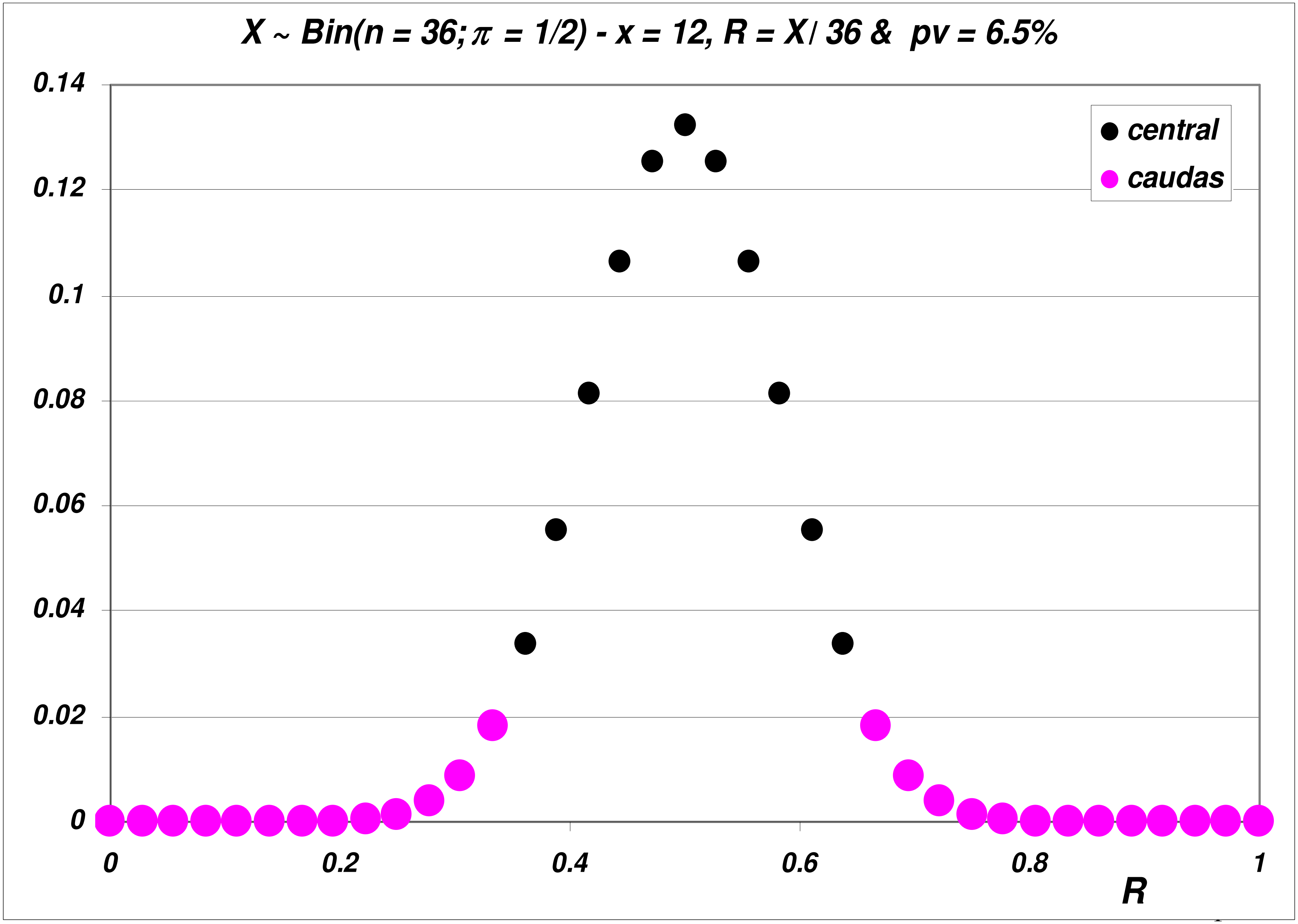
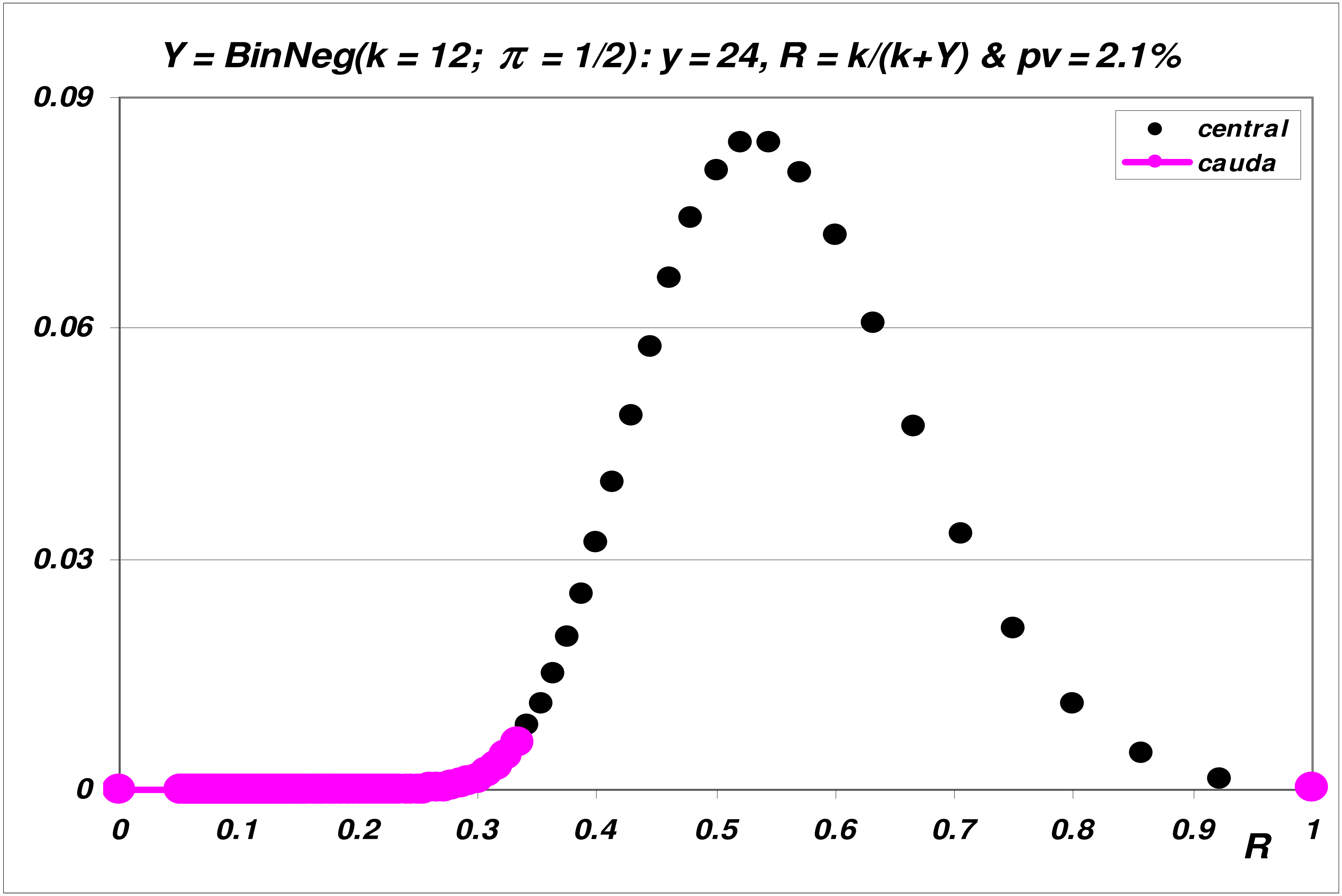
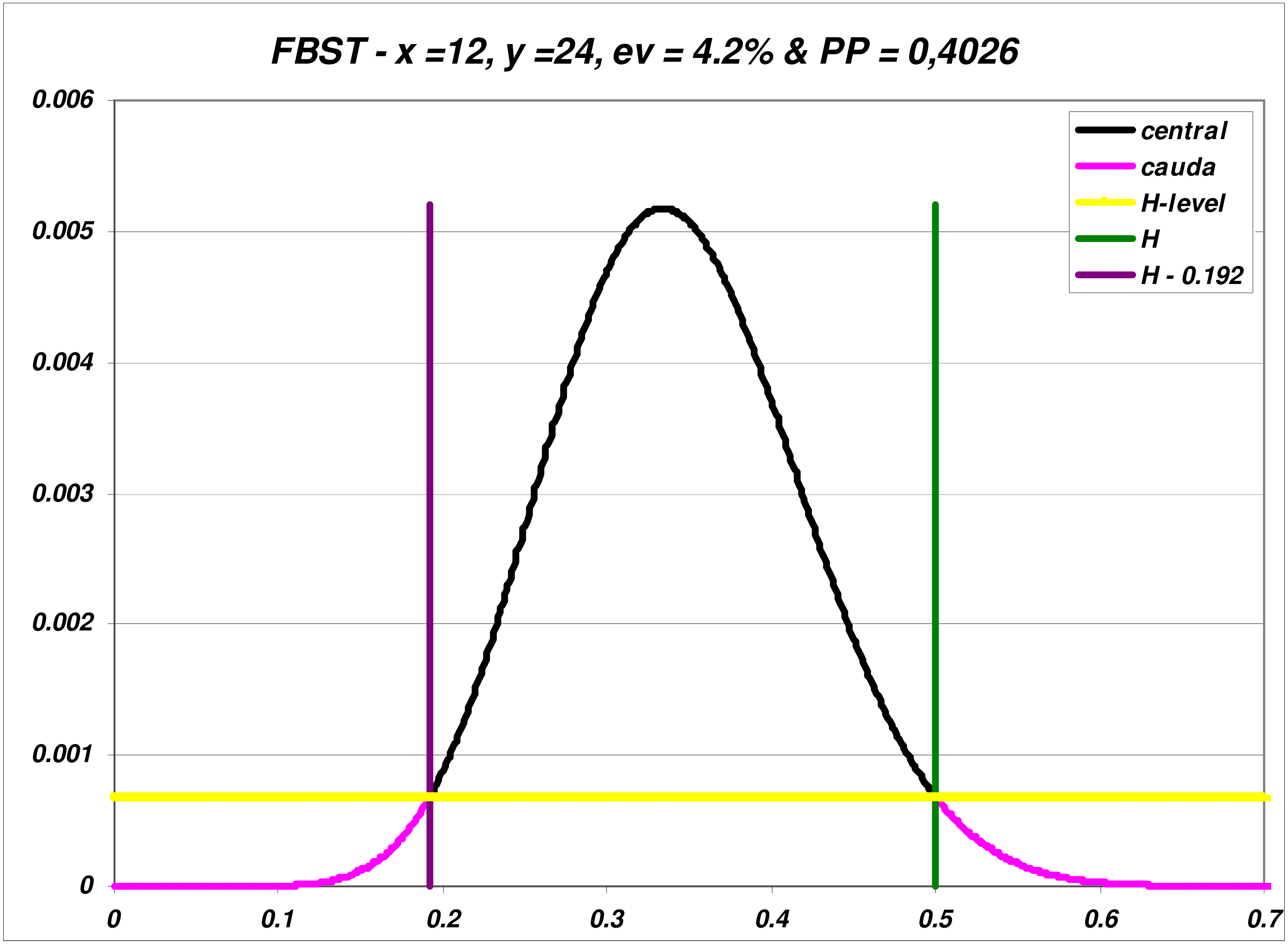


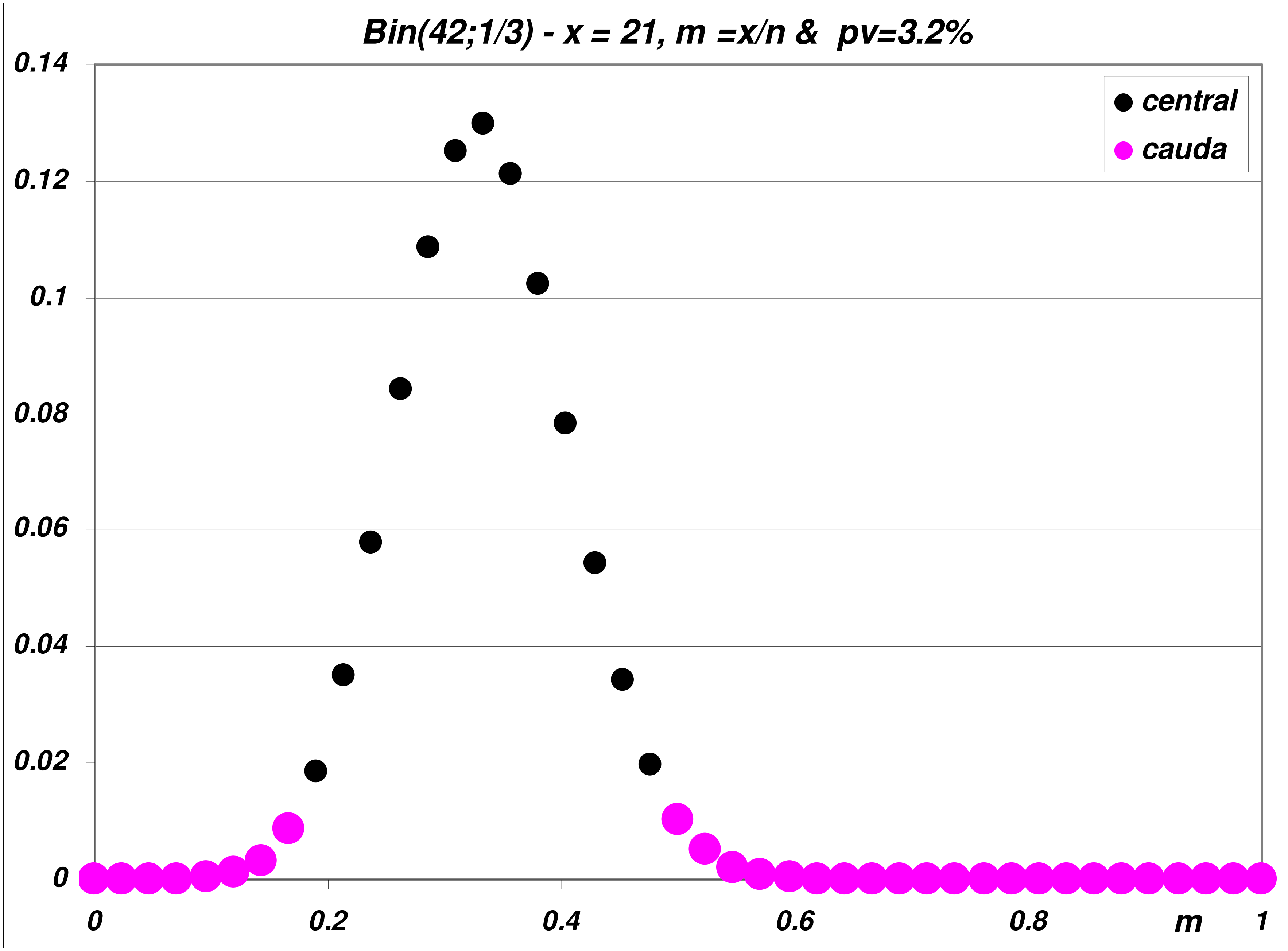
X ~ Bin(n = 36; π = 1/2) - x = 12, R = X/ 36 & pv = 6.5%
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
0.2
0.4
0.6
0.8
1
R
central
caudas

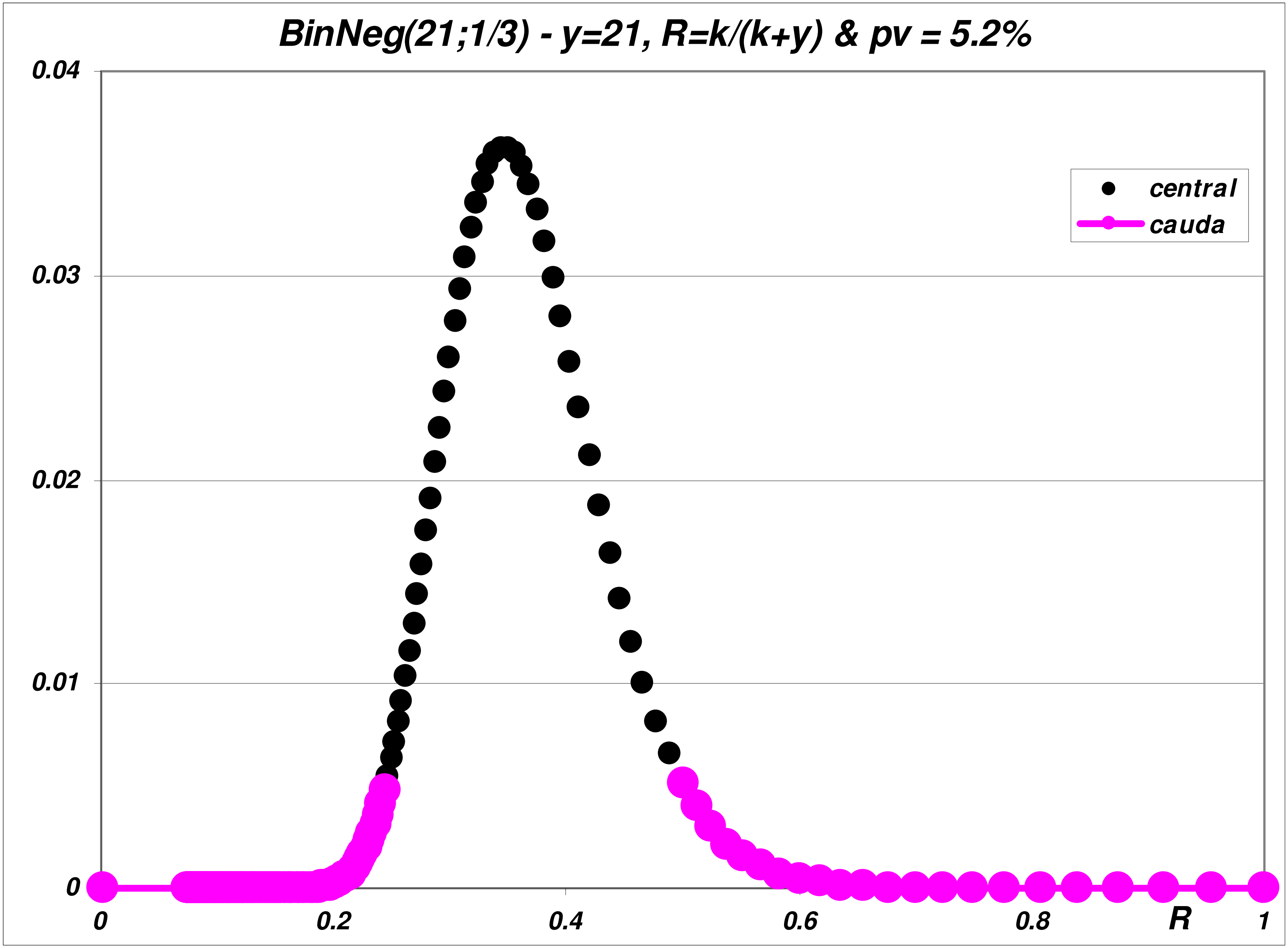


Y = BinNeg(k = 12; π = 1/2): y = 24, R = k/(k+Y) & pv = 2.1%
0.09
0.06
0.03
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
R
central
cauda

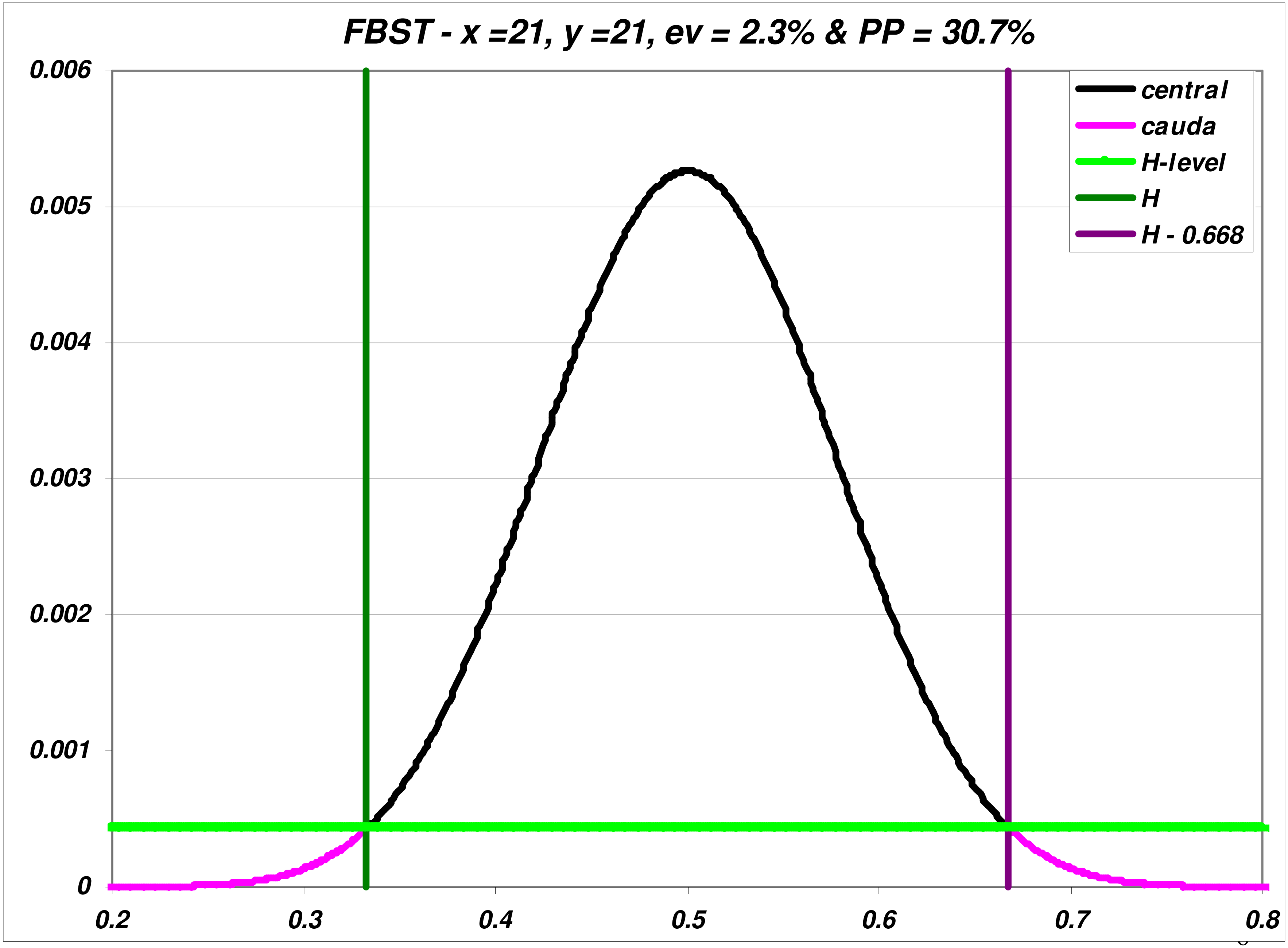


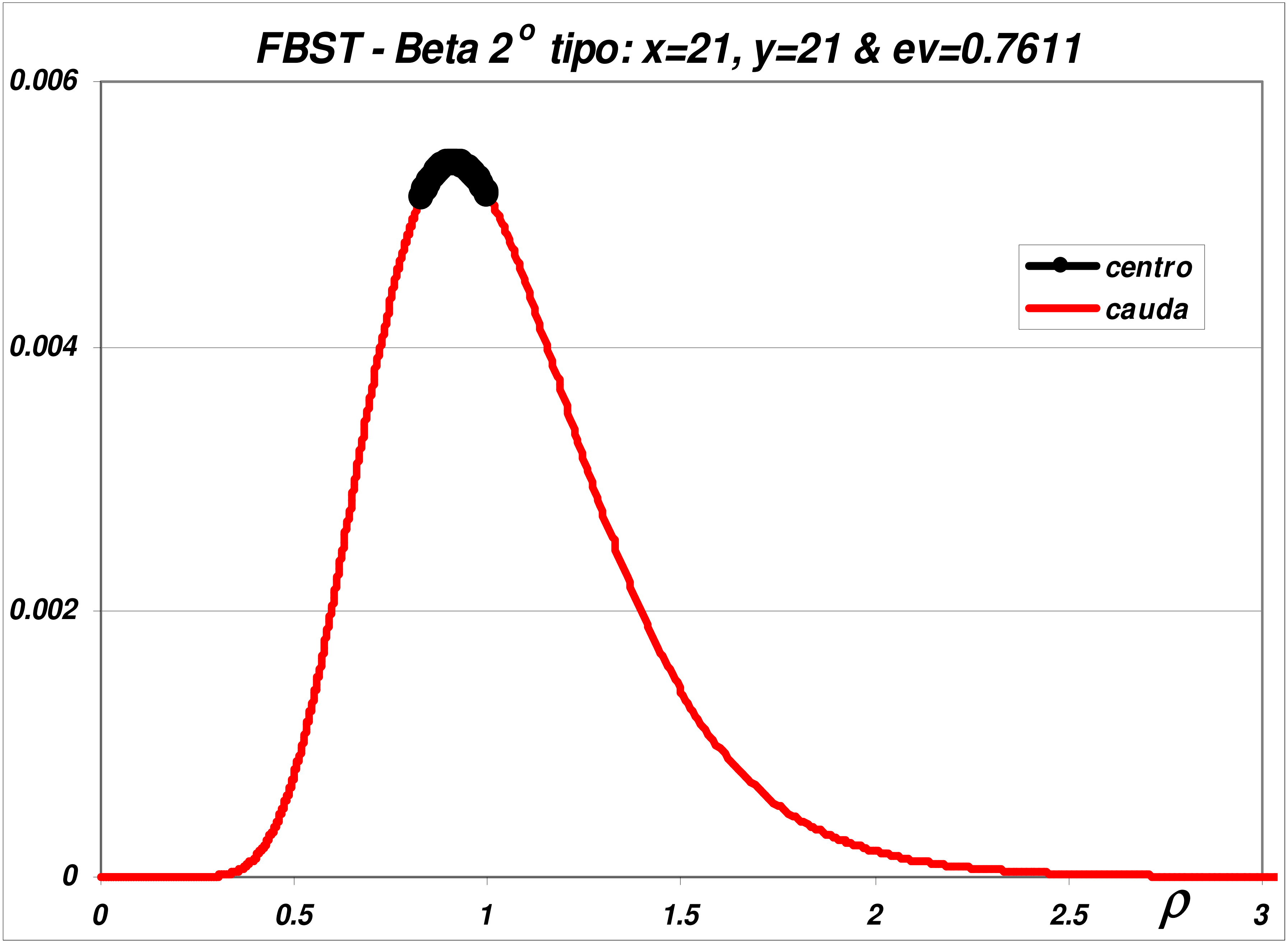
FBST - x =12, y =24, ev = 4.2% & PP = 0,4026
0.006
0.005
0.004
0.003
0.002
0.001
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
central
cauda
H-level
H
H - 0.192


Bin(42;1/3) - x = 21, m =x/n & pv=3.2%
central
cauda
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
0.2
0.4
0.6
0.8
m
1

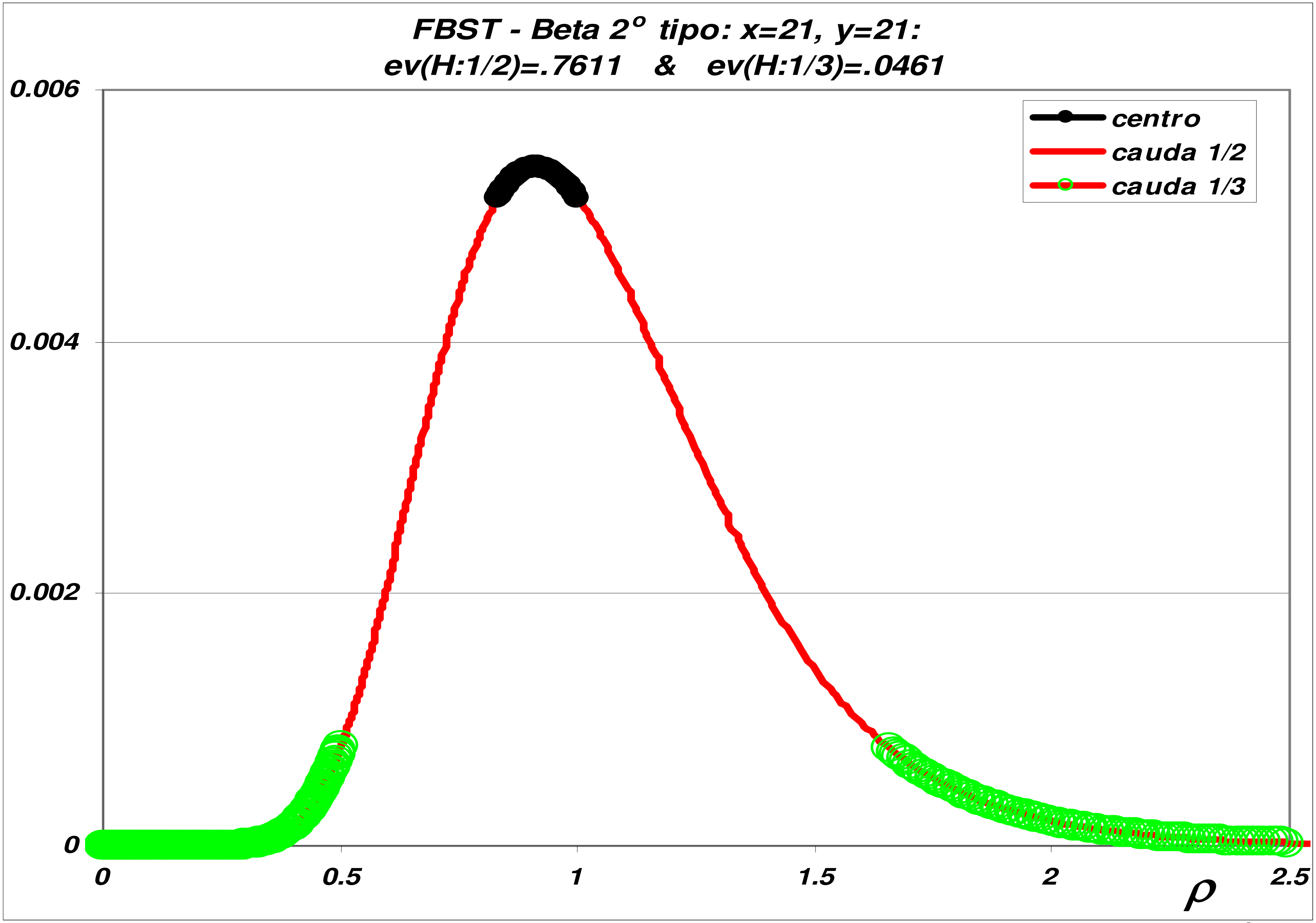


BinNeg(21;1/3) - y=21, R=k/(k+y) & pv = 5.2%
0.04
0.03
0.02
0.01
0
0
0.2
0.4
0.6
0.8
R
1
central
cauda


FBST - x =21, y =21, ev = 2.3% & PP = 30.7%
0.006
0.005
0.004
0.003
0.002
0.001
0
0.2
0.3
0.4
0.5
0.6
0.7
0.8
central
cauda
H-level
H
H - 0.668



FBST - Beta 2° tipo: x=21, y=21 & ev=0.7611
0.006
0.004
0.002
0
0
0.5
1
1.5
2
2.5
ρ
3
centro
cauda


FBST - Beta 2º tipo: x=21, y=21:
ev(H:1/2)=.7611 & ev(H:1/3)=.0461
0.006
0.004
0.002
0
centro
cauda 1/2
cauda 1/3
0
0.5
1
1.5
2
2.5
ρ

$$\pi \sim beta(A,B) \Rightarrow \theta = \pi/(1-\pi) \sim beta2(A,B)$$

$$f(\pi)=B^{-1}(A,B)\,\pi^{A-1}(1-\pi)^{B-1}$$

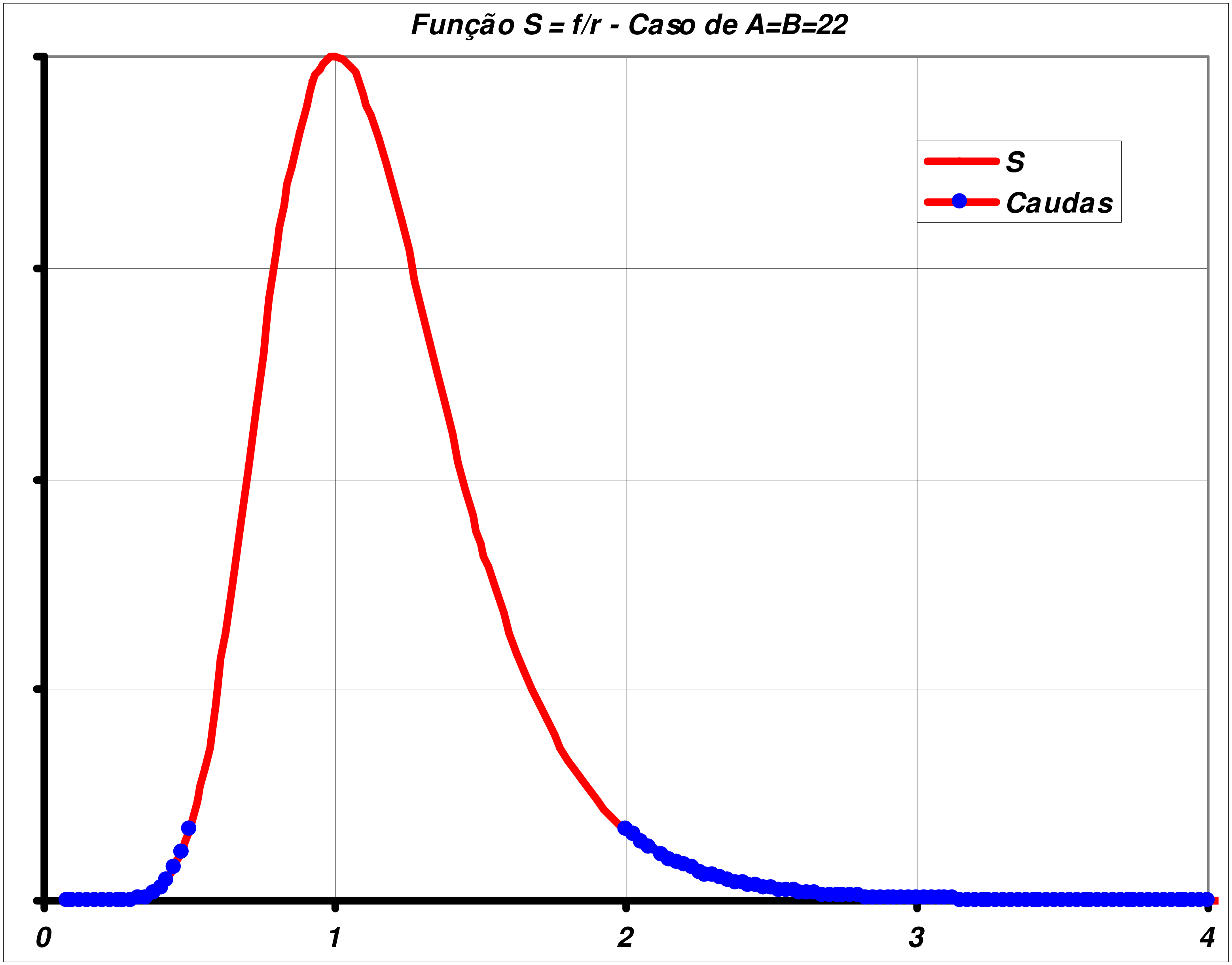
$$f(\theta)=B^{-1}(A,B)\,\theta^{A-1}(1+\theta)^{-(A+B)}$$

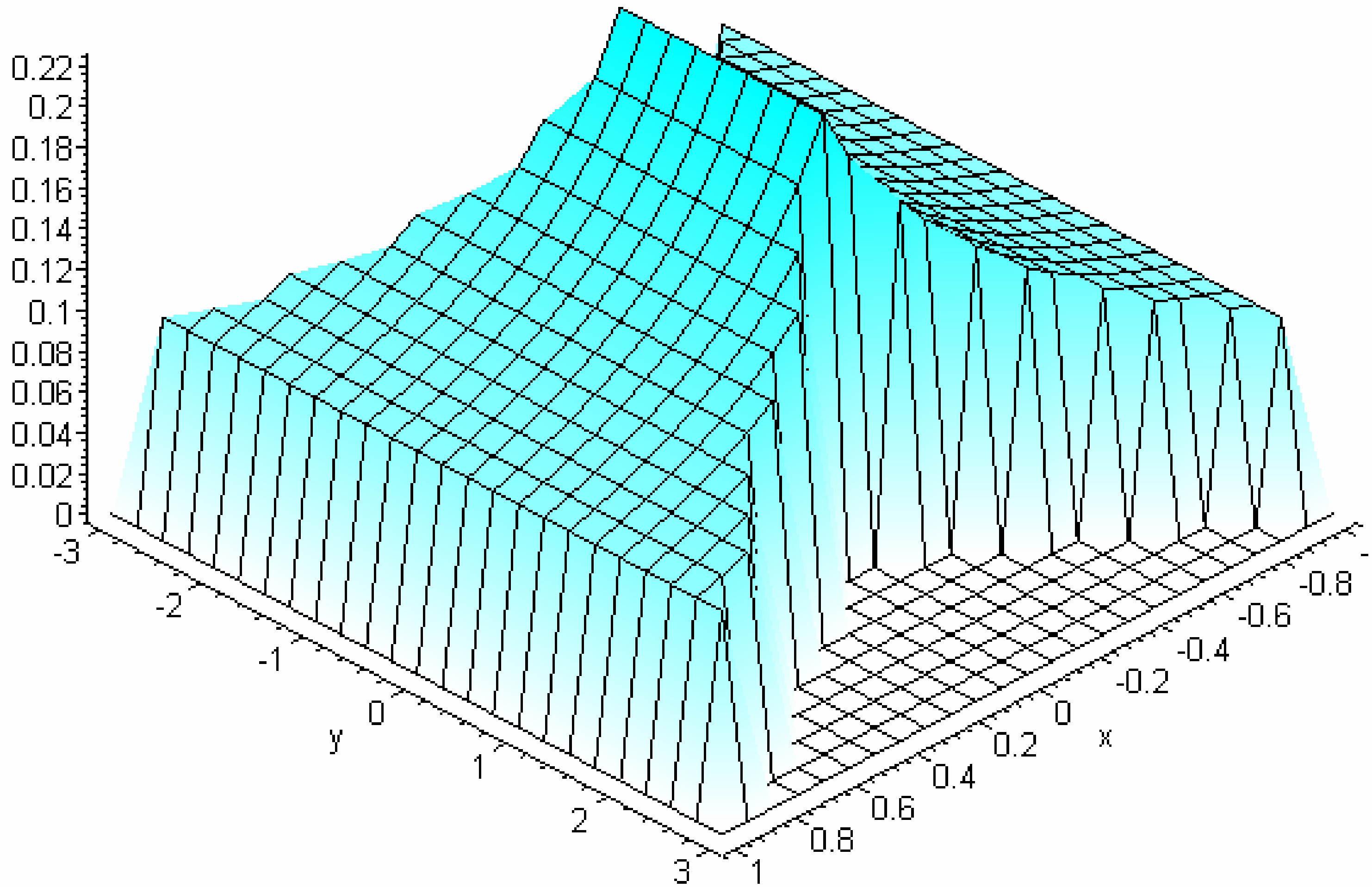
$$S(\theta)=B^{-1}(A,B)\;\theta^{A-1}(1+\theta)^{-(A+B-2)}$$

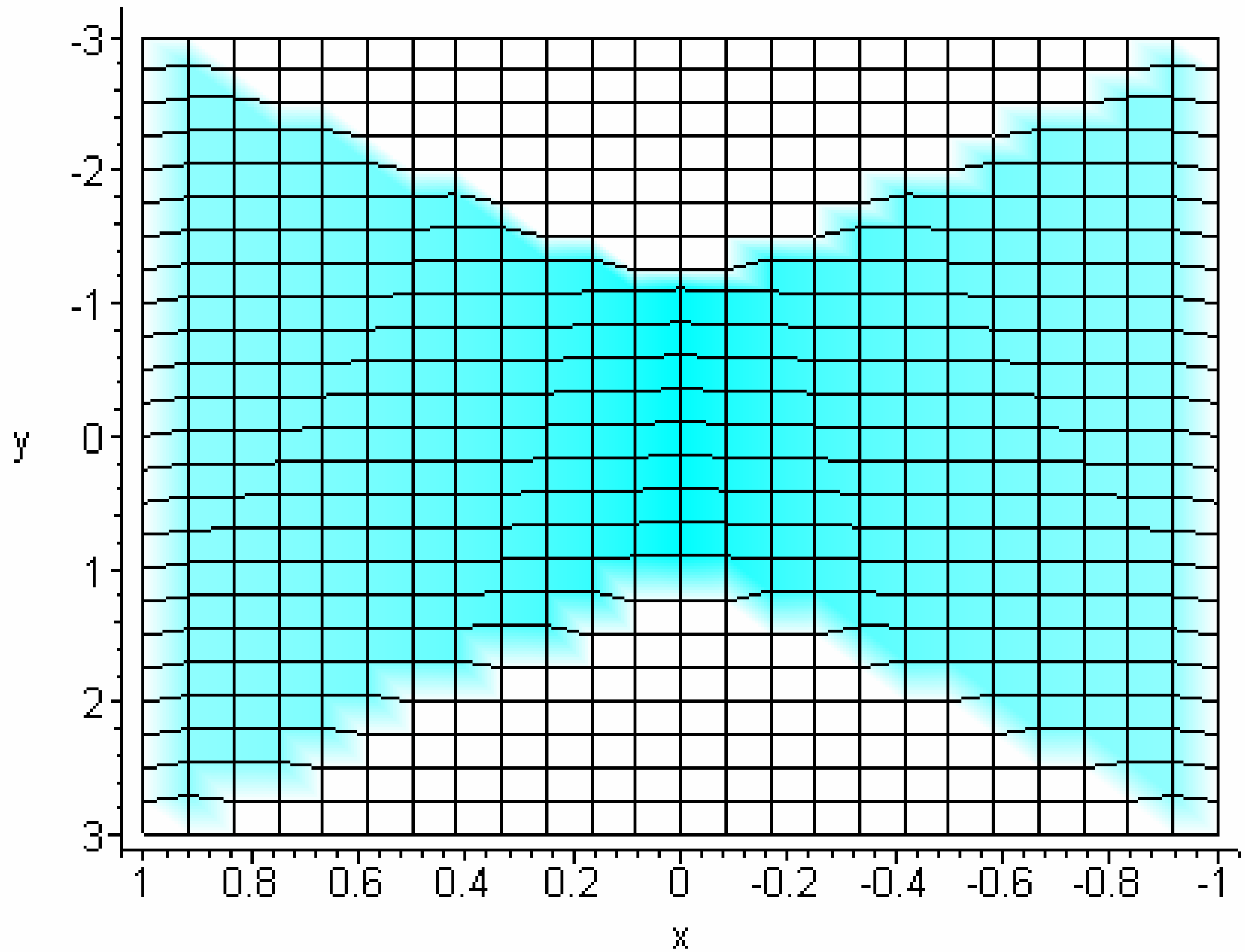
$$\pi^{*}=(A-1)/(A+B-2)$$

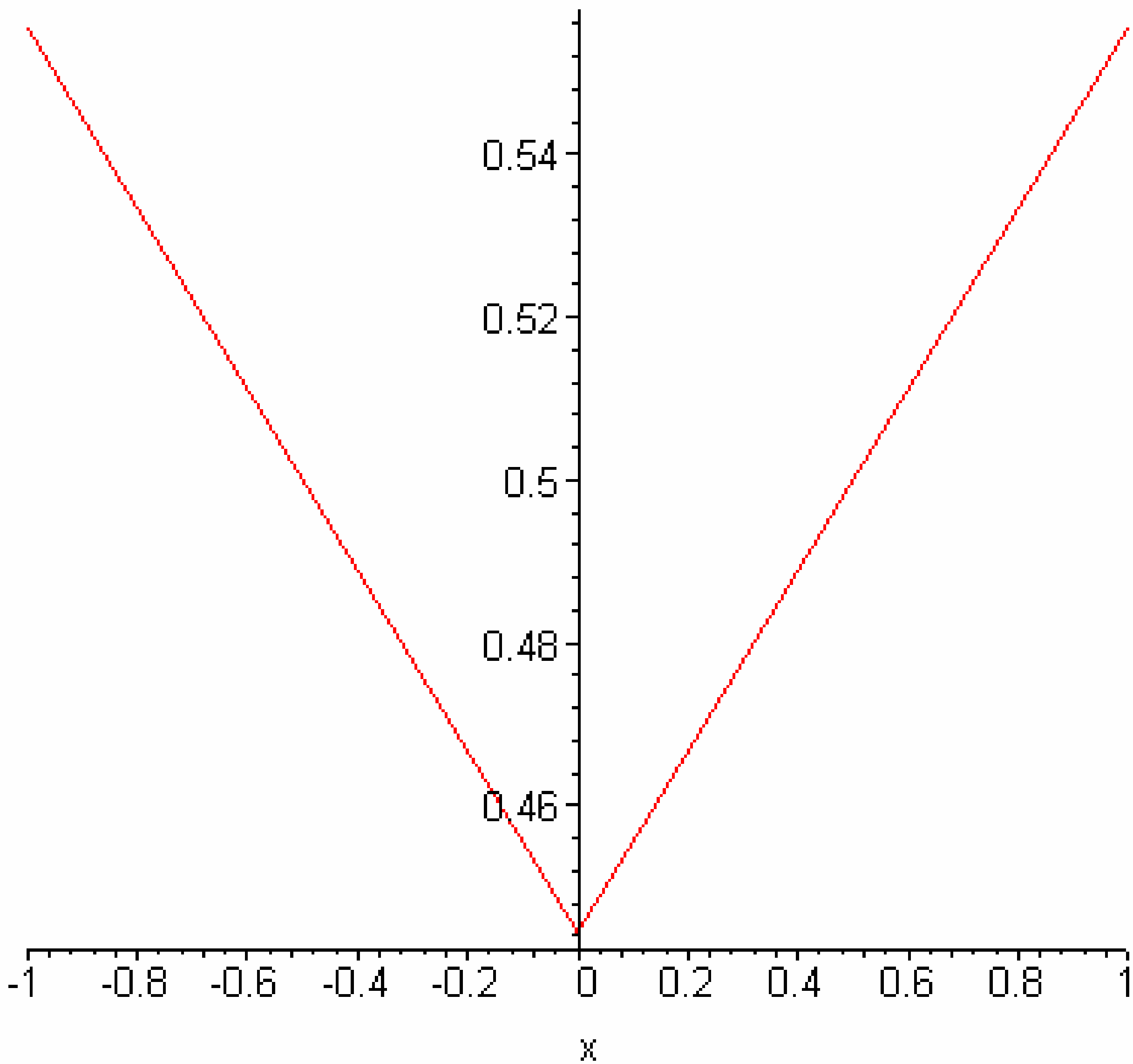
$$\theta^{*}=(A-1)/(B+1)$$

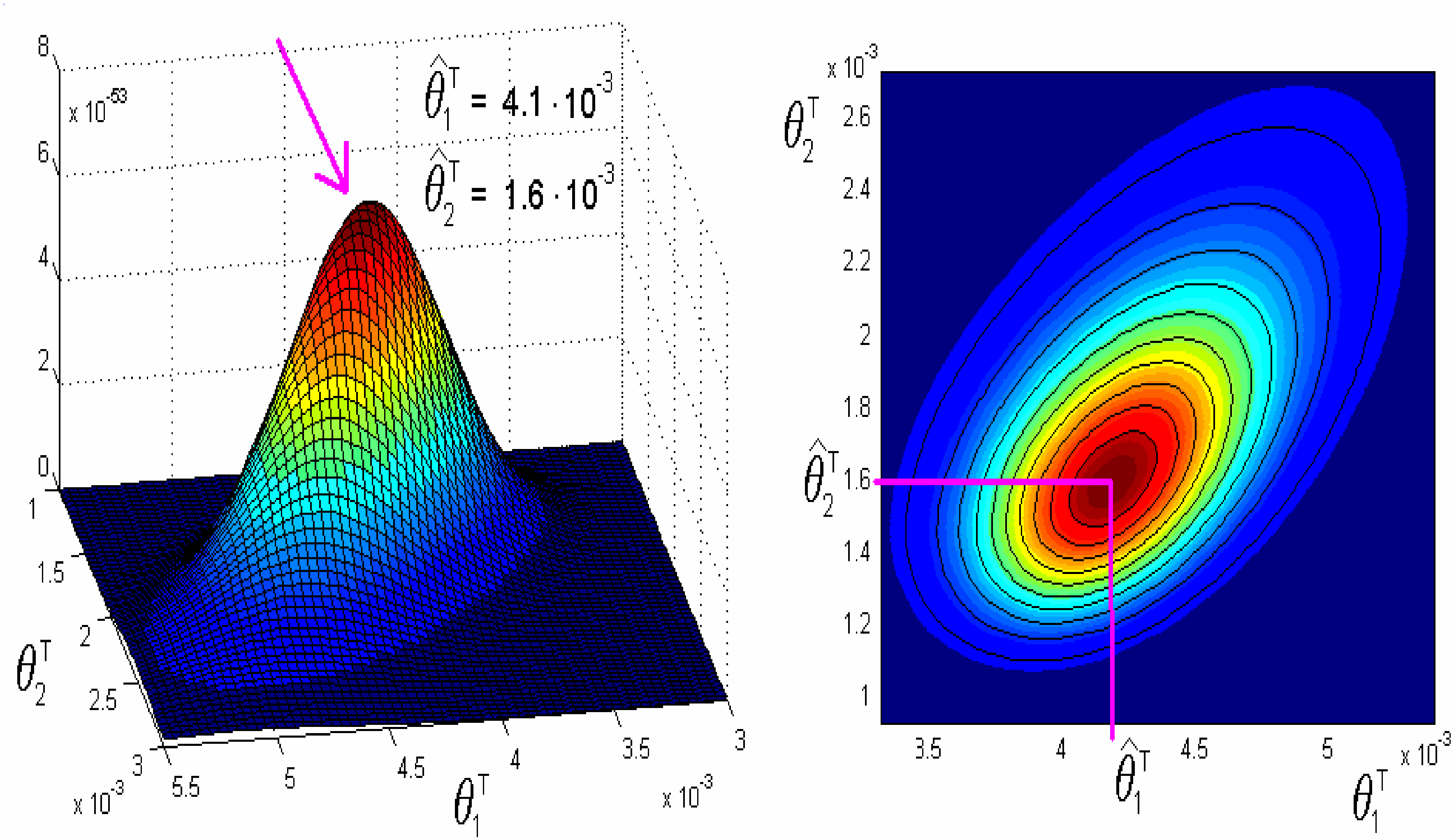
$$\theta^{+}=(A-1)/(B-1)$$


Função S = f/r - Caso de A=B=22
S
Caudas
0
1
2
3
4

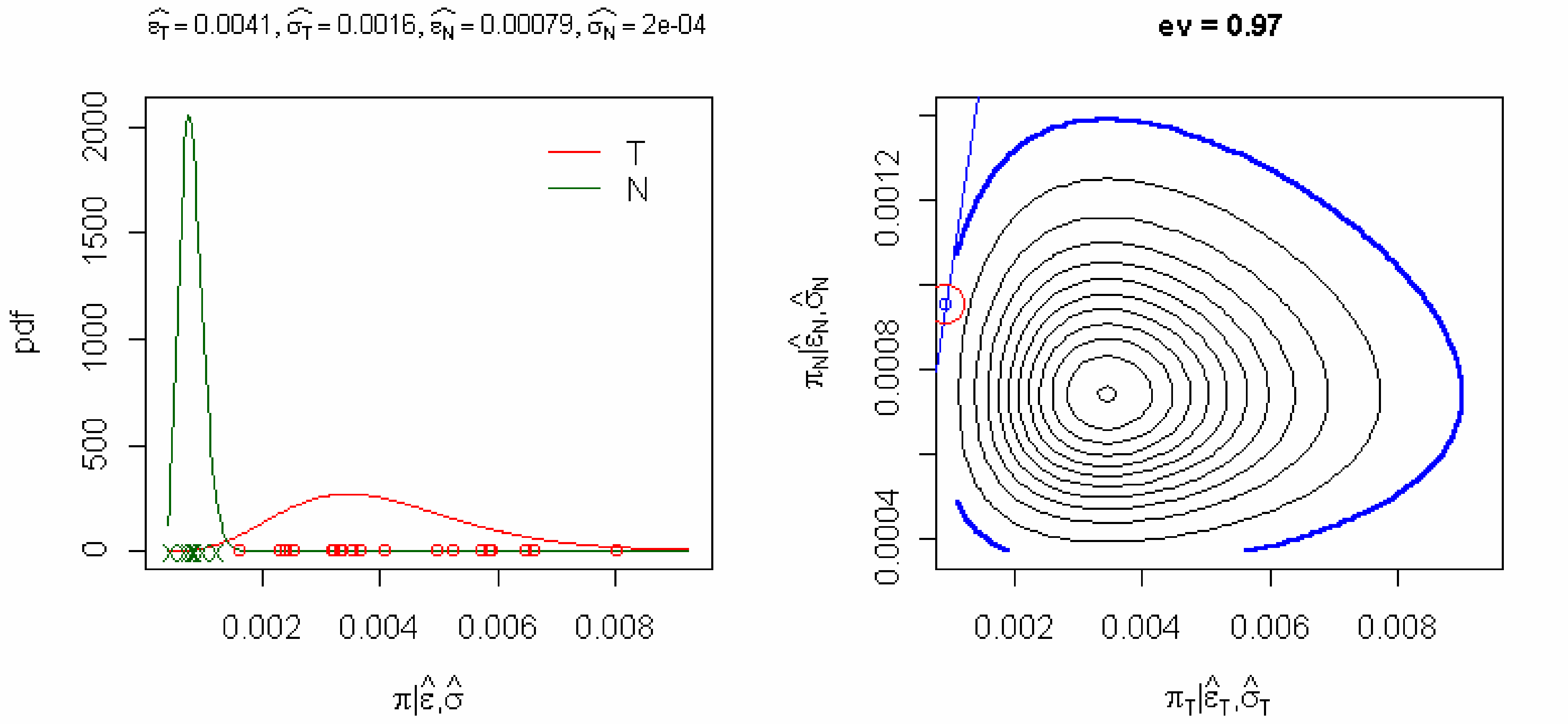

0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
-3
-2
-1
0
y
1
2
3
1
0.8
0.6
0.4
0.2
0
x
-0.2
-0.4
-0.6
-0.8
-1

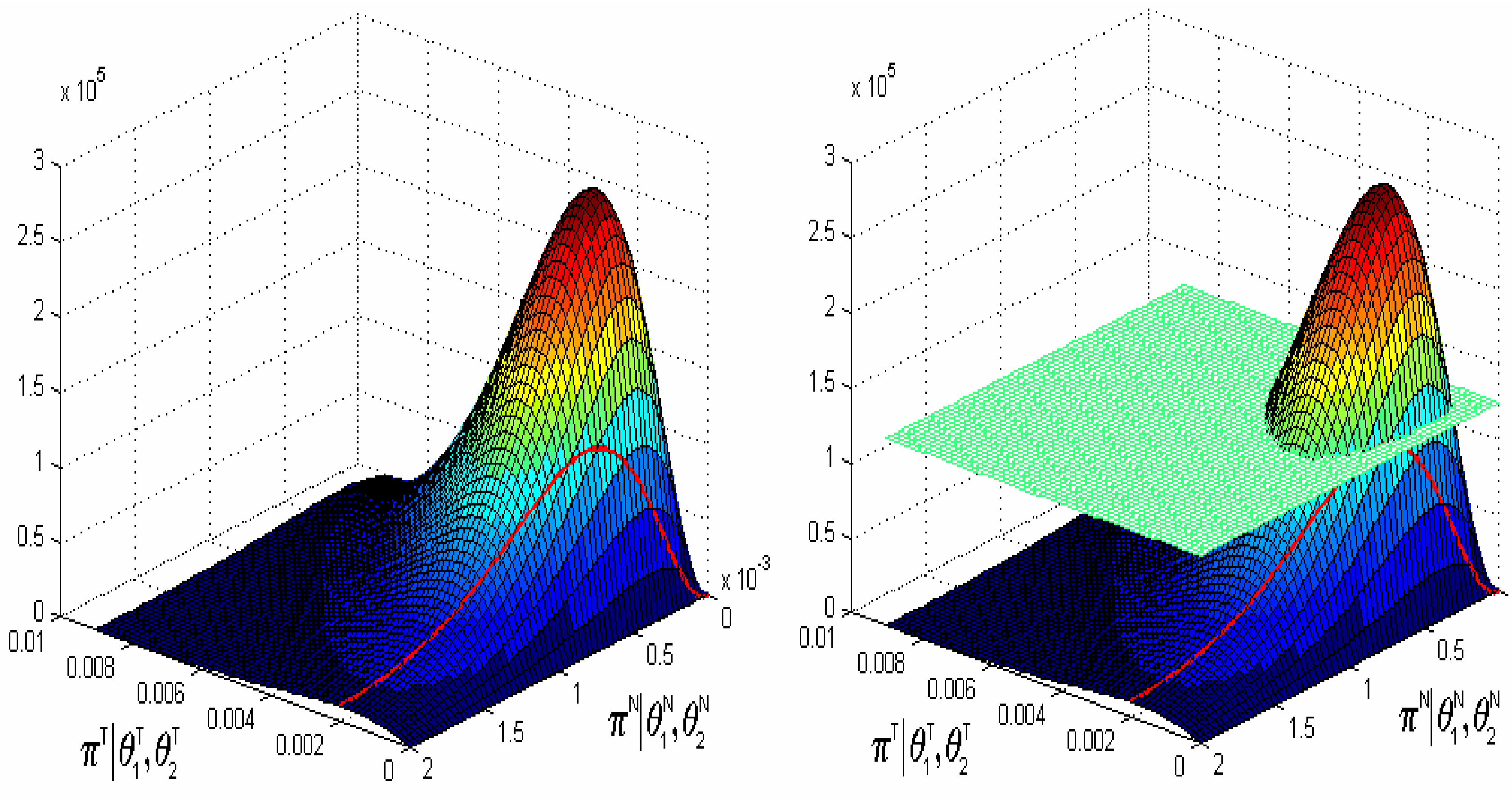

-3
-2
-1
0
1
2
3
y
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
x

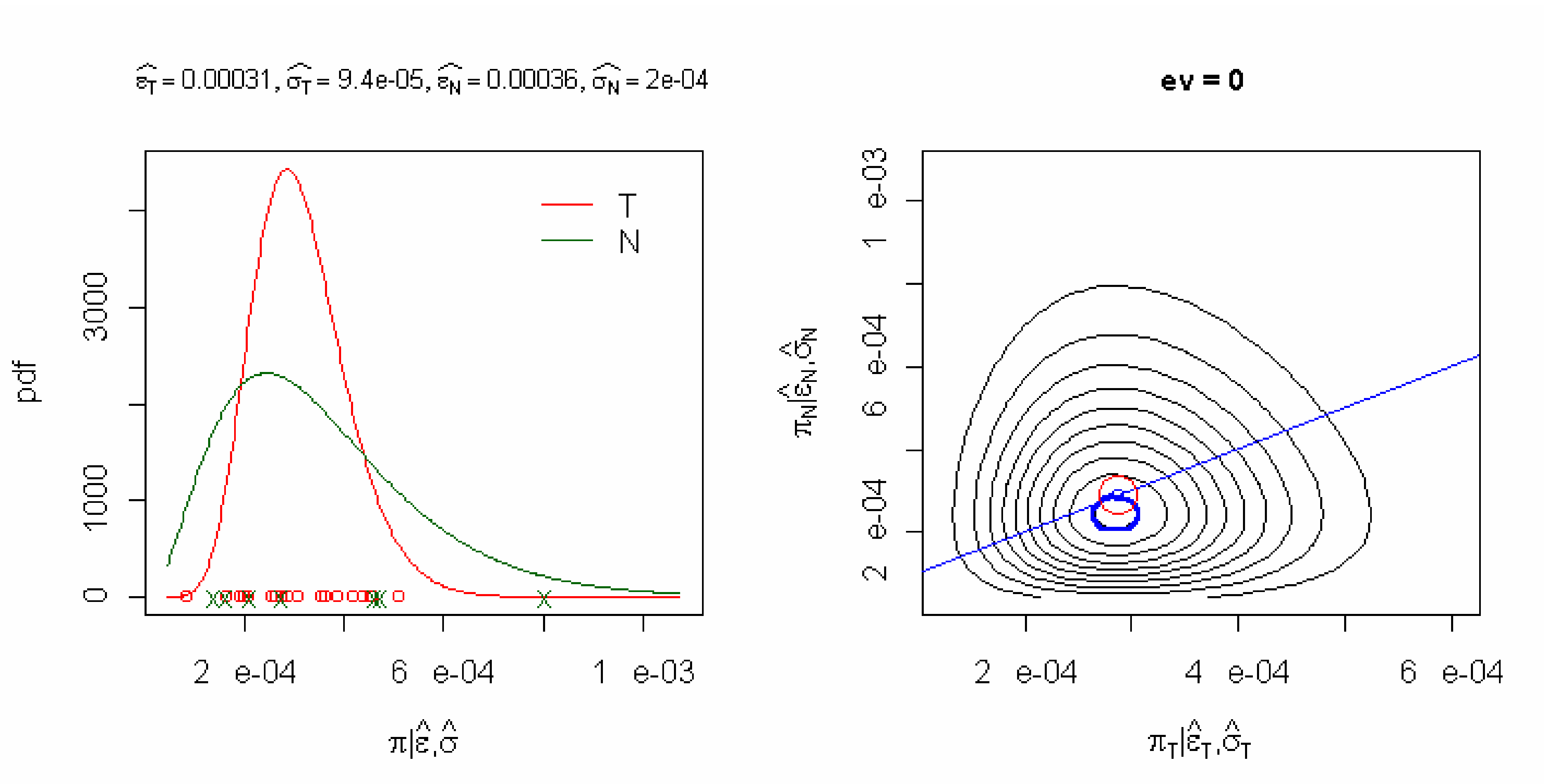

0.54
0.52
0.5
0.48
0.46
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
x



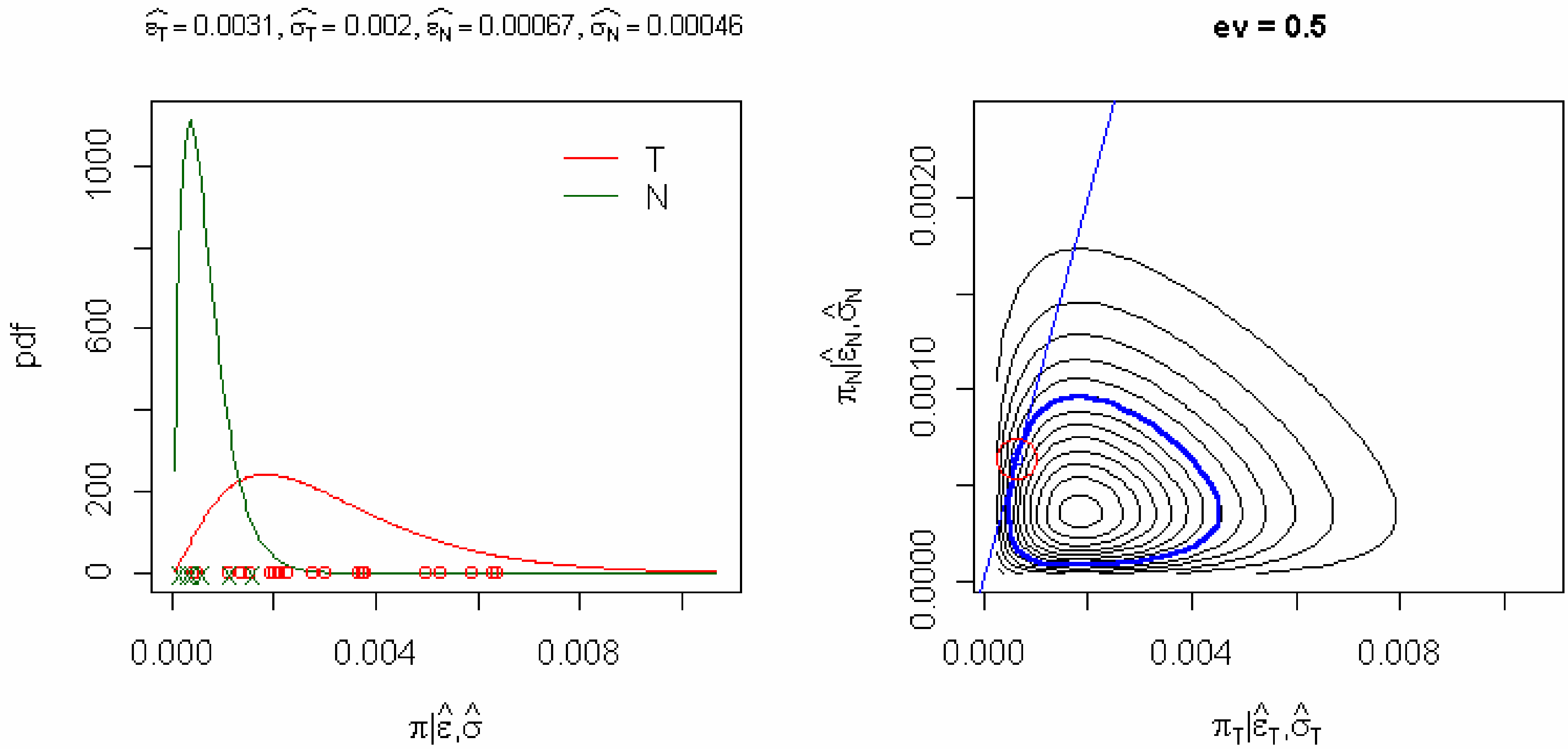
$\hat{\theta}_1^T = 4.1 \cdot 10^{-3}$
$\hat{\theta}_2^T = 1.6 \cdot 10^{-3}$
x 10^{-53}
8
6
4
2
0
1
1.5
2
2.5
3
θ_2^T
x 10^{-3}
5.5
5
4.5
4
3.5
3
θ_1^T
x 10^{-3}
x 10^{-3}
θ_2^T
2.6
2.4
2.2
2
1.8
$\hat{\theta}_2^T$
1.6
1.4
1.2
1
3.5
4
$\hat{\theta}_1^T$
4.5
5
x 10^{-3}
θ_1^T


$\widehat{\varepsilon_T}$ = 0.0041, $\widehat{\sigma_T}$ = 0.0016, $\widehat{\varepsilon_N}$ = 0.00079, $\widehat{\sigma_N}$ = 2e-04
pdf
T
N
0
500
1000
1500
2000
0.002
0.004
0.006
0.008
$\pi|\hat{\varepsilon},\hat{\sigma}$
ev = 0.97
$\pi_N|\hat{\varepsilon}_N,\hat{\sigma}_N$
0.0004
0.0008
0.0012
$\pi_T|\hat{\varepsilon}_T,\hat{\sigma}_T$

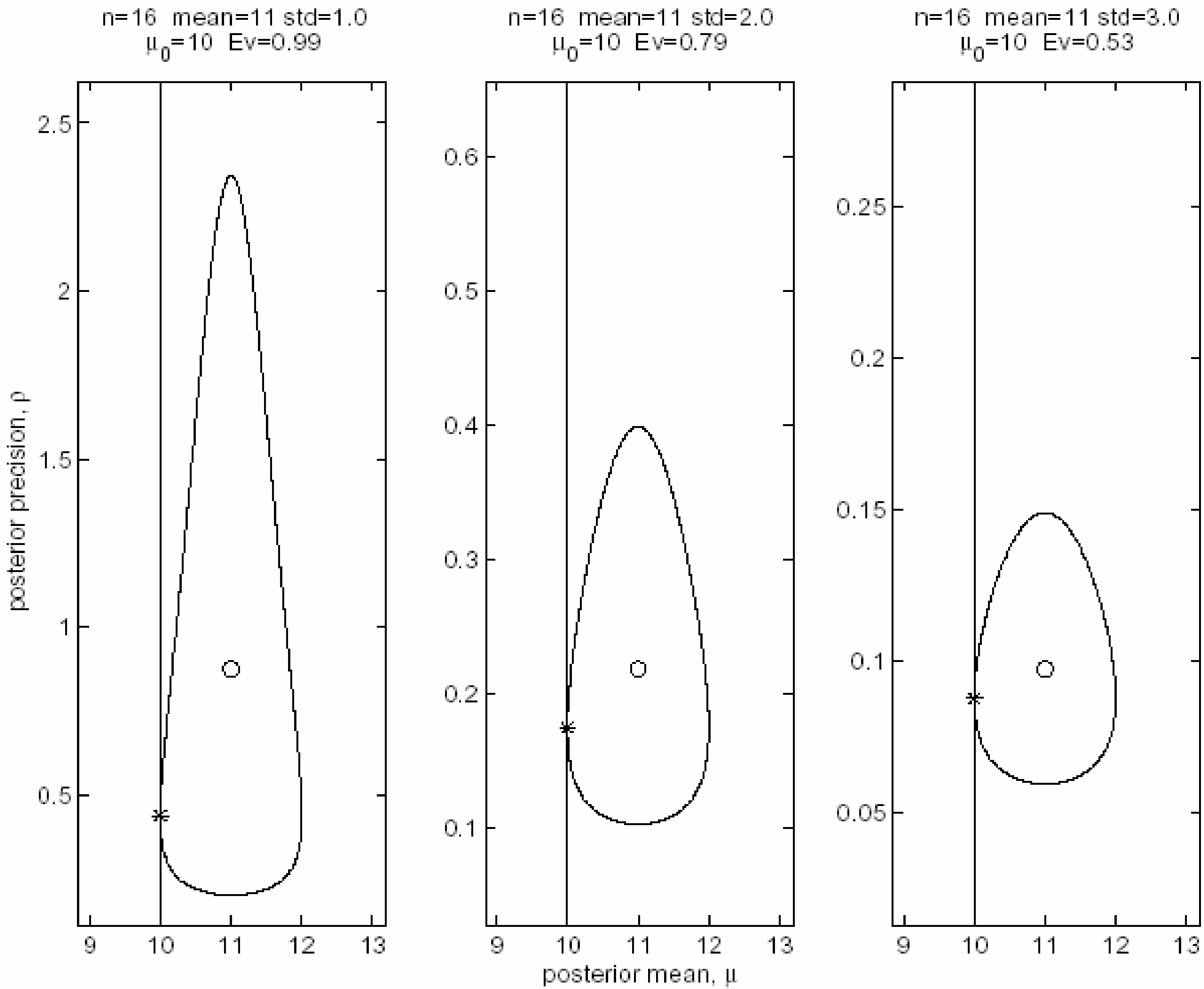

x 10^5
3
2.5
2
1.5
1
0.5
0
0.01
0.008
0.006
0.004
0.002
0
x 10^-3
0
0.5
1
1.5
2
π^T|θ_1^T,θ_2^T
π^N|θ_1^N,θ_2^N
x 10^5
3
2.5
2
1.5
1
0.5
0
0.01
0.008
0.006
0.004
0.002
0
x 10^-3
0
0.5
1
1.5
2
π^T|θ_1^T,θ_2^T
π^N|θ_1^N,θ_2^N



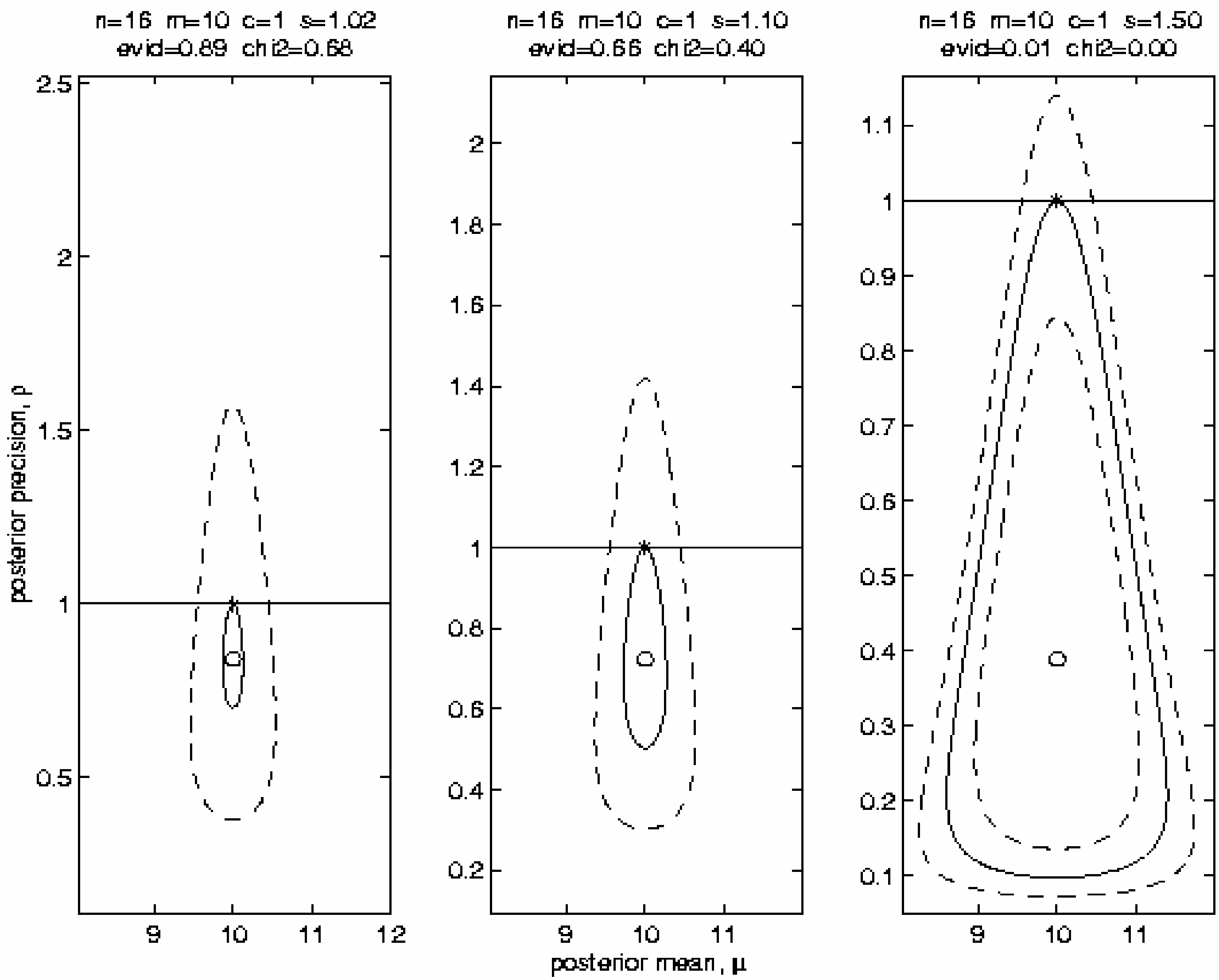
$\widehat{\varepsilon_T}$ = 0.00031, $\widehat{\sigma_T}$ = 9.4e-05, $\widehat{\varepsilon_N}$ = 0.00036, $\widehat{\sigma_N}$ = 2e-04
pdf
0
1000
3000
2 e-04
6 e-04
1 e-03
T
N
$\pi|\hat{\varepsilon},\hat{\sigma}$
ev = 0
$\pi_N|\hat{\varepsilon}_N,\hat{\sigma}_N$
2 e-04
6 e-04
1 e-03
2 e-04
4 e-04
6 e-04
$\pi_T|\hat{\varepsilon}_T,\hat{\sigma}_T$

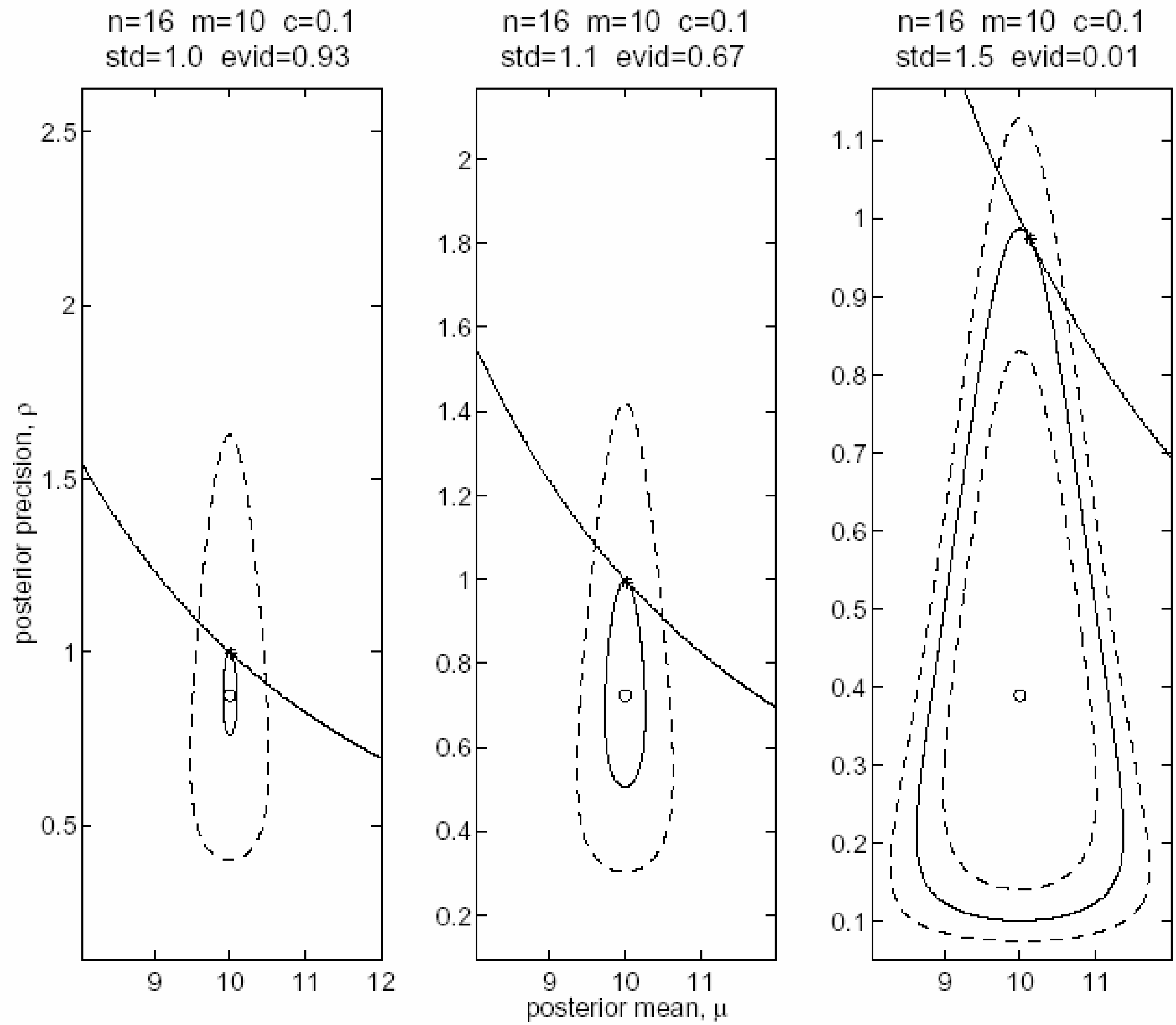


$\widehat{\varepsilon_T}$ = 0.0031, $\widehat{\sigma_T}$ = 0.002, $\widehat{\varepsilon_N}$ = 0.00067, $\widehat{\sigma_N}$ = 0.00046
pdf
1000
600
200
0
T
N
0.000
0.004
0.008
$\pi|\hat{\varepsilon},\hat{\sigma}$
ev = 0.5
$\pi_N|\hat{\varepsilon}_N,\hat{\sigma}_N$
0.0020
0.0010
0.0000
0.000
0.004
0.008
$\pi_T|\hat{\varepsilon}_T,\hat{\sigma}_T$



n=16 mean=11 std=1.0
μ_0=10 Ev=0.99
n=16 mean=11 std=2.0
μ_0=10 Ev=0.79
n=16 mean=11 std=3.0
μ_0=10 Ev=0.53
posterior precision, ρ
posterior mean, μ
2.5
2
1.5
1
0.5
0.6
0.5
0.4
0.3
0.2
0.1
0.25
0.2
0.15
0.1
0.05
9
10
11
12
13


n=16 m=10 c=1 s=1.02
evid=0.89 chi2=0.68
n=16 m=10 c=1 s=1.10
evid=0.66 chi2=0.40
n=16 m=10 c=1 s=1.50
evid=0.01 chi2=0.00
posterior precision, ρ
posterior mean, μ


n=16 m=10 c=0.1
std=1.0 evid=0.93
n=16 m=10 c=0.1
std=1.1 evid=0.67
n=16 m=10 c=0.1
std=1.5 evid=0.01
posterior precision, ρ
posterior mean, μ

3. Testing Independence

The composite null hypothesis describing independence in the contingency table is the constraint

$$H:\ p_{00} = (p_{00} + p_{01})(p_{00} + p_{10}) = p_{0.}\, p_{.0}.$$

Our Figures compares the four statistics, namely, posterior probability (***PP***), NPW-inspired exact ***P-value***, Chi-squared ***p-values*** (Chi-2), and the FBST evidence measure in favor of ***H*** (FBST).

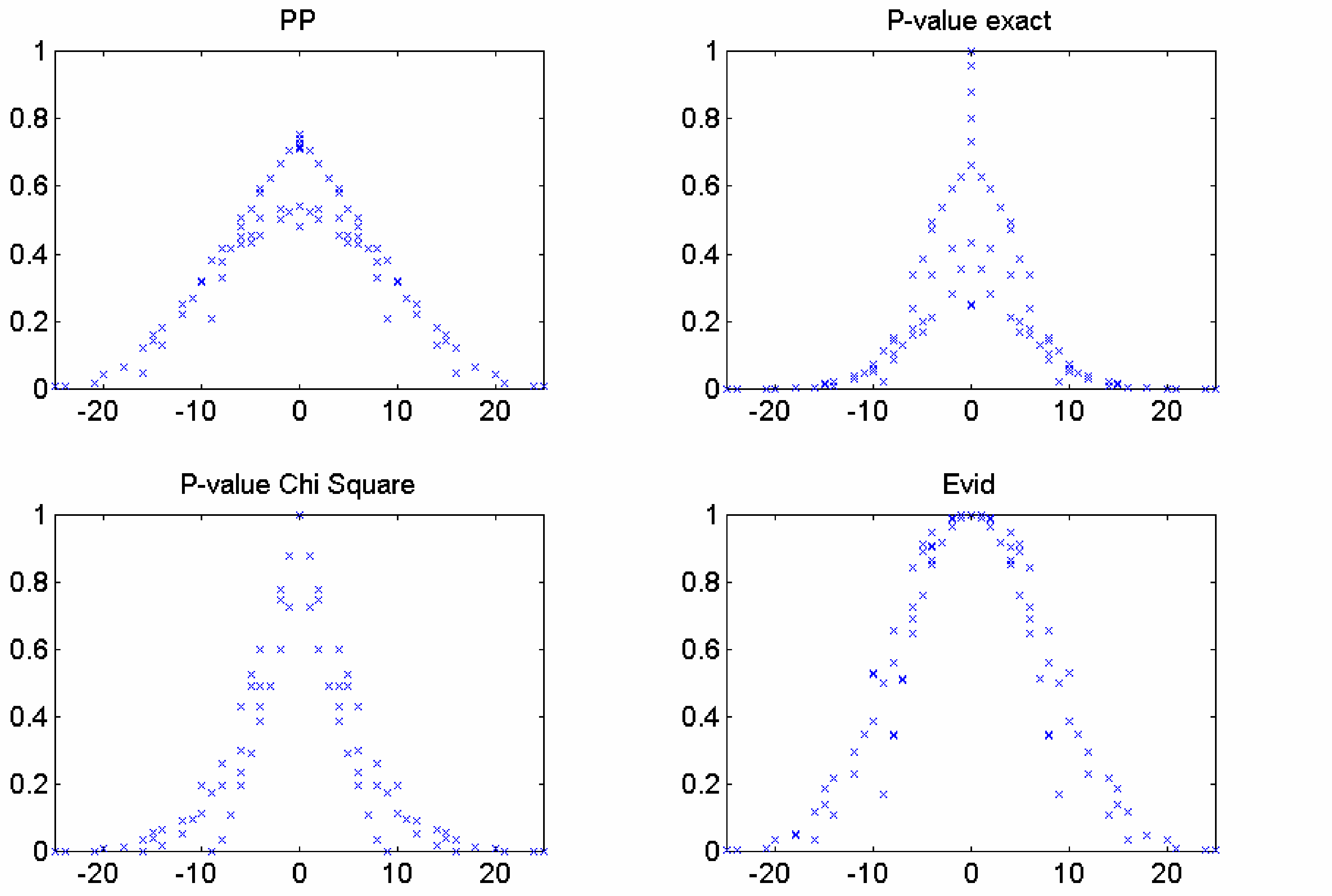
For the computation of ***PP***, we made $\pi(H) = \pi(A) = ½$

In the horizontal axes we placed all sample values of the difference between the diagonal products,

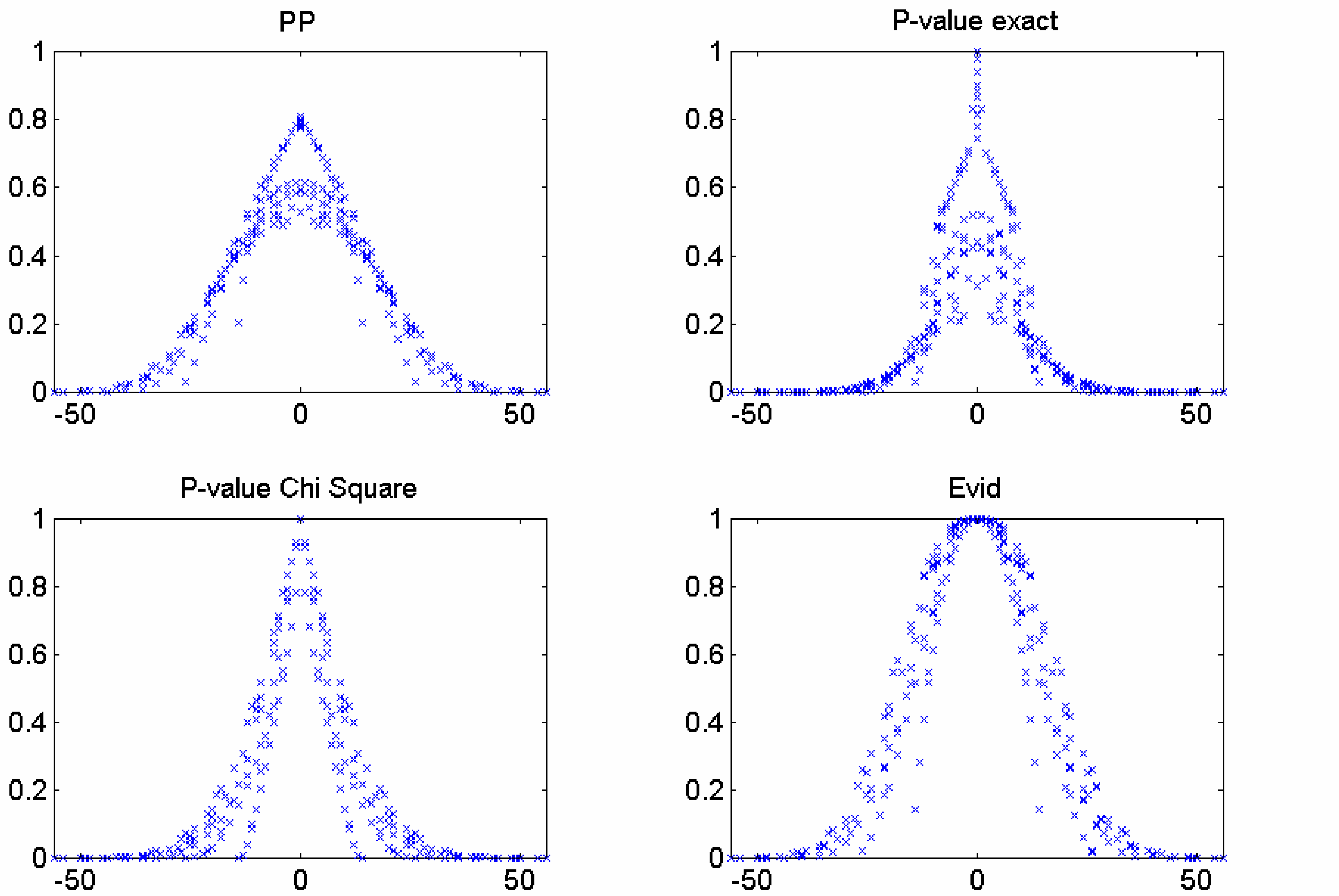
$$D = x_{00}x_{11} - x_{01}x_{10}.$$

The statistic ***D*** in our opinion is highly sensitive to departures from independence and may be used as a baseline for the examination of any test statistic.

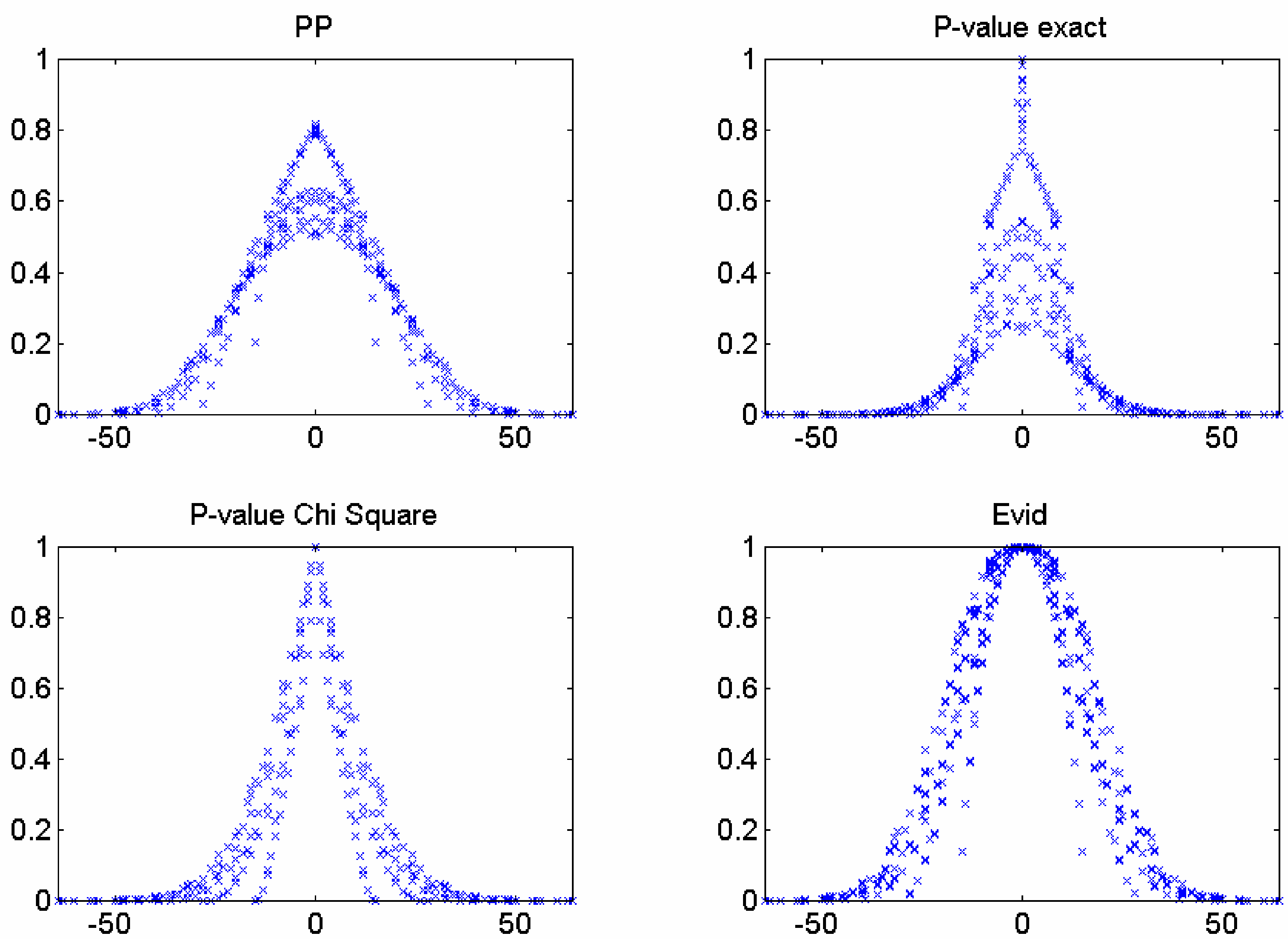
- n=10


PP
P-value exact
P-value Chi Square
Evid
1
0.8
0.6
0.4
0.2
0
-20
-10
0
10
20

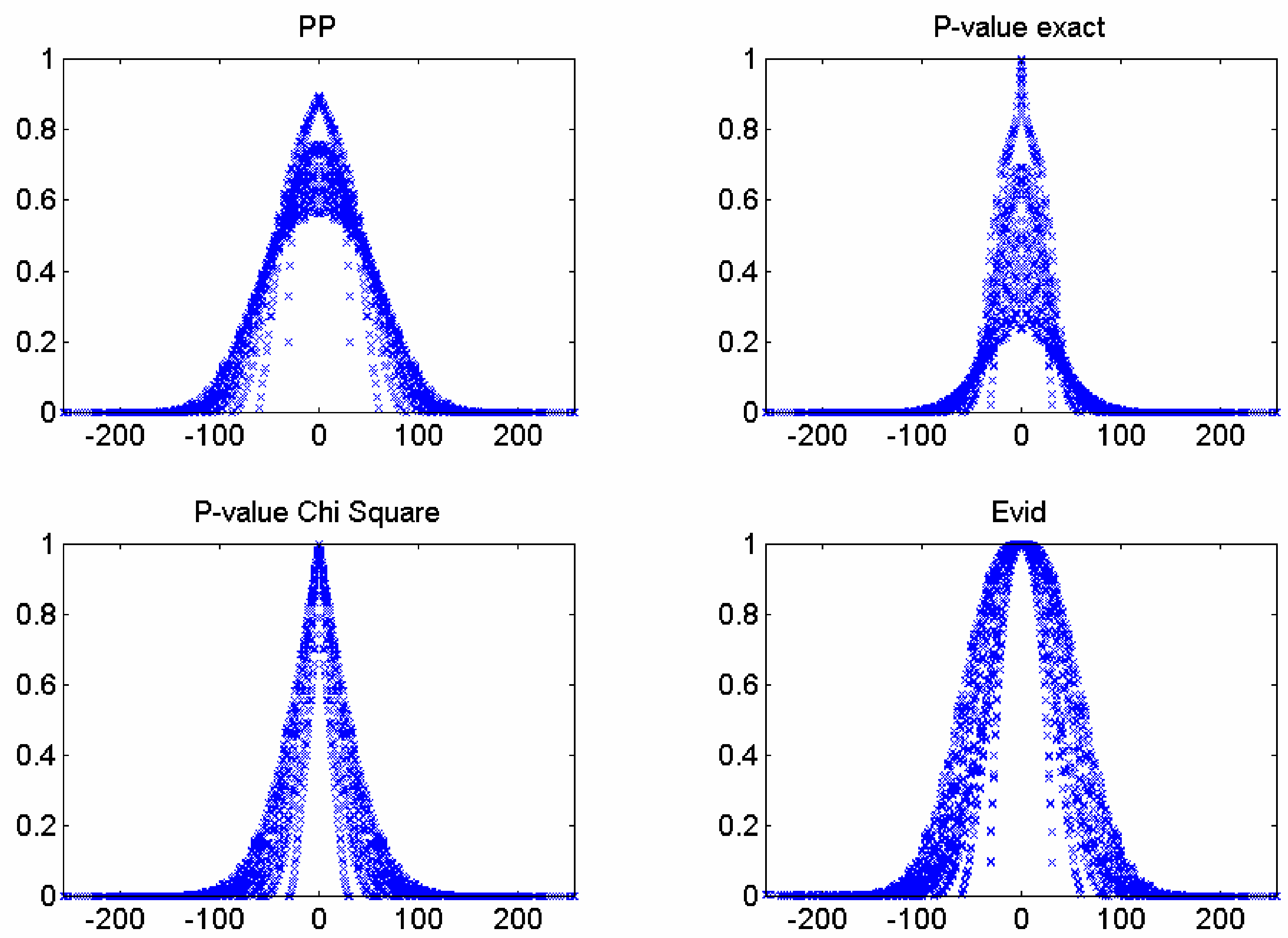
- n=15



- n=16



- n=32

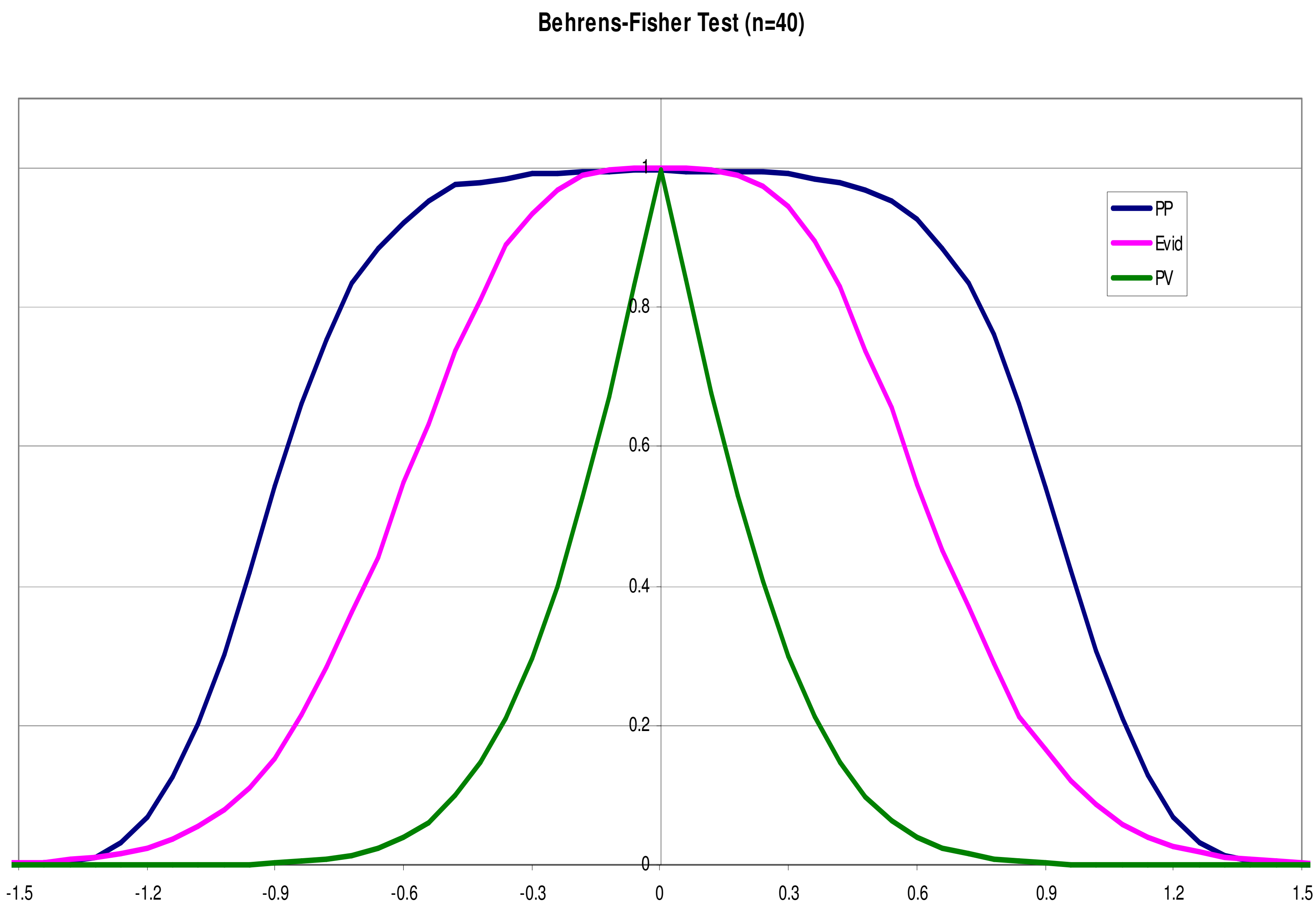

PP
P-value exact
P-value Chi Square
Evid
1
0.8
0.6
0.4
0.2
0
-200
-100
0
100
200

4. FBST for the Behrens-Fisher Problem

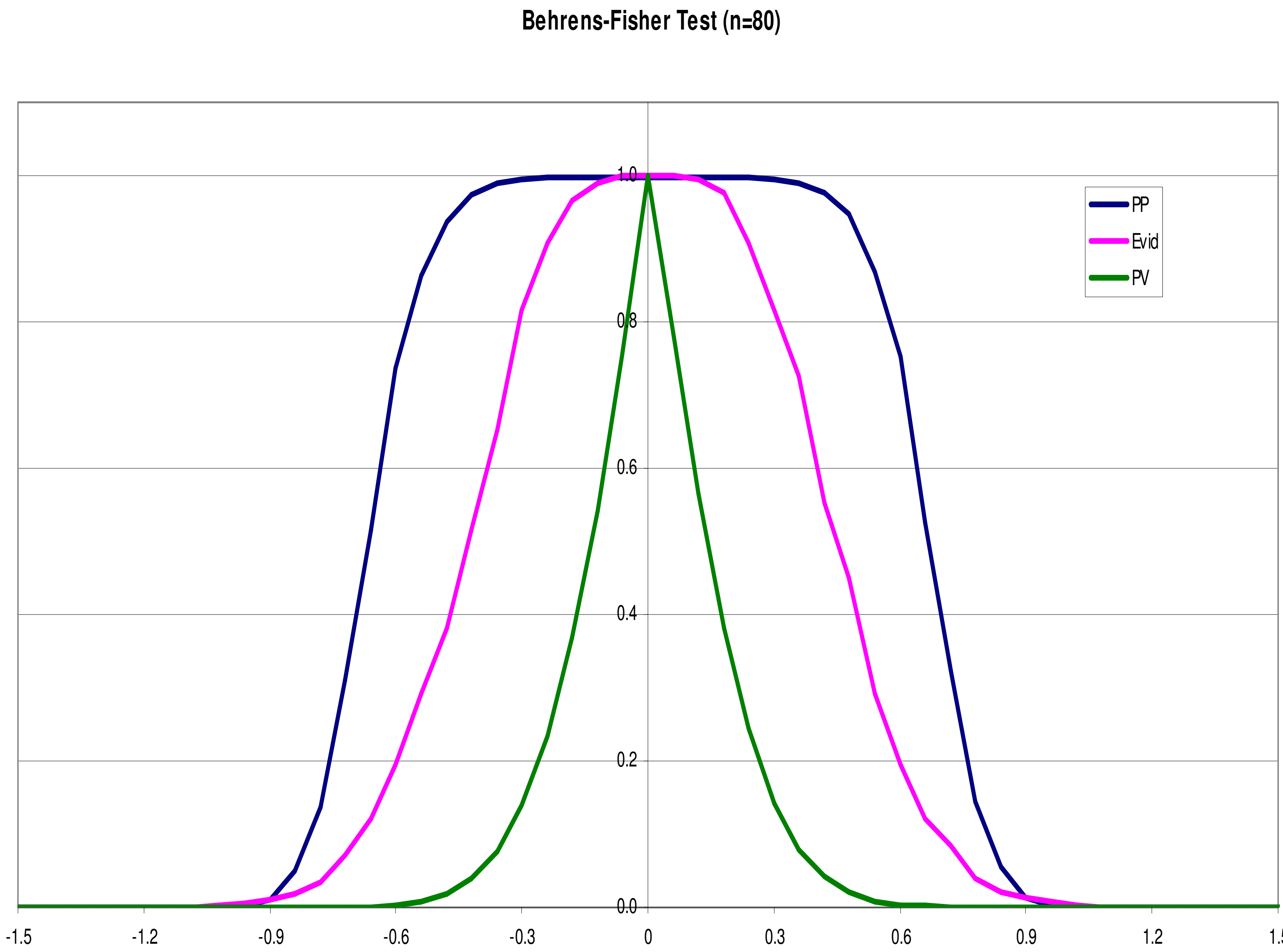
The posterior probabilities are computed using the Bayesian Analysis Package (BAP) of Larry .... For the Behrens-Fisher problem BAP considers four cases, namely:

a. The means and the standard deviations are the same;
b. The means are the same and the variances differ;
c. The means differ and the variances are the same; and
d. The means and variances differ.

BAP assigns prior probability one forth to each case and then computes the posterior probabilities constraining the parameter space to a box defined by upper and lower bounds to mean and variances. The posterior probability computed by BAP for the Behrens-Fisher problem is P(a)+P(b).



Behrens-Fisher Test (n=40)
PP
Evid
PV
1
0.8
0.6
0.4
0.2
0
-1.5
-1.2
-0.9
-0.6
-0.3
0
0.3
0.6
0.9
1.2
1.5


Behrens-Fisher Test (n=80)
PP
Evid
PV
1.0
0.8
0.6
0.4
0.2
0.0
-1.5
-1.2
-0.9
-0.6
-0.3
0
0.3
0.6
0.9
1.2
1.5