Package: copulaSFM (via r-universe)

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Type Package

Title Copula based Simultanous stochastic frontier

Version 0.1.0

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Description The pacage provide a flexible way to mesure the technical efficiency of the production function

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Encoding UTF-8

LazyData true

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copulasfm *Copula based Stochastic frontier Model*

Description

In the standard stochastic frontier model, the two-sided error term V and the one-sided technical inefficiency error term W are assumed to be independent. In this paper, we relax this assumption by modeling the dependence between V and W using copulas. Nine copula families are considered and their parameters are estimated using maximum simulated likelihood.

Usage

```
copSFM(Y,X,family=1,RHO=0.5,LB=-0.99,UB=0.99)
```

Arguments

Y	vector of dependent variable
X	matrix of independent variable
family	Copula function eg. Gaussain=1, Student-t=2 (see, Vinecopula package)
RHO	The initail value of the copula parameter
LB	The lower bound of the copula parameter
UB	The upper bound of the copula parameter

Details

herefore, the above copula families and relevant rotated copula can potentially capture the appropriate dependence between two random variables. Other popular copula families, such as Gaussain, Student,t Clayton, Gumbel etc.

Value

result	The result contain the estimated parameters, standard errors, t-stat, and p-value
AIC	Akaiki Information Criteria
BIC	Bayesian Information Criteria
Loglikelihood	Maximum Log-likelihood function

Author(s)

Woraphon Yamaka and Paravee MAneejuk

References

Wiboonpongse, A., Liu, J., Sriboonchitta, S., & Denoeux, T.(2015). Modeling dependence between error components of the stochastic frontier model using copula: application to intercrop coffee production in Northern Thailand. International Journal of Approximate Reasoning, 65, 34-44.

Maneejuk, P., Yamaka, W., & Sriboonchitta, S.(2017). Analysis of global competitiveness using copula-based stochastic frontier kink model. In Robustness in Econometrics (pp. 543-559). Springer, Cham.

Examples

```
## Required packages
library(truncnorm)
library(mvtnorm)
library("VineCopula")
library("frontier")

#example simulation data
data=sfa.simu(nob=200, alpha=c(1,2,0.5),sigV=1,sigU=0.5,family=1,rho=0.5)

# Select familty  copula upper and lower bouubd ( look at CDVine package)
# family=1   # 1 is Gaussian, 2 is Student-t, 3 is Clayton and so on....

#Gaussian (-.99, .99)
#Student t (-.99, .99)
#Clayton (0.1, Inf)
model=copSFM(Y=data$Y,X=data$X,family=1,RHO=0.5,LB=-0.99,UB=0.99)
```

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te *Technical efficiency measure.*

Description

Computing and plotting the technical efficiency.

Usage

```
TE(theta,Y,X,family=1)
```

Arguments

theta	The estimated parameters form the model
Y	Vector of dependent variable
X	Matrix of independent variable
family	Copula function eg. Gaussain=1, Student-t=2 (see, Vinecopula package)

Details

Computing and plotting the technical efficiency.

Value

itemOutput Technical efficiency series itemplot Plot of Technical efficiency

Author(s)

Woraphon Yamaka

References

Wiboonpongse, A., Liu, J., Sriboonchitta, S., & Denoeux, T. (2015). Modeling dependence between error components of the stochastic frontier model using copula: application to intercrop coffee production in Northern Thailand. International Journal of Approximate Reasoning, 65, 34-44.

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# family=1   # 1 is Gaussian, 2 is Student-t, 3 is Clayton and so on....

#Gaussian (-.99, .99)
#Student t (-.99, .99)
#Clayton (0.1, Inf)

model=copSFM(Y=data$Y,X=data$X,family=1,RHO=0.5,LB=-0.99,UB=0.99)

#EX: Plot the technical efficiency
te1=TE1(model$result[,1],Y=data$Y,X=data$X,family=1)
```

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