};
{y,x} = {tauy,taux} + DiagonalMatrix[{lambday,lambdax}].{eta,xi} + {epsilon,delta};

Cov(zeta1,zeta2)=0; Var(zeta2)=phi; E[xi]=kappa
Cov(epsilon,delta)=0
```

--ThetaFix contains fixed parameters (e.g. sampling interval)

--Nonlinear restrictions are implemented in module System

**Execute the following code and study the example notebooks:**

```
car2.SEM.determ.1komponente.nb (ar(2) with deterministic regressors)
car2.SEM.random.1komponente.nb (ar(2) with random effects, stochastic regressors)
factor.nb (LISREL model EX1.LS8, p.6, 97-122)
```

## Pakete

### Clear Modules

### Implementierung / stochastische Regressoren

### Implementierung / deterministische Regressoren

### Misc

### Maximierung

### Applications