Package 'JumpTest'

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Type Package

Title Financial Jump Detection

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Description A fast simulation on stochastic volatility model, with jump tests, p-values pooling, and FDR adjustments.

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Imports Rcpp (>= 1.0.0), methods, stats

LinkingTo Rcpp, RcppEigen

Depends R (>= 3.5.0), MASS

Suggests knitr, rmarkdown

VignetteBuilder knitr

RoxygenNote 6.1.1

NeedsCompilation yes

Repository CRAN

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R topics documented:

`jumptestday` *Nonparametric jump test for each interval*

Description

perform nonparametric jump test for each given interval (day)

Usage

```
jumptestday(ret, method = "BNS")
```

Arguments

`ret`	log return vector
`method`	jump test methods, chosen from "BNS", "Amed", and "Amin"

Value

`stat`	test statistics
`pvalue`	p-value

Examples

```
orip <- runif(100)
testres <- jumptestday(orip)
ts <- testres@stat
pv <- testres@pvalue
```

`jumptestperiod` *Nonparametric jump test for a long period*

Description

perform nonparametric jump test for many intervals, and saved in vectors

Usage

```
jumptestperiod(retmat, method = "BNS")
```

Arguments

retmat	log return matrix, with intervals saved in columns
method	jump test methods, chosen from "BNS", "Amed", and "Amin"

Value

stat	test statistics
pvalue	p-value
adjp	adjusted p-values via 'BH' method

References

Barndorff-Nielsen, O. E. and N. Shephard (2006). "Econometrics of testing for jumps in financial economics using bipower variation." Journal of financial Econometrics 4(1): 1-30.

Andersen, T. G., et al. (2012). "Jump-robust volatility estimation using nearest neighbor truncation." Journal of Econometrics 169(1): 75-93.

Dumitru, A.-M. and G. Urga (2012). "Identifying jumps in financial assets: a comparison between nonparametric jump tests." Journal of Business & Economic Statistics 30(2): 242-255.

Examples

```
orip <- matrix(runif(3000),1000,3)
testres <- jumptestperiod(orip)
ts <- testres@stat
pv <- testres@pvalue
adjpv <- testres@adjp
```

---

pcombine *p-values matrix to be pooled*

Description

generate p-value matrix with given methods (at least 2)

Usage

```
pcombine(retmat, method)
```

Arguments

retmat	log return matrix by columns
method	jump test methods, chosen from "BNS", "Amed", and "Amin"

Value

a p-values matrix

Examples

```
orip <- matrix(runif(3000),1000,3)
pmatrix <- pcombine(orip,c('BNS','Amed','Amin'))
```

---

ppool *p-values pooling and adjustment*

Description

Pooling input p-values and perfrom FDR adjustments

Usage

```
ppool(pmat, method = "SD")
```

Arguments

pmat	p-values matrix stored by columns
method	pooling methods, see details

Details

for p-values poolings, we provided six methods. "FI" for Fisher's method, "FD" for Fisher's with correlation adjustments, "SI" for Stouffer's method, "SD" for Stouffer's method with correlation adjustments, "MI" for minimum p-value methods, and "MA" for maximum p-value method

Value

stat	pooled test statistcs
pvalue	pooled p-values
adjp	pooled p-values via "BH" adjustments

References

Benjamini, Y. and Y. Hochberg (1995). "Controlling the false discovery rate: a practical and powerful approach to multiple testing." Journal of the Royal Statistical Society. Series B (Methodological): 289-300.

Chang, L.-C., et al. (2013). "Meta-analysis methods for combining multiple expression profiles: comparisons, statistical characterization and an application guideline." BMC bioinformatics 14(1): 368.

Won, S., et al. (2009). "Choosing an optimal method to combine P-values." Statistics in medicine 28(11): 1537-1553.

Alves, G., & Yu, Y. K. (2014). Accuracy evaluation of the unified P-value from combining correlated P-values. PloS one, 9(3), e91225.

Examples

```
orip <- matrix(runif(3000),1000,3)
pvobj <- ppool(orip)
pvalue <- pvobj@pvalue
padjust <- pvobj@adjp
```

SV *SV model with one factor simulation*

Description

Simulate stochastic volatility model (np jump) with given length and other parameters

Usage

```
SV(M, m, p0 = 3, mu = 0.05, v0 = 0, b = 0.2, alpha = 0.015,
  sigma = 0.05)
```

Arguments

M	number of interverals to be simulated
m	number of time points within each interval
p0	start price
mu	drift
v0	starting volatility
b	volatility parameter
alpha	volatility parameter
sigma	volatility parameter

Value

simulated time series

References

Yen, Y.-M. (2013). "Testing Jumps via False Discovery Rate Control." PloS one 8(4): e58365.

Examples

```
SV(390,1200)
```

SV1F *SV1F model with one factor simulation*

Description

Simulate stochastic volatility with one factor model (no jump) with given length and other parameters

Usage

```
SV1F(M, m, p0 = 3, mu = 0.03, v0 = 5, beta0 = 0, beta1 = 0.125,
  alphav = -0.1, cov = -0.62)
```

Arguments

M	number of interverals to be simulated
m	number of time points within each interval
p0	start price
mu	drift
v0	volatility parameter
beta0	underlying Brownian motion intercept paramter
beta1	underlying Brownian motion slope parameter
alphav	volatility parameter
cov	Brownian motion correlation

Value

simulated time series

References

Chernov, M., et al. (2003). "Alternative models for stock price dynamics." Journal of Econometrics 116(1): 225-257.

Examples

```
SV1F(1200,390)
```

SV1FJ *SV1FJ model simulation*

Description

Simulate Stochastic Volitility model with one factor model (including jump) with given length and other parameters

Usage

```
SV1FJ(M, m, p0 = 3, lam = 0.2, mu = 0.03, v0 = 0.5, beta0 = 0,
  beta1 = 0.125, alphav = -0.1, cov = -0.62)
```

Arguments

M	number of interverals to be simulated
m	number of time points within each interval
p0	start price
lam	frequency of jump
mu	drift
v0	volatility parameter
beta0	underlying Brownian motion intercept paramter
beta1	underlying Brownian motion slope parameter
alphav	volatility parameter
cov	Brownian motion correlation

Value

simulated time series

References

Chernov, M., et al. (2003). "Alternative models for stock price dynamics." Journal of Econometrics 116(1): 225-257.

Examples

```
SV1FJ(1000,390)
```

SV2F *SV2F model simulation*

Description

Simulate Stochastic Volitility model with two factors model (no jump) with given length and other parameters

Usage

```
SV2F(M, m, p.0 = 3, mu = 0.03, v.1 = 0.5, v.2 = 0.5,
  beta.0 = -1.2, beta.1 = 0.04, beta.2 = 1.5, alpha.1 = -0.137 *
  exp(-2), alpha.2 = -1.386, beta.v2 = 0.25, r1 = -0.3, r2 = -0.3)
```

Arguments

M	number of interverals to be simulated
m	number of time points within each interval
p.0	start price
mu	drift
v.1	volatility parameter
v.2	volatility parameter
beta.0	underlying Brownian motion intercept paramter
beta.1	underlying Brownian motion slope parameter
beta.2	underlying Brownian motion slope parameter
alpha.1	volatility parameter
alpha.2	volatility parameter
beta.v2	second factor Brownian motion slope parameter
r1	correlation to first factor
r2	correlation to second factor

Value

simulated time series

References

Chernov, M., et al. (2003). "Alternative models for stock price dynamics." Journal of Econometrics 116(1): 225-257.

Examples

```
SV2F(1000,390)
```

SVJ *SVJ model with one factor simulation*

Description

Simulate stochastic volatility model (with jump) with given length and other parameters

Usage

```
SVJ(M, m, p0 = 3, lambda = 0.2, mu = 0.05, v0 = 0, b = 0.2,
  alpha = 0.015, sigma = 0.05, sigma1 = 1)
```

Arguments

M	number of interverals to be simulated
m	number of time points within each interval
p0	start price
lambda	frequency of jump
mu	drift
v0	starting volatility
b	volatility parameter
alpha	volatility parameter
sigma	volatility parameter
sigma1	jump size parameter

Value

simulated time series

References

Yen, Y.-M. (2013). "Testing Jumps via False Discovery Rate Control." PloS one 8(4): e58365.

Examples

```
SVJ(390,1200)
```

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