

Table 1.1 Percent points for distributions of $\frac{1}{(T + \frac{1}{2})^2} \sum_{t=1}^T y_t^2$

		Probability of a smaller value							
		0.01	0.05	0.1	0.5	0.9	0.95	0.99	Mean
$T = 10$	<i>E</i>	0.0292	0.0527	0.0736	0.2894	1.1962	1.6570	2.7908	0.4989
	<i>A</i>	0.0285	0.0522	0.0733	0.2893	1.1963	1.6571	2.7911	0.4988
$T = 20$	<i>E</i>	0.0330	0.0555	0.0758	0.2902	1.1959	1.6561	2.7883	0.4997
	<i>A</i>	0.0329	0.0554	0.0757	0.2902	1.1959	1.6561	2.7884	0.4997
$T = 50$	<i>E</i>	0.0342	0.0563	0.0764	0.2904	1.1958	1.6558	2.7876	0.49995
	<i>A</i>	0.0342	0.0563	0.0764	0.2904	1.1958	1.6558	2.7876	0.49995
$T = \infty$		0.0345	0.0565	0.0765	0.2905	1.1958	1.6557	2.7875	0.5000

Table 1.2 Percent points for distributions of $\frac{1}{T^2} \sum_{t=1}^T (y_t - \bar{y})^2$

		Probability of a smaller value							
		0.01	0.05	0.1	0.5	0.9	0.95	0.99	Mean
$T = 10$	<i>E</i>	0.0181	0.0313	0.0416	0.1174	0.3480	0.4629	0.7472	0.1650
	<i>A</i>	0.0181	0.0296	0.0401	0.1171	0.3481	0.4632	0.7480	0.1650
$T = 20$	<i>E</i>	0.0228	0.0352	0.0449	0.1185	0.3475	0.4617	0.7444	0.1663
	<i>A</i>	0.0226	0.0350	0.0448	0.1185	0.3475	0.4618	0.7445	0.1663
$T = 50$	<i>E</i>	0.0245	0.0363	0.0458	0.1188	0.3473	0.4614	0.7436	0.1666
	<i>A</i>	0.0245	0.0363	0.0458	0.1188	0.3473	0.4614	0.7436	0.1666
$T = \infty$		0.0248	0.0366	0.0460	0.1189	0.3473	0.4614	0.7435	0.1667

Table 1.3 Percent points for limiting distributions of $T(\hat{\rho}_\delta - 1)$

δ	Probability of a smaller value							Mean	SD
	0.01	0.05	0.1	0.5	0.9	0.95	0.99		
-1	-12.687	-7.036	-4.714	0.578	4.717	6.095	9.337	0.219	4.152
-0.5	-13.124	-7.469	-5.144	-0.141	2.732	3.567	5.495	-0.781	3.576
0	-13.695	-8.039	-5.714	-0.853	0.928	1.285	2.033	-1.781	3.180
0.5	-14.510	-8.856	-6.533	-1.721	-0.418	-0.302	-0.179	-2.781	3.037
1	-15.803	-10.107	-7.752	-2.757	-1.142	-0.925	-0.636	-3.781	3.180
1.5	-17.860	-11.852	-9.325	-3.743	-1.576	-1.236	-0.791	-4.781	3.576
2	-20.666	-13.942	-11.092	-4.662	-1.895	-1.446	-0.883	-5.781	4.152

Table 1.4 Percent points for (1.62), (1.63) and $N(0,1)$

		Probability of a smaller value						
		0.5	0.6	0.7	0.8	0.9	0.95	0.975
(1.62)	0	0.0887	0.2494	0.5169	1.0344	1.5951	2.1819	2.9838
(1.63)	0	0.2034	0.4293	0.7157	1.1731	1.6183	2.0606	2.6442
$N(0,1)$	0	0.2533	0.5244	0.8416	1.2816	1.6449	1.9600	2.3263

Table 1.5 Percent points of $F_j(x)$ in (1.72)

		Probability of a smaller value						
		0.5	0.6	0.7	0.8	0.9	0.95	0.975
$j = 1$	0	0.1940	0.4089	0.6800	1.1100	1.5262	1.9392	2.4852
$j = 2$	0	0.1414	0.2955	0.4836	0.7662	1.0251	1.2723	1.5890

Table 1.6 Percent points for limiting distributions of $T(\hat{\beta}_j - \beta)$

		Probability of a smaller value						
		0.5	0.6	0.7	0.8	0.9	0.95	0.975
$j = 1$	0	0.4113	0.8823	1.5163	2.6191	3.7716	4.9646	6.5855
$j = 2$	0	0.6747	1.4242	2.3740	3.8846	5.3489	6.8141	8.8364

Figure 1.1 Probability densities in (1.25)

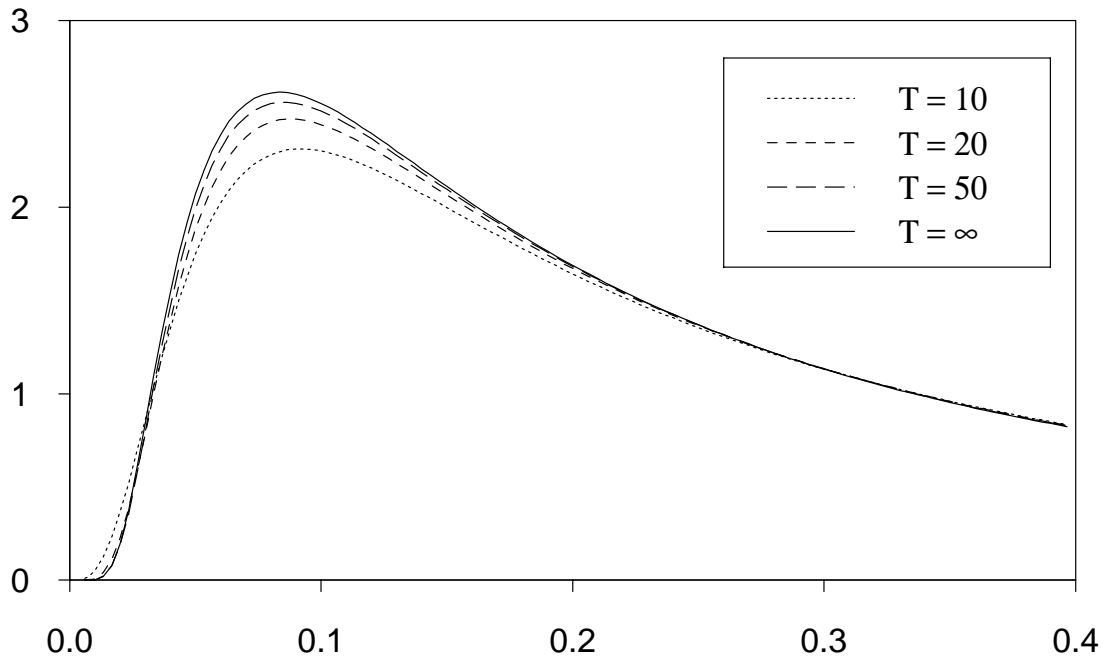


Figure 1.2 Probability densities in (1.26)

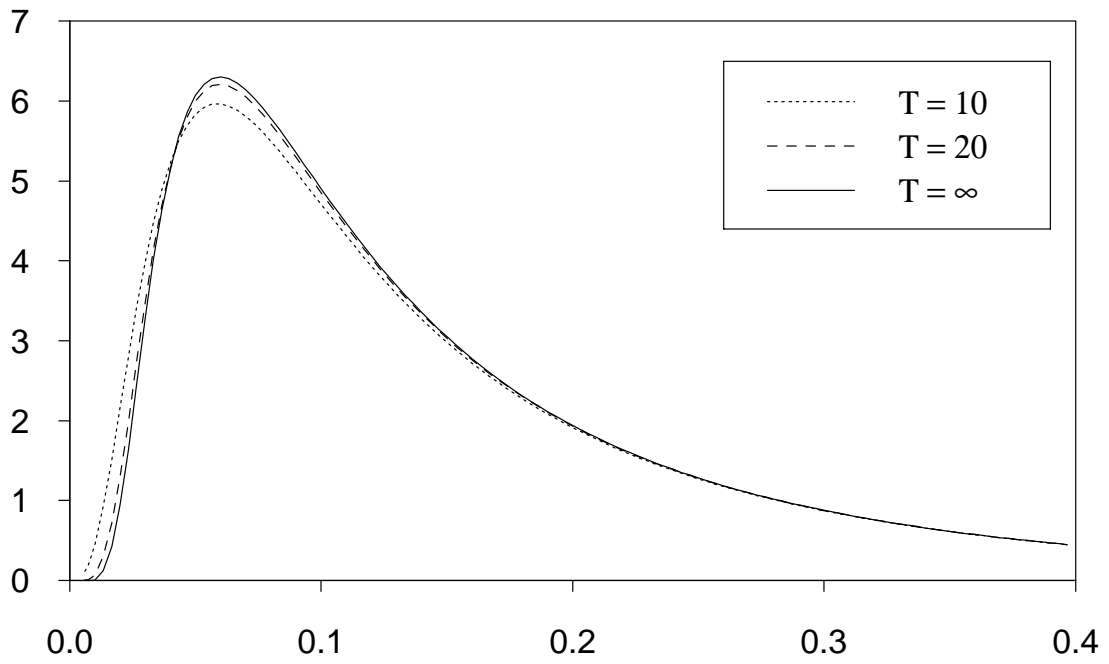


Figure 1.3 Limiting probability densities in (1.38)

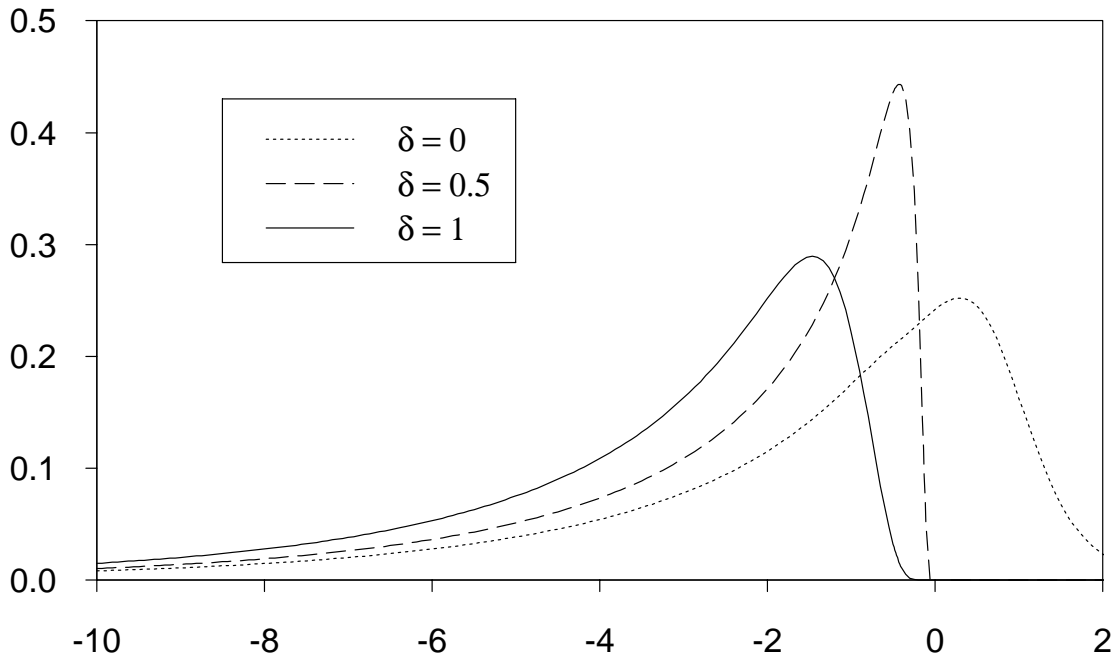


Figure 1.4 Probability densities of (1.62), (1.63) and $N(0,1)$

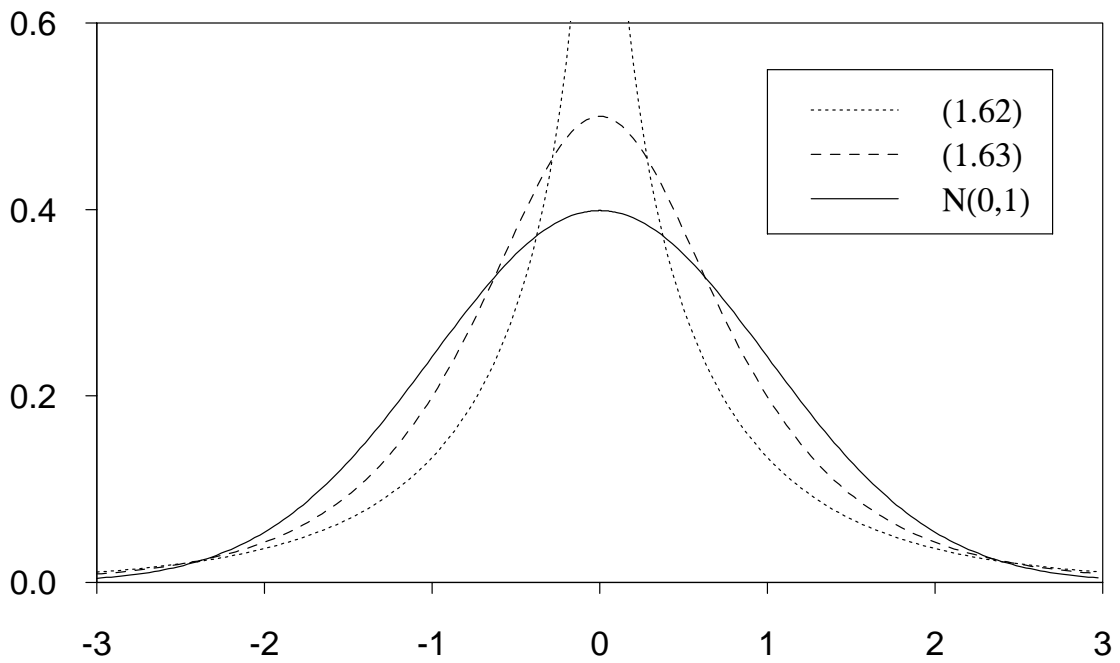


Figure 1.5 Probability densities of $F_j(x)$ in (1.72)

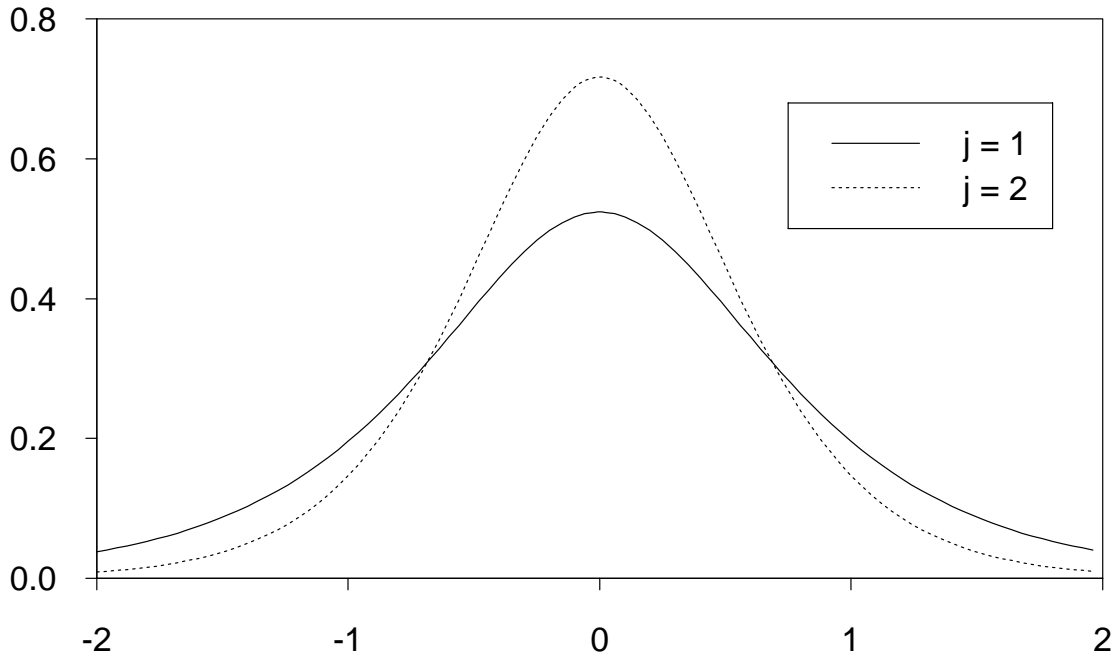


Figure 1.6 Limiting probability densities of $T(\hat{\beta}_j - \beta)$

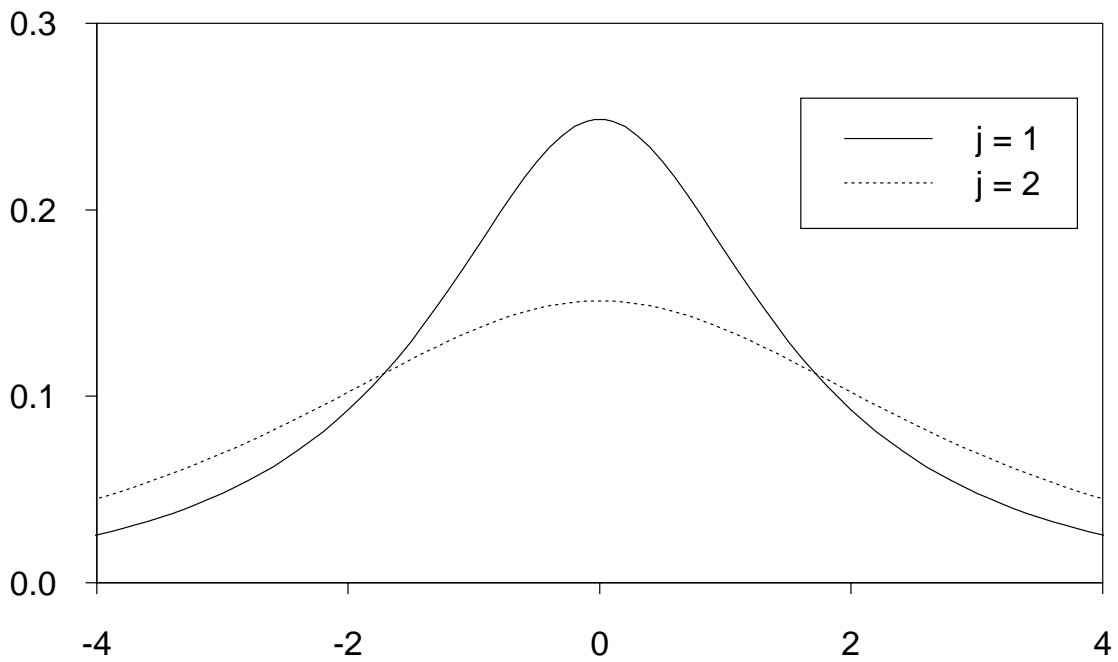


Figure 2.1 Simulated standard Brownian motion

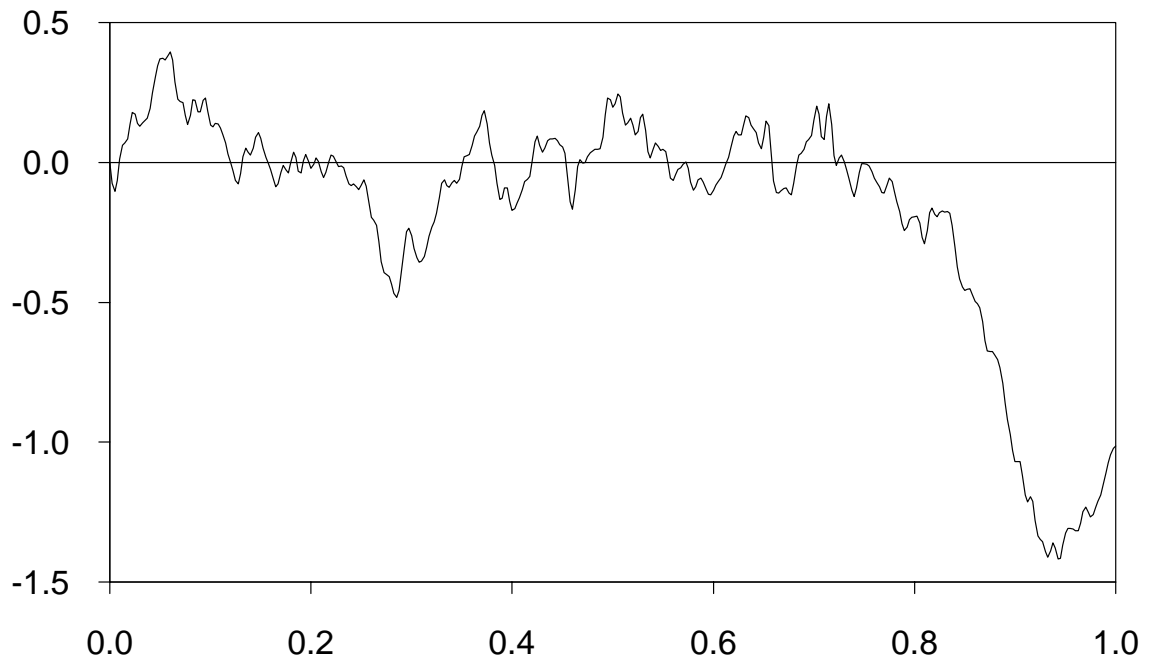


Figure 2.2 Simulated Brownian bridge

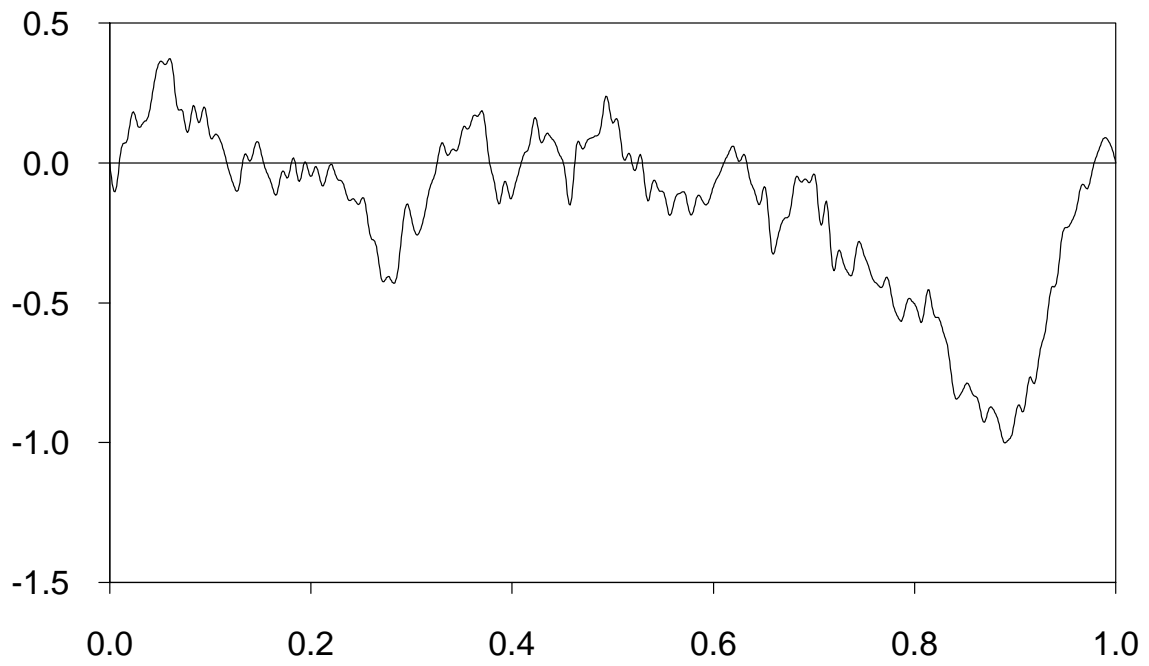


Figure 2.3 Simulated one - fold integrated Brownian motion

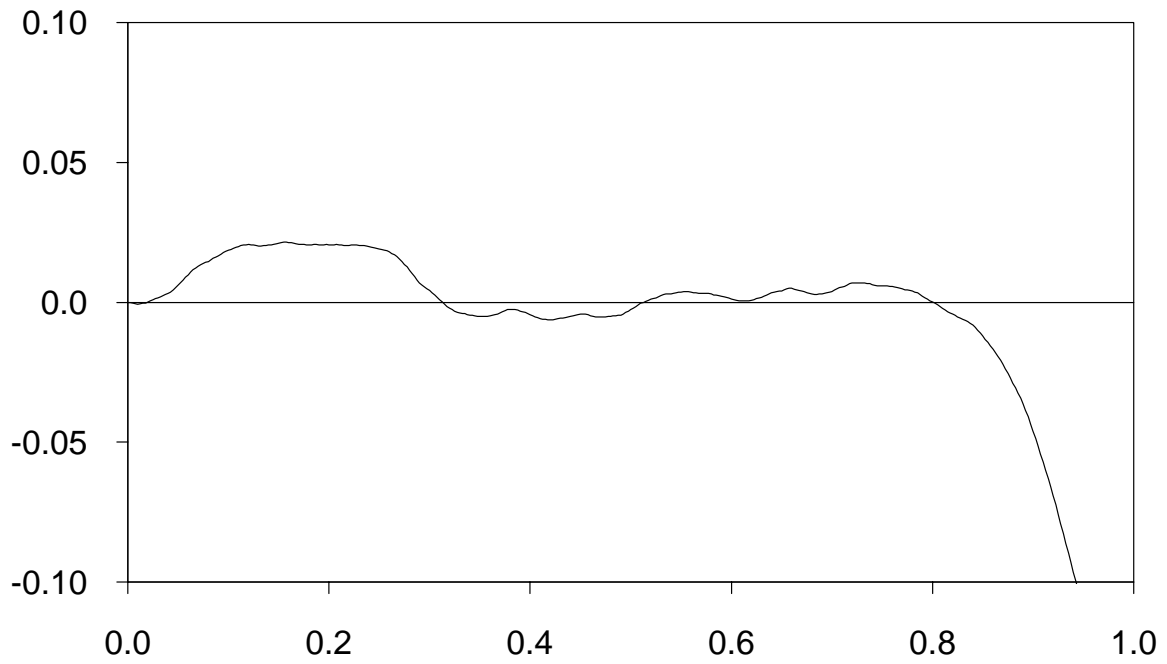


Figure 2.4 Simulated two - fold integrated Brownian motion

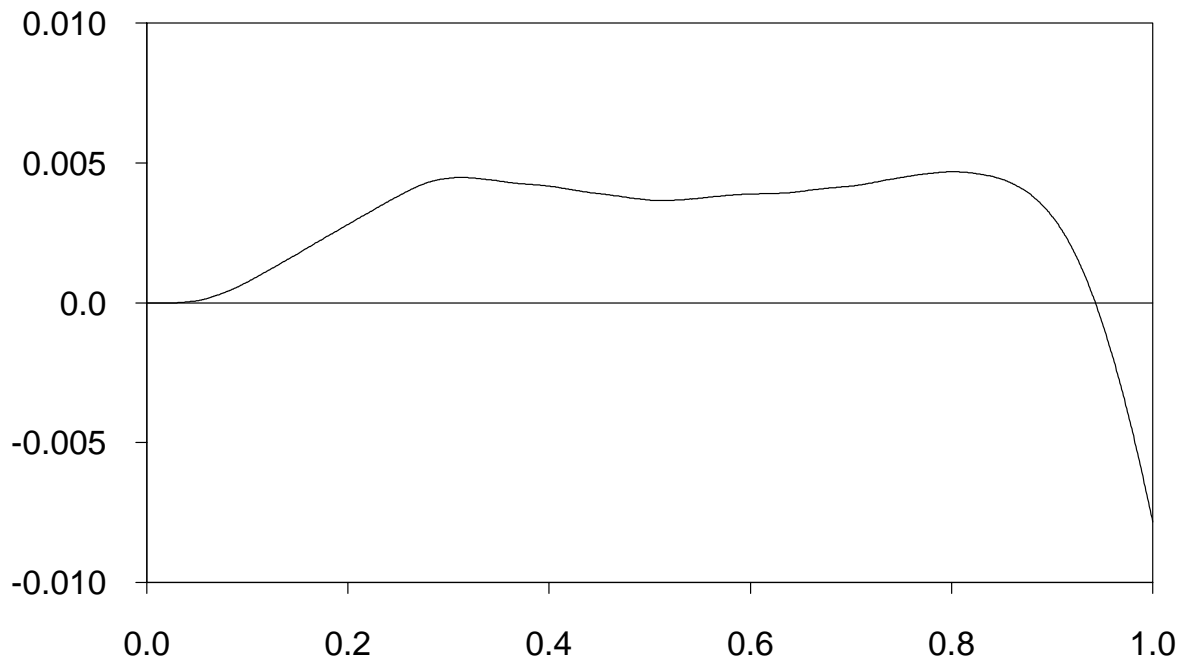


Figure 2.5 Nonstationary O - U process

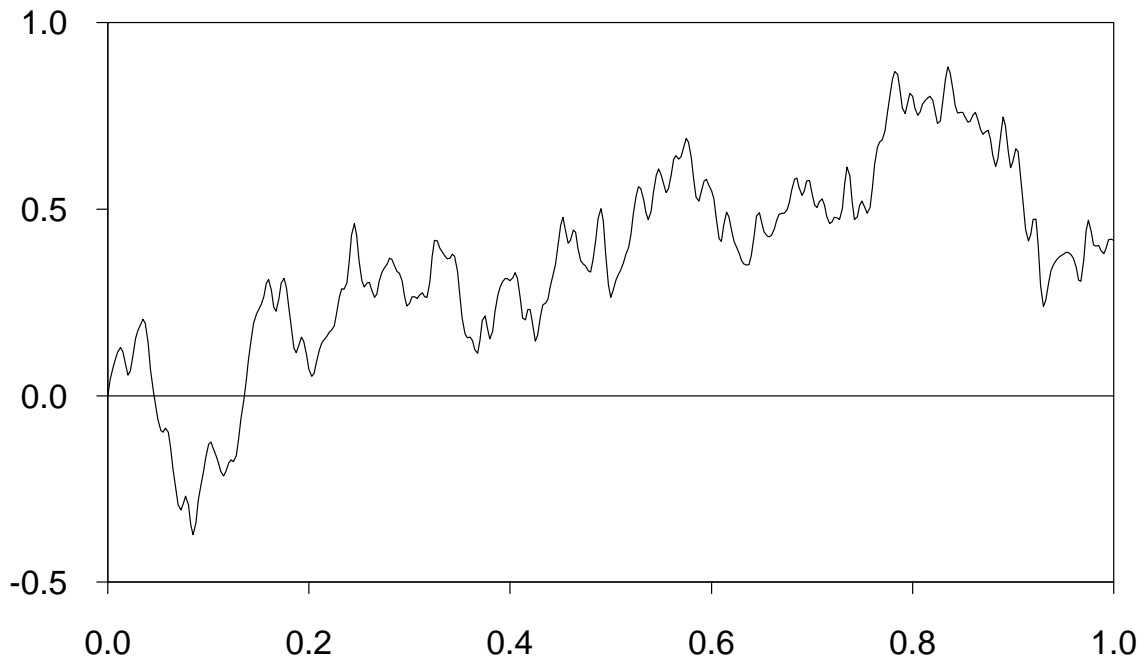


Figure 2.6 Stationary O - U process

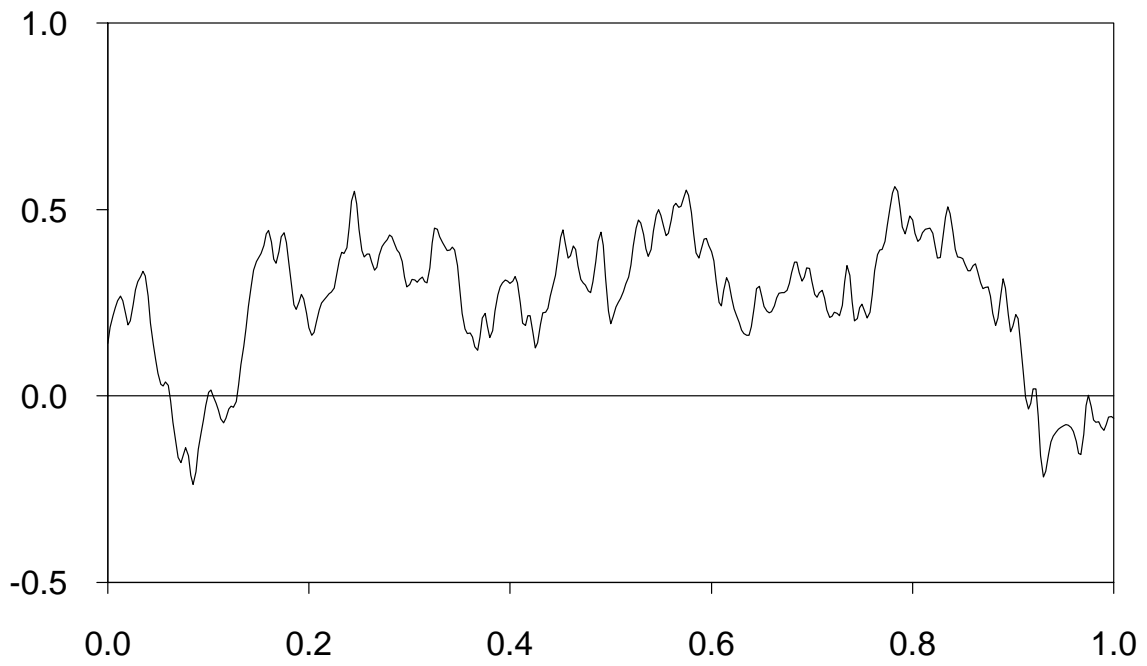


Figure 3.1 Sample path of $\{X_n\}$

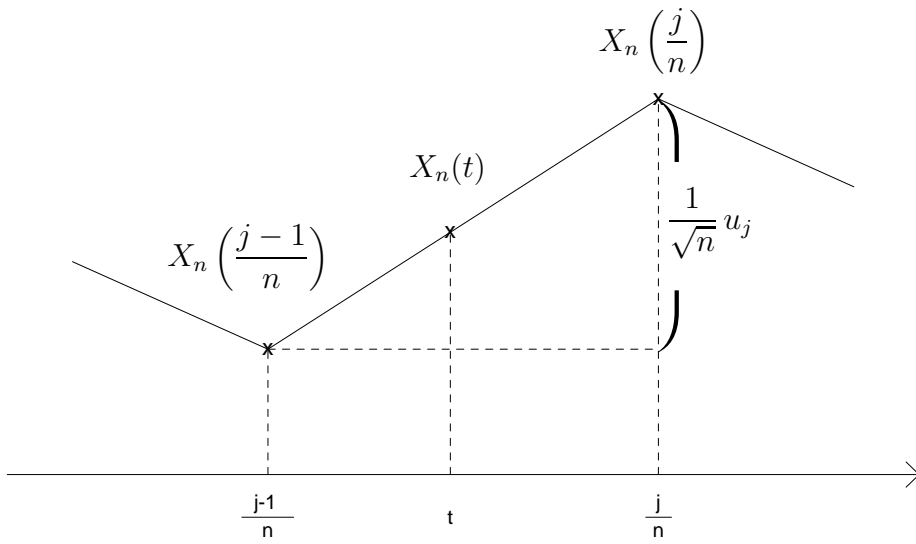


Table 6.1 Fortran program for computing $F_1(x)$ and $f_1(x)$

```

PARAMETER(M=50,N=50,KX=120)
IMPLICIT REAL*8(A-E,P-Z),COMPLEX*16(F)
DIMENSION F(0:2),FDF(2),FPD(2)
PI=1D0/3.141592653589793D0
SN=DFLOAT(N)
L=M*N
DO 100 K=1,KX
X=DFLOAT(K)*1D-2
F(0)=1D0
S1=0D0
S2=0D0
T1=0D0
T2=0D0
DO 1 I=1,L-1,2
DO 2 J=1,2
U=DFLOAT(I+J-1)/SN
T=U*U
CALL CHAR(T,F(J-1),F(J))
FDF(J)=DCMLX(DSIN(T*X),DCOS(T*X)-1D0)*F(J)*2D0/U
FPD(J)=DCMLX(DCOS(T*X),-DSIN(T*X))*F(J)*2D0*U
2 CONTINUE
S1=S1+DREAL(FDF(1))
S2=S2+DREAL(FDF(2))
T1=T1+DREAL(FPD(1))
T2=T2+DREAL(FPD(2))
F(0)=F(2)
1 CONTINUE
PROB=PI*(4D0*S1+2D0*S2-DREAL(FDF(2)))/(3D0*SN)
PD=PI*(4D0*T1+2D0*T2-DREAL(FPD(2)))/(3D0*SN)
WRITE(6,20)X,PROB,PD
20 FORMAT(3F13.6)
100 CONTINUE
STOP
END
SUBROUTINE CHAR(T,FL,FP)
IMPLICIT REAL*8(T),COMPLEX*16(F)
F0=(0D0,1D0)
F1=2D0*F0*T
F2=CDSQRT(F1)
FP=1D0/CDSQRT(CDSIN(F2)/F2)
IF(CDABS(FL+FP).LE.CDABS(FL-FP))FP=-FP
RETURN
END

```

Table 6.2 Fortran program for computing $F_6(x)$ and $f_6(x)$

```

PARAMETER(M=30,N=100,KX=18)
IMPLICIT REAL*8(A-E,P-Z),COMPLEX*16(F,G)
DIMENSION F(0:2),G(0:2),FDF(2),GDF(2)
DATA DINC/1D-6/
PI=1D0/3.141592653589793D0
SN=DFLOAT(N)
L=M*N
DO 100 K=1,KX
X=DFLOAT(K)-15.5D0
X1=X+DINC
F(0)=1D0
G(0)=1D0
S1=0D0
S2=0D0
T1=0D0
T2=0D0
DO 1 I=1,L-1,2
DO 2 J=1,2
U=DFLOAT(I+J-1)/SN
T=U*U
CALL CHAR(X,T,U,F(J-1),F(J),FDF(J))
CALL CHAR(X1,T,U,G(J-1),G(J),GDF(J))
2 CONTINUE
S1=S1+DIMAG(FDF(1))
S2=S2+DIMAG(FDF(2))
T1=T1+DIMAG(GDF(1))
T2=T2+DIMAG(GDF(2))
F(0)=F(2)
G(0)=G(2)
1 CONTINUE
PROB=PI*(4D0*S1+2D0*S2-DIMAG(FDF(2)))/(3D0*SN)+5D-1
PROB1=PI*(4D0*T1+2D0*T2-DIMAG(GDF(2)))/(3D0*SN)+5D-1
PD=(PROB1-PROB)/DINC
WRITE(6,20)X,PROB,PD
20 FORMAT(3X,F8.4,F10.6,F8.4)
100 CONTINUE
STOP
END
SUBROUTINE CHAR(X,T,U,FL,FP,F)
IMPLICIT REAL*8(X,T,U),COMPLEX*16(F)
F0=(0D0,1D0)
F1=CDEXP(F0*T/2D0)
F2=2D0*F0*T*X
F3=CDSQRT(F2)
FP=F1/CDSQRT(CDCOS(F3)+F0*T*CDSIN(F3)/F3)
IF(CDABS(FL+FP).LE.CDABS(FL-FP))FP=-FP
F=FP*2D0/U
RETURN
END

```

Table 6.3 Fortran program for computing percent points of S_3 in (6.19)

```

PARAMETER(M=50,N=50,II=50,IS=5,JK=7)
IMPLICIT REAL*8(A-E,P-Z),COMPLEX*16(F,G)
DIMENSION F(0:2),DF(2),XX(JK),YY(JK),PERPO(JK),
* RA(N),RB(N),SA(0:II,0:II),SB(0:II,0:II)
DATA XX/5D-4,17D-4,3D-3,39D-3,22D-2,31D-2,53D-2/
DATA YY/6D-4,18D-4,4D-3,40D-3,23D-2,32D-2,54D-2/
DATA PERPO/1D-2,5D-2,1D-1,5D-1,9D-1,95D-2,99D-2/
PI=3.141592653589793D0
SN=DFLOAT(N)
L=M*N
F(0)=1D0
DO 1 I=1,L-1,2
DO 2 J=1,2
U=DFLOAT(I+J-1)/SN
T=U*U*U*U
CALL CHAR(T,F(J-1),F(J))
DF(J)=DIMAG(F(J))*4D0/U
2 CONTINUE
S1=S1+DF(1)
S2=S2+DF(2)
F(0)=F(2)
1 CONTINUE
PROB0=(4D0*S1+2D0*S2-DF(2))/3D0/SN/PI
DO 100 IK=1,JK
X1=XX(IK)
X2=YY(IK)
IT=0
222 IT=IT+1
X=(X1+X2)/2D0
FAL=1D0
FBL=1D0
AL=0D0
BL=0D0
DO 3 I=0,II
DA=PI/X/2D0
DB=PI/X
AP=DSQRT(DSQRT(DFLOAT(2*I+1)*DA))
BP=DSQRT(DSQRT(DFLOAT(I+1)*DB))
HA=AP-AL
HB=BP-BL
DO 4 J=1,N
UA=AL+HA*DFLOAT(J)/SN
UB=BL+HB*DFLOAT(J)/SN
TA=UA*UA*UA*UA
TB=UB*UB*UB*UB
CALL CHAR(TA,FAL,FAP)
FAL=FAP
CALL CHAR(TB,FBL,FBP)
FBL=FBP
RA(J)=DCOS(TA*X)*DIMAG(FAP)*4D0/UA

```

```

RB(J)=DSIN(TB*X)*DREAL(FBP)*4D0/UB
4 CONTINUE
AL=AP
BL=BP
S1=OD0
S2=OD0
T1=OD0
T2=OD0
DO 5 J=2,N,2
S1=S1+RA(J-1)
S2=S2+RA(J)
T1=T1+RB(J-1)
T2=T2+RB(J)
5 CONTINUE
VA=(4D0*S1+2D0*S2-RA(N))*HA
VB=(4D0*T1+2D0*T2-RB(N))*HB
IF(MOD(I,2).EQ.0)THEN
SA(I,0)=VA
SB(I,0)=VB
ELSE
SA(I,0)=-VA
SB(I,0)=-VB
END IF
3 CONTINUE
DO 6 K=1,II
DO 7 J=IS,II-K
SA(J,K)=(SA(J+1,K-1)-SA(J,K-1))/2D0
SB(J,K)=(SB(J+1,K-1)-SB(J,K-1))/2D0
7 CONTINUE
6 CONTINUE
SUMA=OD0
SUMB=OD0
SUMC=OD0
SUMD=OD0
DO 8 I=0,II
IF(MOD(I,2).EQ.0.)THEN
SGN=1D0
ELSE
SGN=-1D0
END IF
IF(I.LE.IS-1)THEN
SUMA=SUMA+SGN*SA(I,0)
SUMB=SUMB+SGN*SB(I,0)
ELSE
SUMC=SUMC+SGN*SA(IS,I-IS)
SUMD=SUMD+SGN*SB(IS,I-IS)
END IF
8 CONTINUE
PROBA=(SUMA+SUMC/2D0)/3D0/SN/PI
PROBB=(SUMB+SUMD/2D0)/3D0/SN/PI
PROB=PROBO-PROBA+PROBB
IF(PROB-PERPO(IK).LT.OD0)THEN
X1=X
ELSE
X2=X
END IF
IF(X2-X1.LE.1D-10.OR.IT.EQ.30)GO TO 111

```

```

WRITE(6,30)IT,X,PROB
GO TO 222
111 WRITE(6,30)IT,X,PROB
30 FORMAT(I5,2F15.8)
100 CONTINUE
STOP
END
SUBROUTINE CHAR(T,FL,FP)
IMPLICIT REAL*8(A-D,P-Z),COMPLEX*16(F)
FO=(ODO,1D0)
F1=2D0*FO*T
F2=CDSQRT(F1)
F3=CDSQRT(F2)
F4=(1D0+CDCOS(F3)*CDCOS(FO*F3))/2D0
FP=1D0/CDSQRT(F4)
IF(CDABS(FL+FP).LE.CDABS(FL-FP))FP=-FP
RETURN
END

```

Table 6.4 Percent points of S_3 in (6.19) and S_4 in (6.31)

	Probability of a smaller value						
	0.01	0.05	0.1	0.5	0.9	0.95	0.99
S_3	0.00056	0.00179	0.00347	0.0393	0.2213	0.3132	0.5391
S_4	0.000022	0.000099	0.000224	0.00384	0.02240	0.03176	0.05479

Table 6.5 Saddlepoint approximations associated with (6.58)

x	0.01	0.05	0.1	0.2	0.5	0.8	1
θ_-	-1395.97	-77.08	-25.27	-9.08	-2.68	-1.52	-1.17
θ_+	3.06	3.21	3.39	3.68	4.18	4.41	4.50
P_-	10^{-5}	0.12	0.42	0.75	1.00	1.05	1.06
P_+	0.50	0.57	0.65	0.79	0.96	0.99	1.00
P	10^{-5}	0.12	0.42	0.73	0.96	0.99	1.00

Table 6.6 Saddlepoint approximate percentiles associated with (6.58) and (6.62)

(6.58)					
		$\alpha = 0.05$	exact	$x = 0.0366$	
θ	-135	-133	-131.5921	-128	-126
odds	0.050	0.021	0	-0.054	-0.084
x	0.0360	0.0363	0.0365	0.0371	0.0374
		$\beta = 0.95$	exact	$x = 0.4614$	
θ	4.10	4.12	4.1454	4.16	4.18
odds	-0.205	-0.117	0	0.070	0.171
x	0.4288	0.4448	0.4661	0.4789	0.4972
(6.62)					
		$\alpha = 0.05$	exact	$x = 0.00179$	
θ	-1330	-1310	-1295.4102	-1270	-1250
odds	0.027	0.011	0	-0.020	-0.036
x	0.00171	0.00173	0.00175	0.00178	0.00180
		$\beta = 0.95$	exact	$x = 0.3132$	
θ	5.15	5.17	5.1978	5.22	5.24
odds	-0.175	-0.103	0	0.087	0.168
x	0.2932	0.3035	0.3185	0.3311	0.3429

Figure 6.1 The computer - generated c. f. in (6.3)

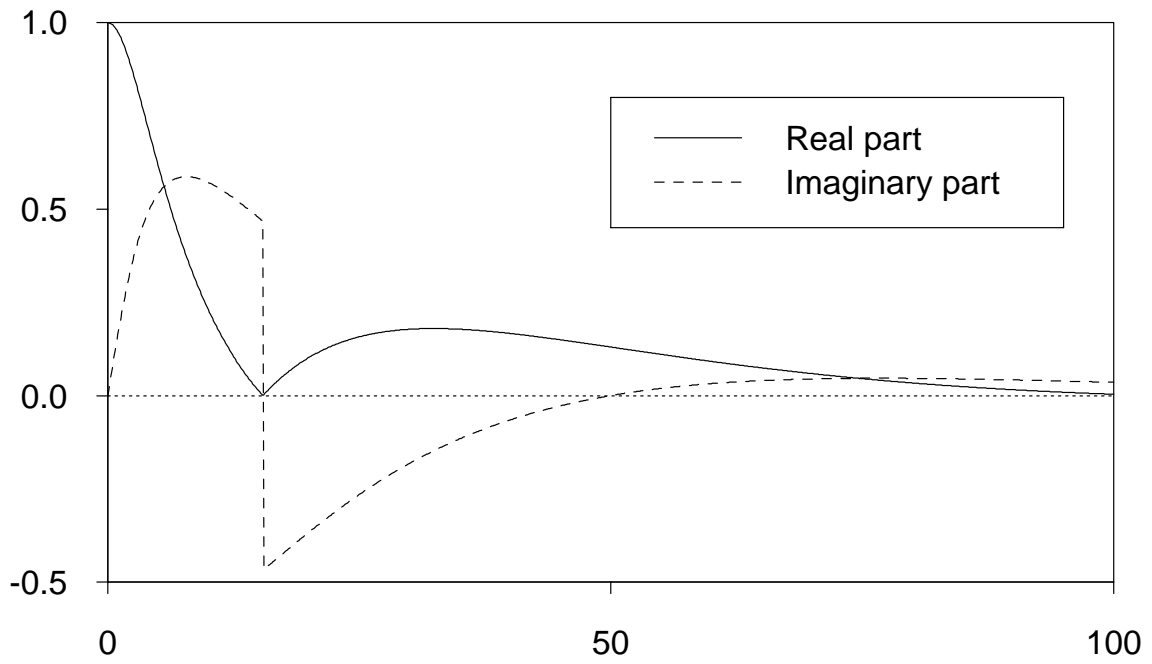


Figure 6.2 The true c. f. in (6.3)

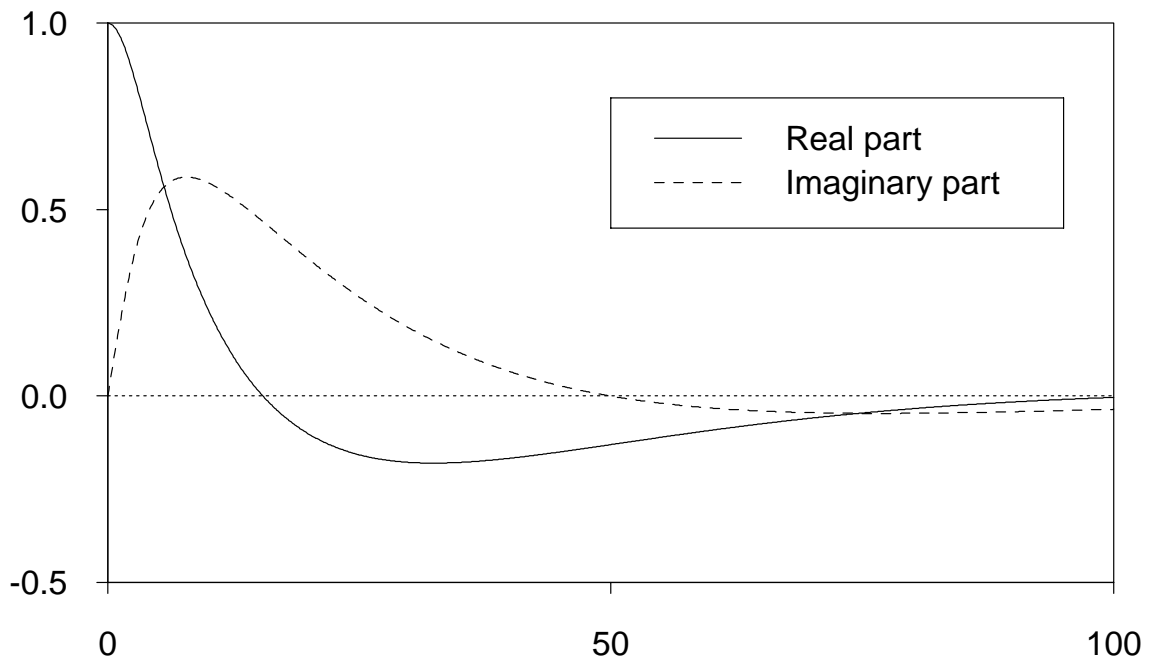


Figure 6.3 The integrand in (6.6) for $x = 0.74346$

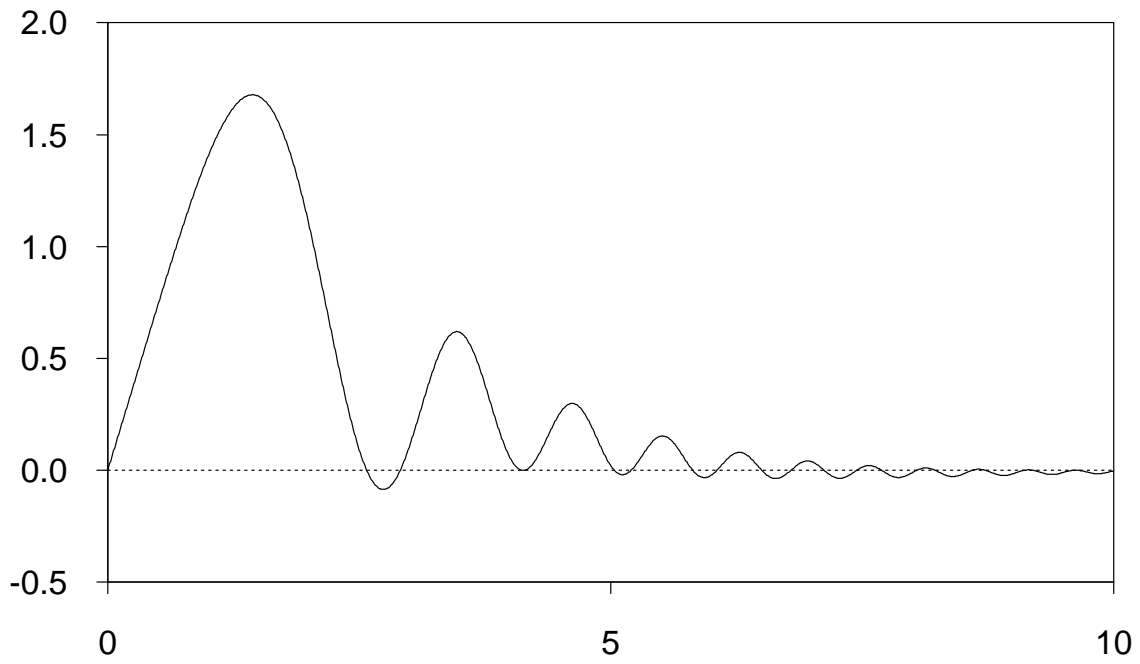


Figure 6.4 The integrand in (6.8) for $x = 0.74346$

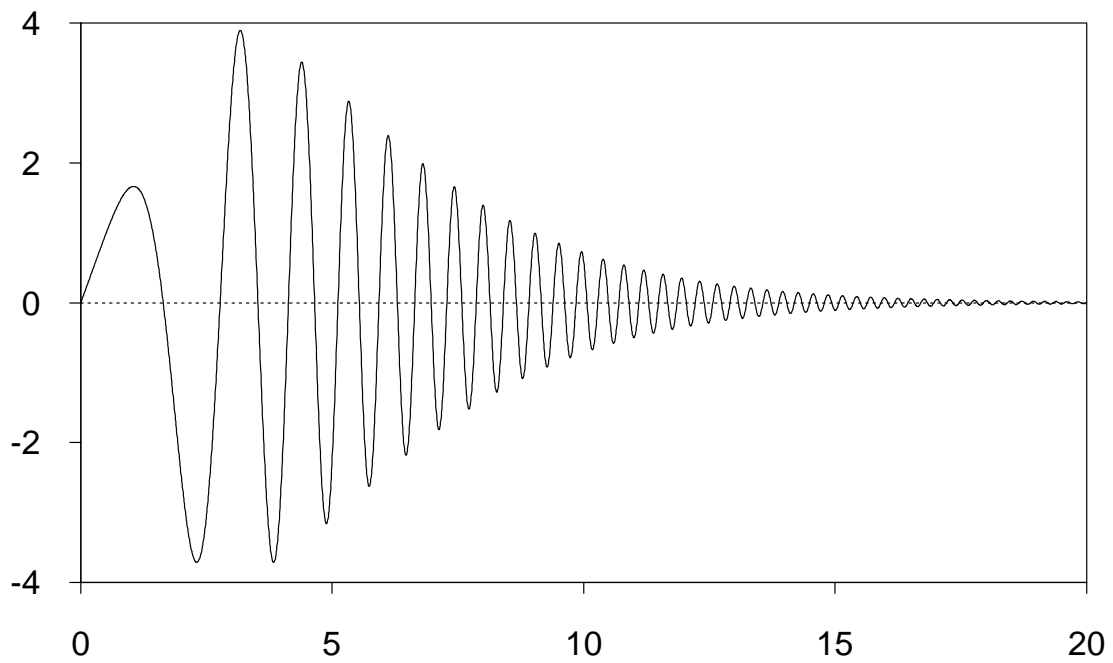


Figure 6.5 The integrand in (6.14) for $x = 3$

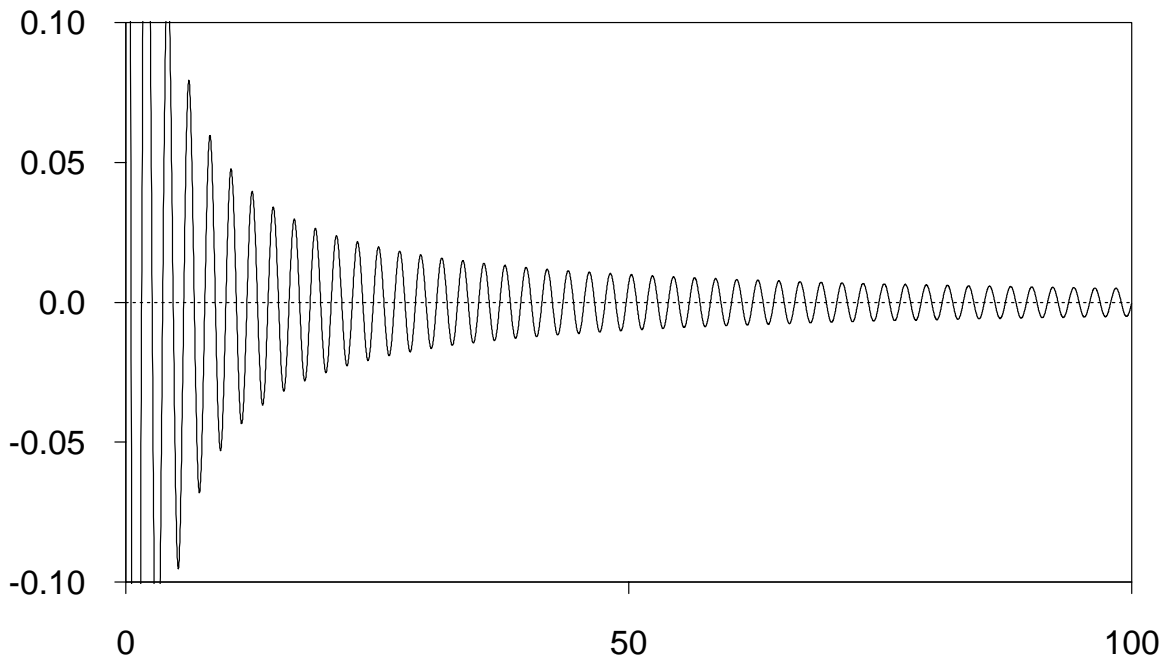


Figure 6.6 The integrand in (6.17) for $x = 3$

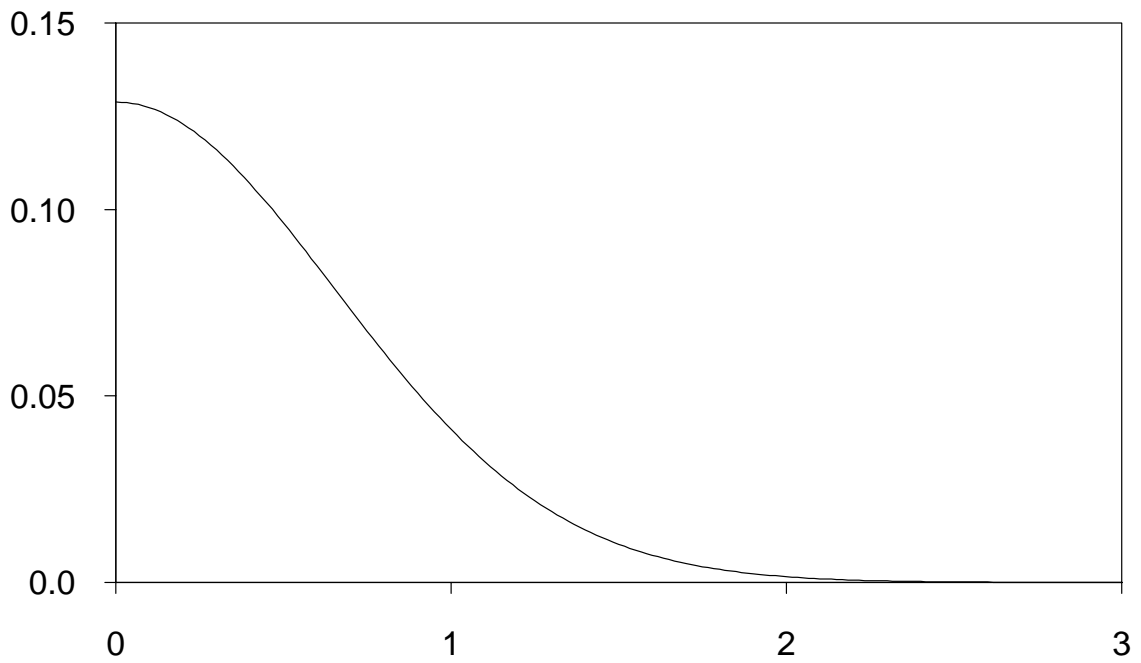


Figure 6.7 The c. f. in (6.20)

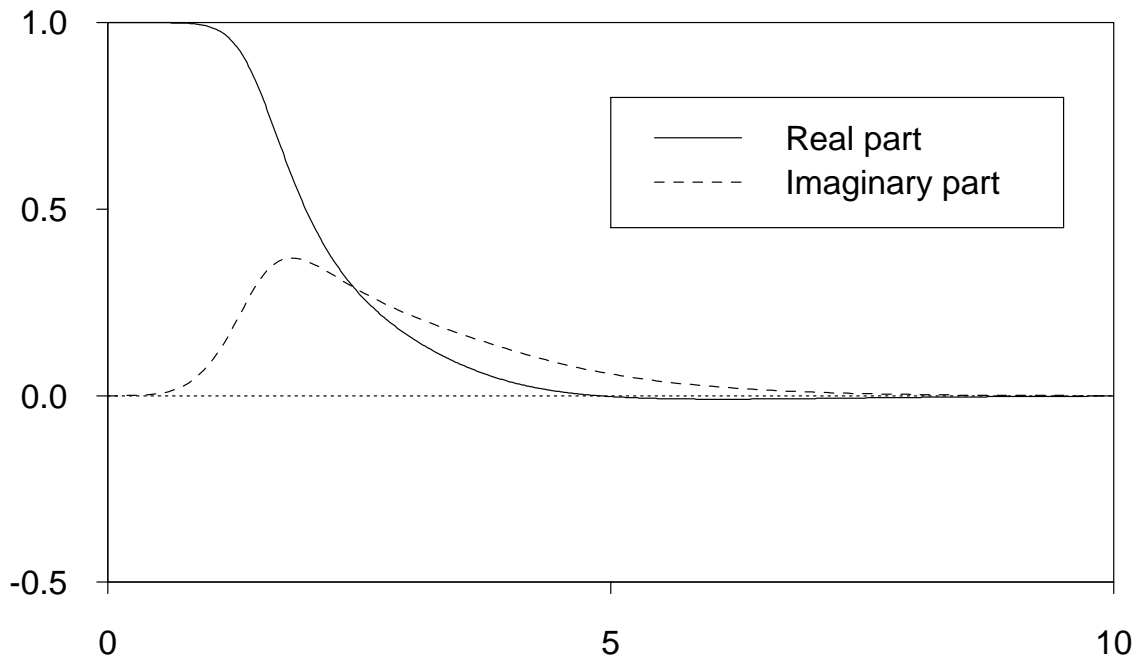


Figure 6.8 The integrand in (6.21) for $x = 0.3$

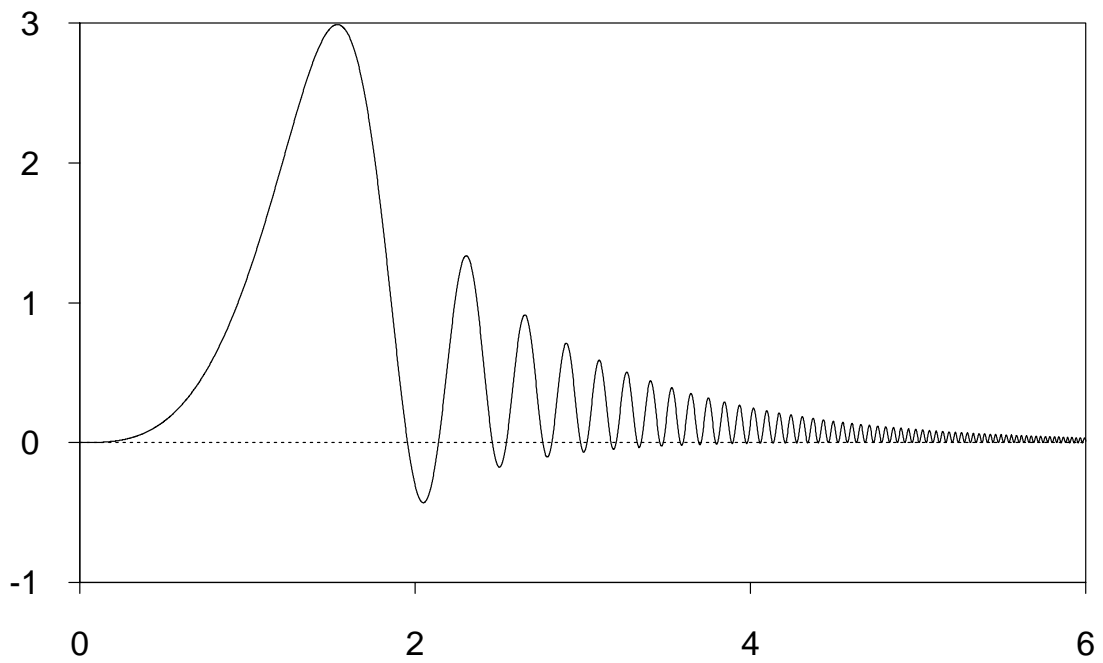


Figure 6.9 The integrand in (6.23) for $x = 0.3$

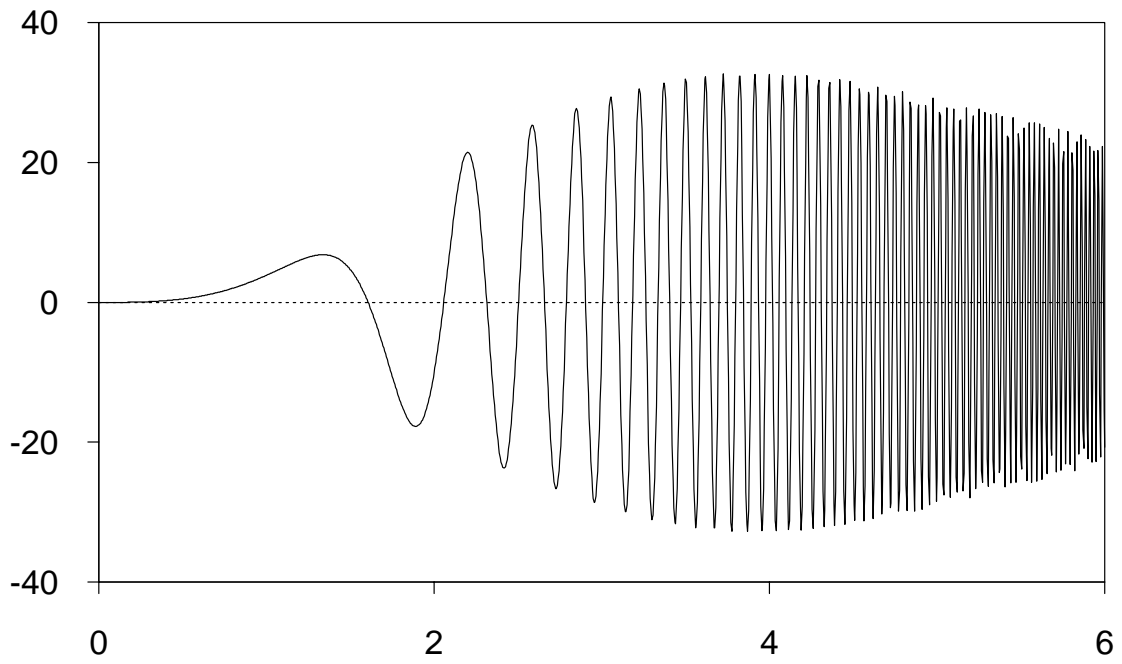


Figure 6.10 The function in (6.28) for $x = 0.3$

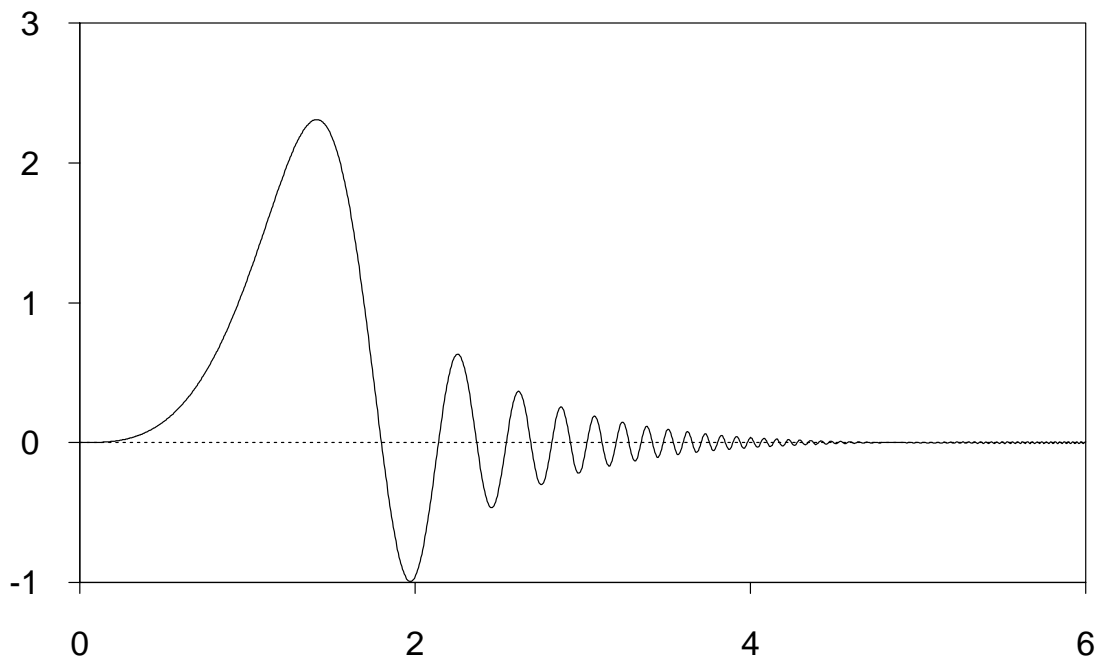


Figure 6.11 The function in (6.29) for $x = 0.3$

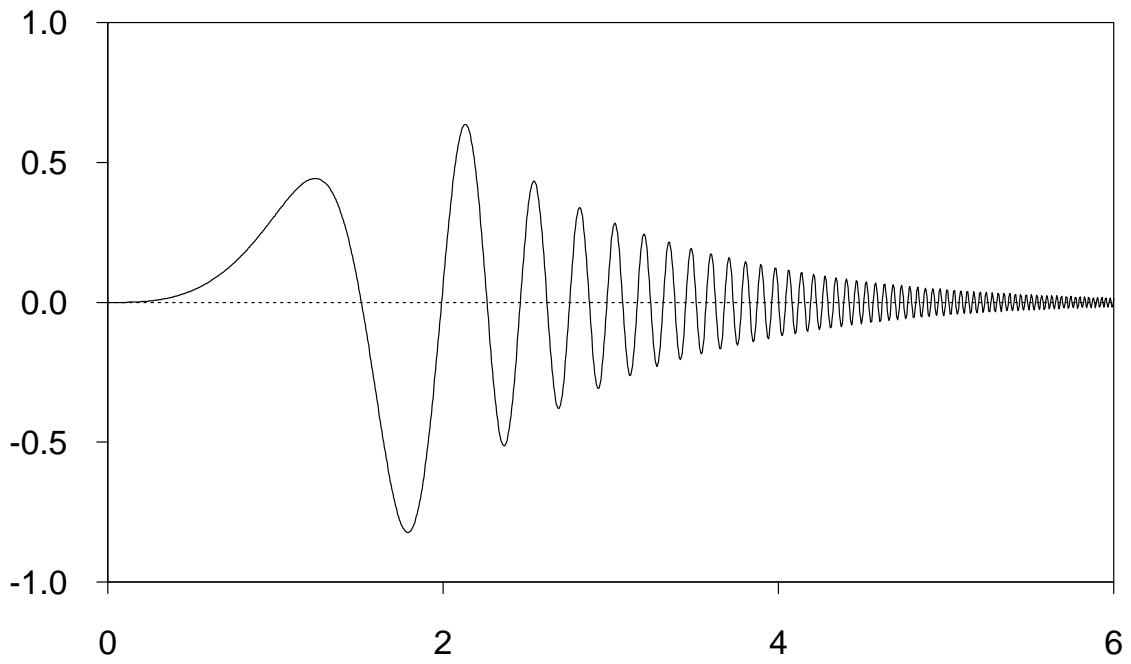


Figure 6.12 The function in (6.30)

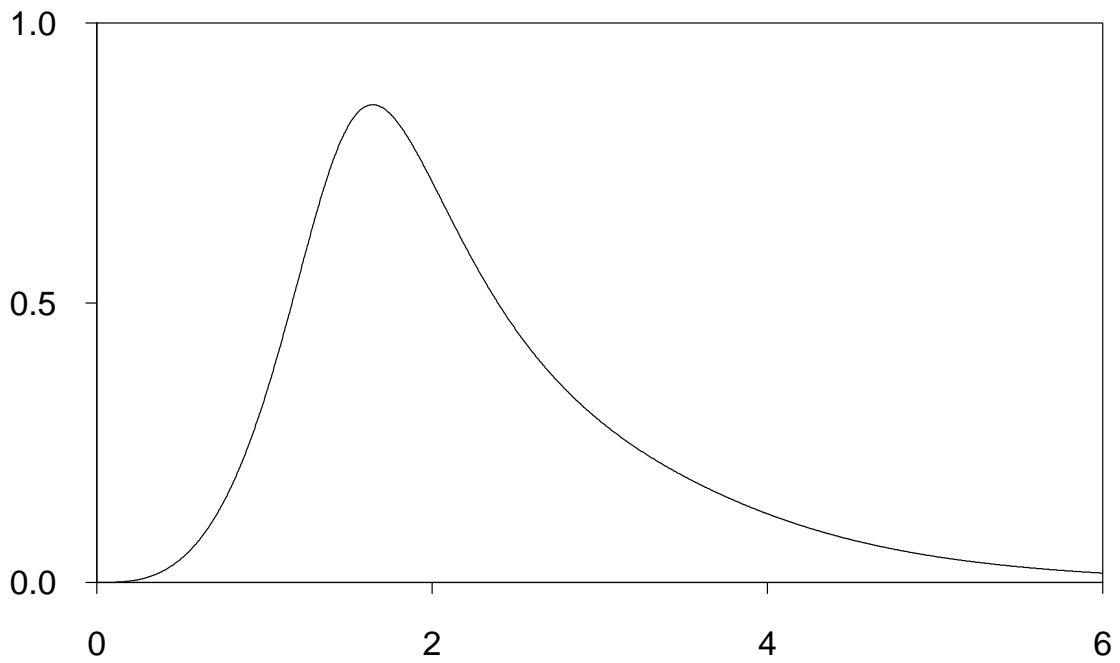


Figure 6.13 The distribution functions of (6.19) and (6.31)

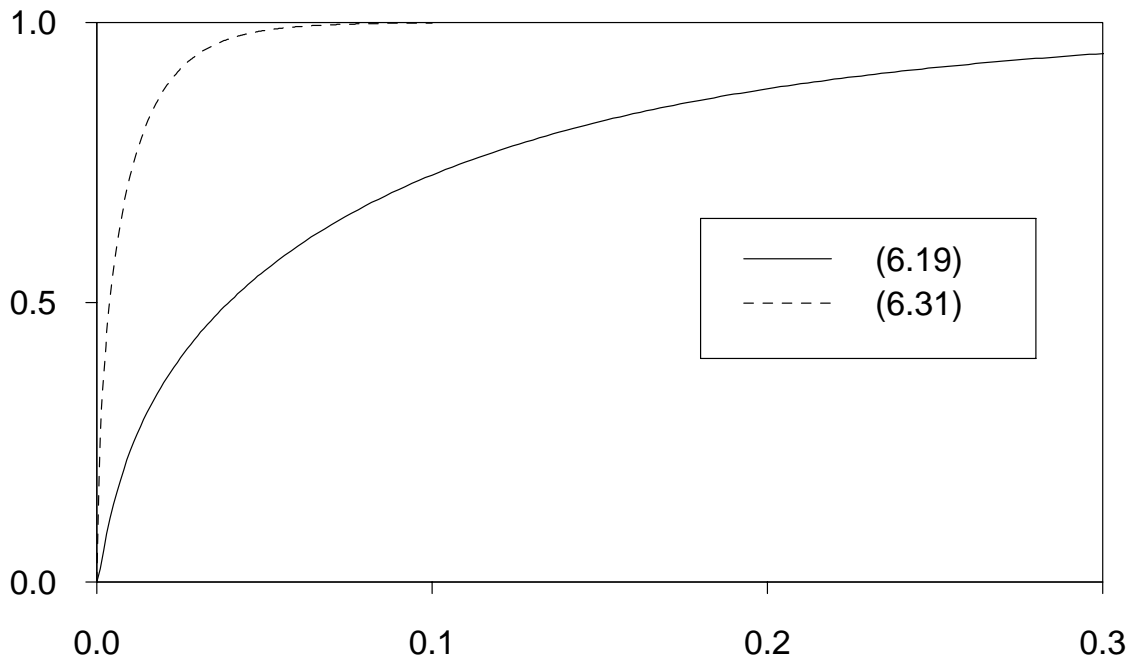


Figure 6.14 The integrand in (6.41) for $x = -8.03913$

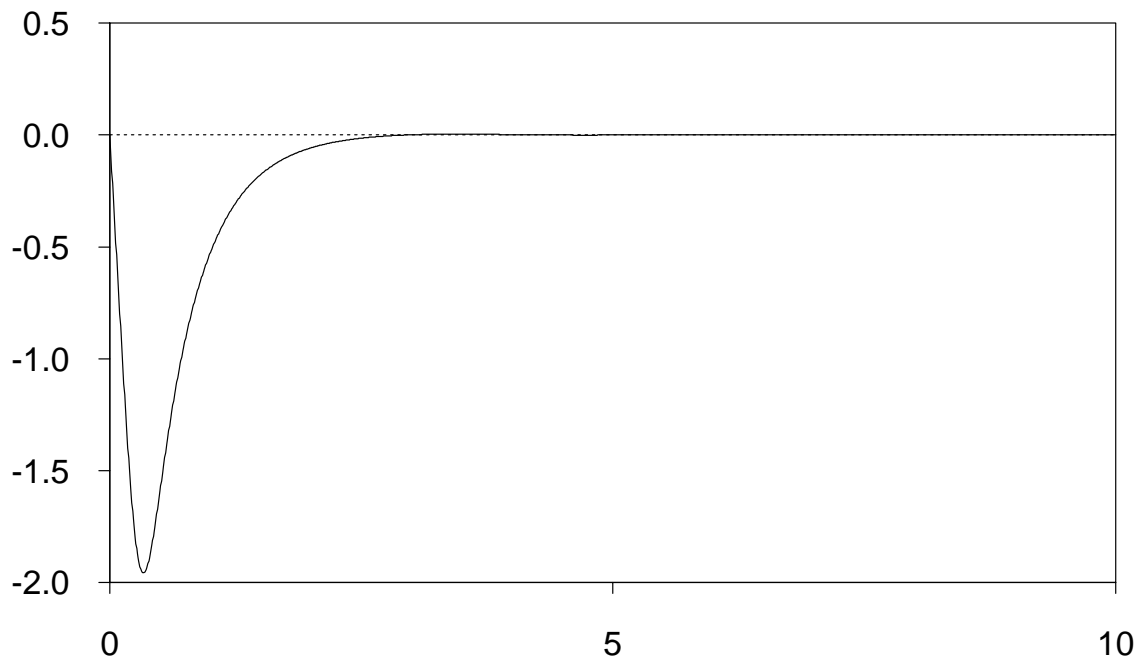


Figure 6.15 The integrand in (6.41) for $x = 0.05$

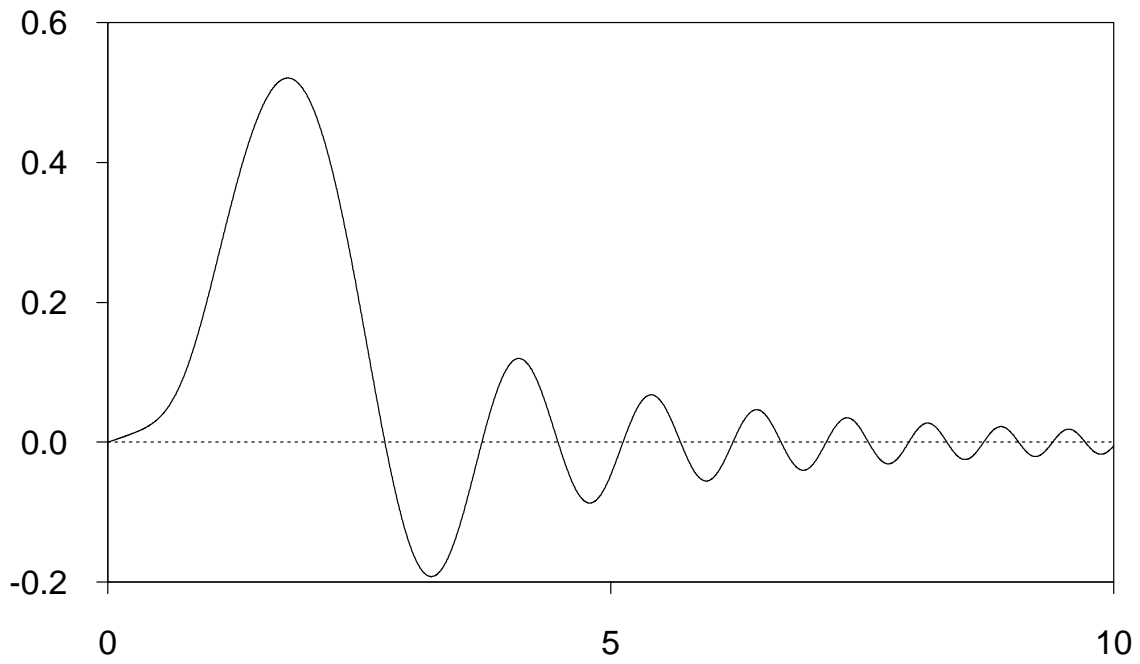


Figure 6.16 The integrand in (6.46) for $x = -14.8468$

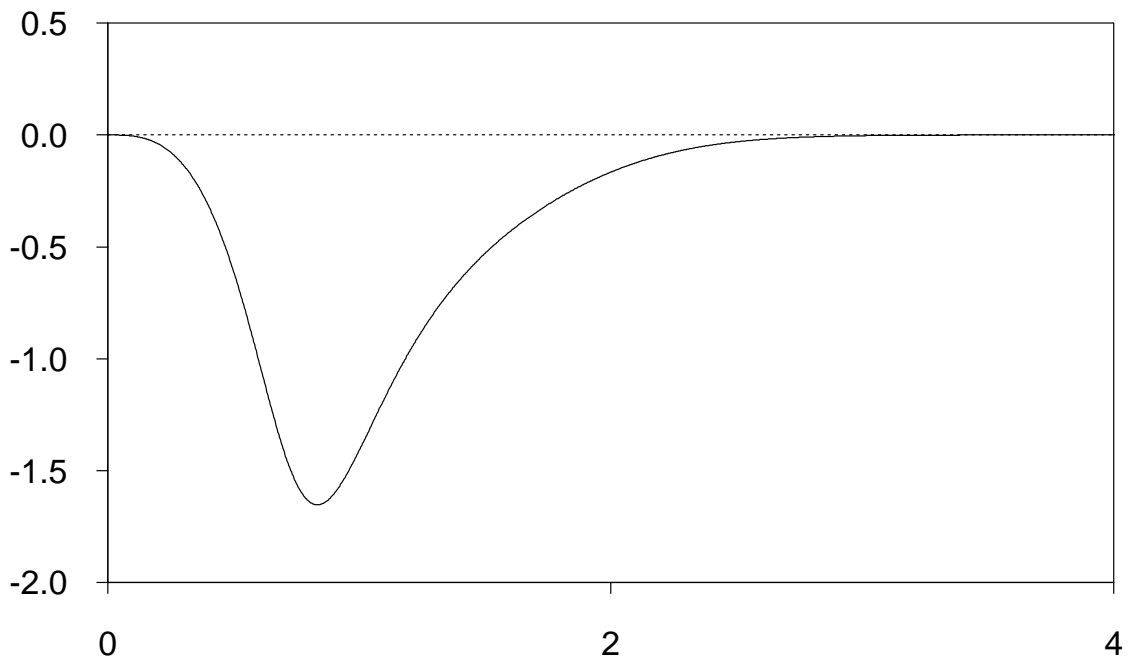


Figure 6.17 The probability density of (6.19)

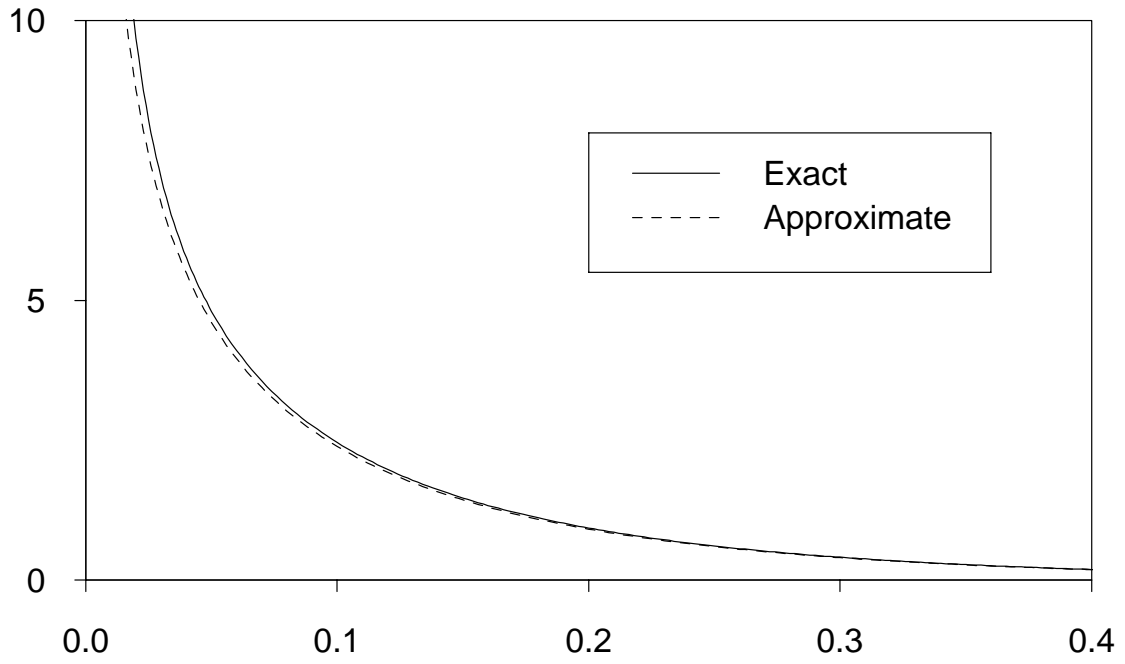


Figure 6.18 The probability density of (6.31)

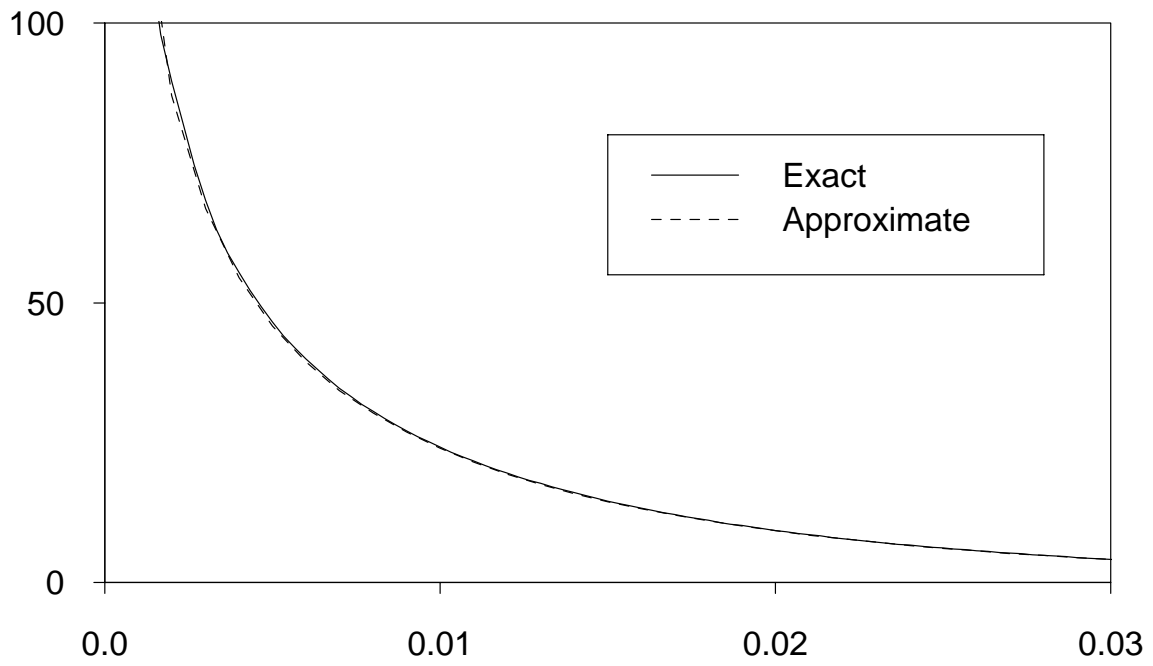


Figure 6.19 Saddlepoint approximate distributions

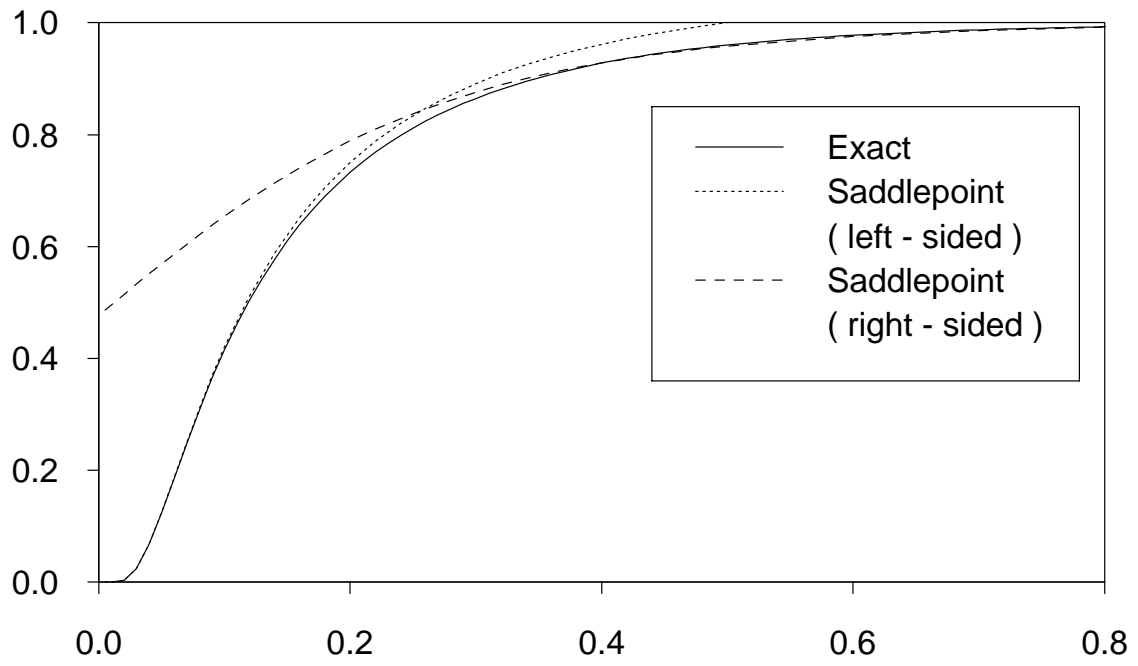


Table 7.1 Limiting distributions of $T(\hat{\rho} - 1)$ in Model A

		Probability of a smaller value						Mean	SD
		0.01	0.05	0.1	0.5	0.9	0.95	0.99	
		The fixed initial value case ($r = 1$)							
$c = -2$									
	$\gamma = 0$	-10.054	-4.559	-2.343	1.689	2.519	2.758	3.355	0.749 2.644
	$\gamma = 0.5$	-7.254	-2.845	-1.020	1.824	2.376	2.540	2.968	1.155 1.982
	$\gamma = 1$	-2.876	0.260	1.122	1.937	2.249	2.336	2.529	1.701 0.959
$c = 0$									
	$\gamma = 0$	-13.695	-8.039	-5.714	-0.853	0.928	1.285	2.033	-1.781 3.180
	$\gamma = 0.5$	-10.956	-6.431	-4.571	-0.679	0.764	1.048	1.634	-1.418 2.549
	$\gamma = 1$	-6.848	-4.020	-2.857	-0.391	0.588	0.778	1.130	-0.844 1.622
$c = 2$									
	$\gamma = 0$	-17.039	-11.138	-8.641	-2.941	-0.538	-0.082	0.785	-3.930 3.680
	$\gamma = 0.5$	-14.276	-9.504	-7.472	-2.759	-0.695	-0.316	0.392	-3.554 3.044
	$\gamma = 1$	-10.102	-7.026	-5.695	-2.482	-0.919	-0.631	-0.141	-2.979 2.086
		The stationary case ($r = 1$)							
$c = 0.1$		-8.265	-4.006	-2.505	-0.279	0.395	0.627	1.211	-0.788 1.766
$c = 0.5$		-11.138	-6.370	-4.521	-0.999	0.270	0.574	1.241	-1.698 2.427
$c = 1$		-12.850	-7.831	-5.818	-1.651	-0.029	0.322	1.043	-2.431 2.781
$c = 2$		-15.260	-9.929	-7.717	-2.775	-0.669	-0.262	0.533	-3.633 3.234
$c = 5$		-20.737	-14.808	-12.232	-5.888	-2.620	-2.029	-1.095	-6.821 4.144
$c = 10$		-28.470	-21.834	-18.846	-10.939	-6.206	-5.271	-3.846	-11.904 5.246

Table 7.2 Limiting distributions of $T(\hat{\rho} - 1)$ in Model B

		Probability of a smaller value						Mean	SD
		0.01	0.05	0.1	0.5	0.9	0.95	0.99	
		The fixed initial value case ($r = 1$)							
$c = -2$									
	$\gamma = 0$	-16.182	-9.439	-6.423	0.313	1.809	2.127	2.831	-1.187 3.969
	$\gamma = 0.5$	-14.339	-7.601	-4.558	1.097	2.129	2.421	3.107	-0.201 3.504
	$\gamma = 1$	-8.963	-2.132	0.325	1.704	2.388	2.650	3.296	1.254 2.117
$c = 0$	any γ	-20.626	-14.094	-11.251	-4.357	-0.845	-0.143	1.054	-5.379 4.511
$c = 2$									
	$\gamma = 0$	-23.682	-16.896	-13.891	-6.308	-2.277	-1.487	-0.135	-7.374 4.951
	$\gamma = 0.5$	-22.605	-15.998	-13.095	-5.858	-2.021	-1.246	0.079	-6.881 4.744
	$\gamma = 1$	-19.687	-13.672	-11.092	-4.862	-1.553	-0.856	0.353	-5.751 4.139
		The stationary case ($r = 1$)							
$c = 0.1$		-20.717	-14.181	-11.335	-4.314	-0.898	-0.189	1.017	-5.448 4.522
$c = 0.5$		-21.108	-14.551	-11.291	-4.714	-1.121	-0.390	0.846	-5.736 4.569
$c = 1$		-21.644	-15.054	-12.172	-5.091	-1.419	-0.668	0.600	-6.118 4.636
$c = 2$		-22.811	-16.143	-13.209	-5.894	-2.401	-1.269	0.048	-6.935 4.786
$c = 5$		-26.640	-19.704	-16.601	-8.558	-4.016	-3.143	-1.740	-9.615 5.284
$c = 10$		-33.267	-25.871	-22.492	-13.334	-7.640	-6.488	-4.712	-14.385 6.103

Table 7.3 Limiting distributions of $T(\hat{\rho} - 1)$ in Models C and D for the fixed initial value case

c	Probability of a smaller value							Mean	SD
	0.01	0.05	0.1	0.5	0.9	0.95	0.99		
Model C ($r = 1, \gamma = 0$)									
-2	-21.838	-14.696	-11.507	-3.266	1.374	2.175	3.479	-4.348	5.414
0	-23.736	-16.636	-13.479	-5.511	-1.383	-0.602	0.686	-6.661	5.163
2	-24.699	-17.566	-14.386	-6.301	-2.043	-1.249	0.068	-7.448	5.247
Model D ($r = 1, \gamma = 0$)									
-2	-27.347	-19.621	-16.097	-6.563	-0.622	0.475	2.173	-7.655	6.354
0	-29.359	-21.711	-18.245	-9.103	-3.767	-2.673	-0.854	-10.246	6.033
2	-30.266	-22.576	-19.083	-9.815	-4.367	-3.269	-1.447	-10.962	6.116

Table 7.4 Limiting distributions of $N(\hat{\rho}_m - 1)$ in Model A

c	Probability of a smaller value							Mean	SD
	0.01	0.05	0.1	0.5	0.9	0.95	0.99		
$m = 2, r = 1$									
-2	-3.322	-0.560	0.452	1.876	2.395	2.540	2.864	1.566	1.149
0	-7.058	-4.195	-3.005	-0.387	0.770	1.014	1.478	-0.832	1.730
2	-10.255	-7.142	-5.789	-2.472	-0.756	-0.414	0.176	-2.955	2.175
$m = 4, r = 1$									
-2	-0.007	1.002	1.328	1.946	2.294	2.388	2.578	1.850	0.493
0	-3.735	-2.268	-1.648	-0.180	0.615	0.791	1.107	-0.386	0.988
2	-6.738	-5.033	-4.265	-2.235	-0.989	-0.724	-0.280	-2.473	1.360
$m = 12, r = 1$									
-2	1.399	1.627	1.724	1.984	2.181	2.234	2.331	1.964	0.190
0	-1.503	-0.965	-0.722	-0.057	0.410	0.521	0.715	-0.118	0.463
2	-4.160	-3.436	-3.091	-2.078	-1.321	-1.142	-0.838	-2.156	0.708

Table 7.5 Limiting distributions of $N(\hat{\rho}_m - 1)$ in Model B

c	Probability of a smaller value							Mean	SD
	0.01	0.05	0.1	0.5	0.9	0.95	0.99		
$m = 2, \quad r = 1$									
-2	-7.982	-3.954	-2.205	0.723	1.650	1.860	2.281	0.108	2.004
0	-13.106	-9.507	-7.894	-3.693	-1.190	-0.664	0.214	-4.207	2.800
2	-15.975	-12.154	-10.407	-5.689	-2.739	-2.111	-1.071	-6.223	3.157
$m = 4, \quad r = 1$									
-2	-3.074	-1.122	-0.431	0.876	1.506	1.653	1.926	0.650	0.965
0	-9.023	-6.961	-6.006	-3.344	-1.547	-1.145	-0.471	-3.606	1.813
2	-11.713	-9.470	-8.411	-5.368	-3.205	-2.710	-1.883	-5.635	2.094
$m = 12, \quad r = 1$									
-2	-0.271	0.224	0.430	0.962	1.327	1.417	1.576	0.909	0.378
0	-5.857	-4.929	-4.479	-3.113	-2.038	-1.776	-1.322	-3.201	0.968
2	-8.314	-7.268	-6.753	-5.148	-3.837	-3.510	-2.943	-5.237	1.150

Table 7.6 Limiting distributions of $N(\hat{\rho}_m - 1)$ in Model C

c	Probability of a smaller value							Mean	SD
	0.01	0.05	0.1	0.5	0.9	0.95	0.99		
$m = 2, \quad r = 1$									
-2	-13.561	-9.440	-7.529	-2.205	0.992	1.601	2.577	-2.839	3.492
0	-15.625	-11.594	-9.749	-4.783	-1.780	-1.171	-0.191	-5.374	3.289
2	-16.586	-12.527	-10.662	-5.605	-2.492	-1.856	-0.834	-6.191	3.360
$m = 4, \quad r = 1$									
-2	-8.817	-6.318	-5.120	-1.665	0.586	1.060	1.829	-2.023	2.300
0	-11.092	-8.715	-7.594	-4.396	-2.205	-1.725	-0.940	-4.700	2.173
2	-12.045	-9.644	-8.508	-5.238	-2.956	-2.450	-1.622	-5.537	2.232
$m = 12, \quad r = 1$									
-2	-4.863	-3.671	-3.088	-1.327	0.012	0.329	0.865	-1.454	1.230
0	-7.454	-6.347	-5.804	-4.132	-2.805	-2.483	-1.932	-4.237	1.185
2	-8.388	-7.261	-6.706	-4.985	-3.600	-3.260	-2.678	-5.087	1.226

Table 7.7 Limiting distributions of $N(\hat{\rho}_m - 1)$ in Model D

c	Probability of a smaller value							Mean	SD
	0.01	0.05	0.1	0.5	0.9	0.95	0.99		
$m = 2, \quad r = 1$									
-2	-18.482	-13.898	-11.725	-5.397	-1.158	-0.312	1.016	-6.025	4.246
0	-20.709	-16.257	-14.178	-8.336	-4.410	-3.543	-2.113	-8.914	3.961
2	-21.597	-17.109	-15.007	-9.074	-5.065	-4.183	-2.730	-9.655	4.025
$m = 4, \quad r = 1$									
-2	-13.267	-10.405	-9.004	-4.761	-1.730	-1.069	0.000	-5.123	2.887
0	-15.760	-13.067	-11.772	-7.928	-5.049	-4.372	-3.233	-8.221	2.680
2	-16.627	-13.905	-12.593	-8.684	-5.742	-5.050	-3.883	-8.977	2.728
$m = 12, \quad r = 1$									
-2	-8.753	-7.316	-6.597	-4.343	-2.534	-2.095	-1.346	-4.477	1.598
0	-11.663	-10.360	-9.709	-7.645	-5.905	-5.465	-4.693	-7.744	1.498
2	-12.500	-11.178	-10.517	-8.414	-6.636	-6.184	-5.392	-8.513	1.526

Table 7.8 Limiting distribution of $T(\hat{\beta}_2 + 1)$ in (7.137)

Probability of a smaller value								Mean	SD
0.01	0.05	0.1	0.5	0.9	0.95	0.99			
-2.956	-2.028	-1.539	0.775	6.010	8.389	14.115	1.664	3.460	

Table 7.9 Limiting unit root distributions in (7.151)

d	Probability of a smaller value							Mean	SD
	0.01	0.05	0.1	0.5	0.9	0.95	0.99		
2	0.0075	0.168	0.510	1.946	3.384	4.038	5.528	2	1.146
3	0.0331	0.607	1.376	2.984	4.505	5.312	6.897	3	1.310

Figure 7.1 Limiting distributions of $T(\hat{\rho} - 1)$ in Model A (Fixed initial value case)

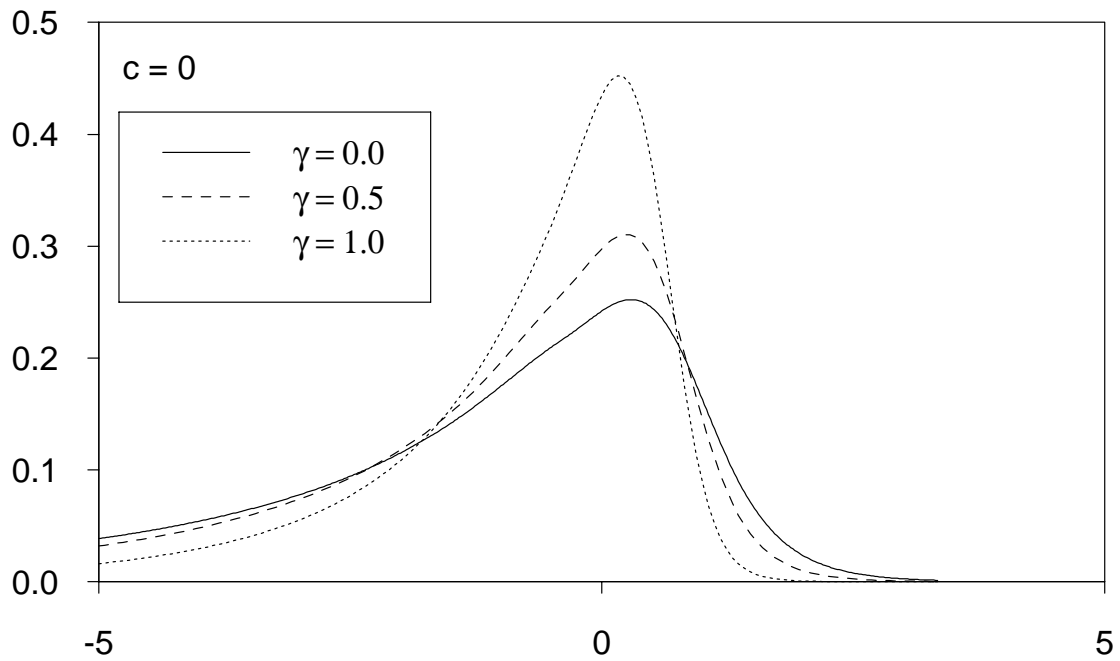


Figure 7.2 Limiting distributions of $T(\hat{\rho} - 1)$ in Model A (Stationary case)

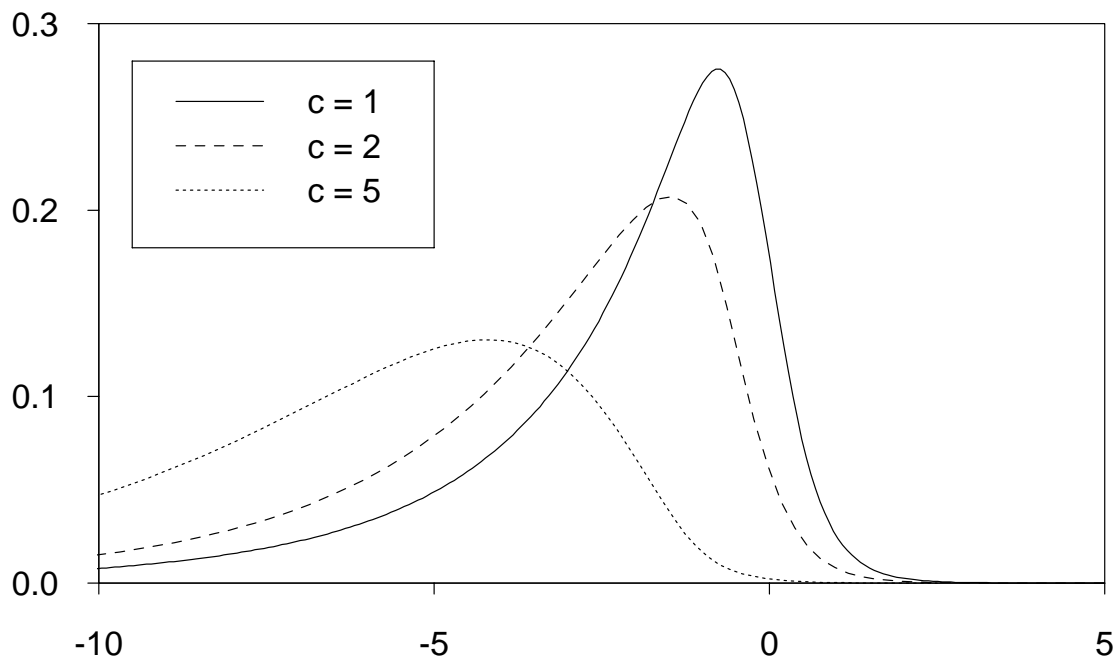


Figure 7.3 Limiting distributions of $T(\hat{\rho} - 1)$ in Model B (Fixed initial value case)

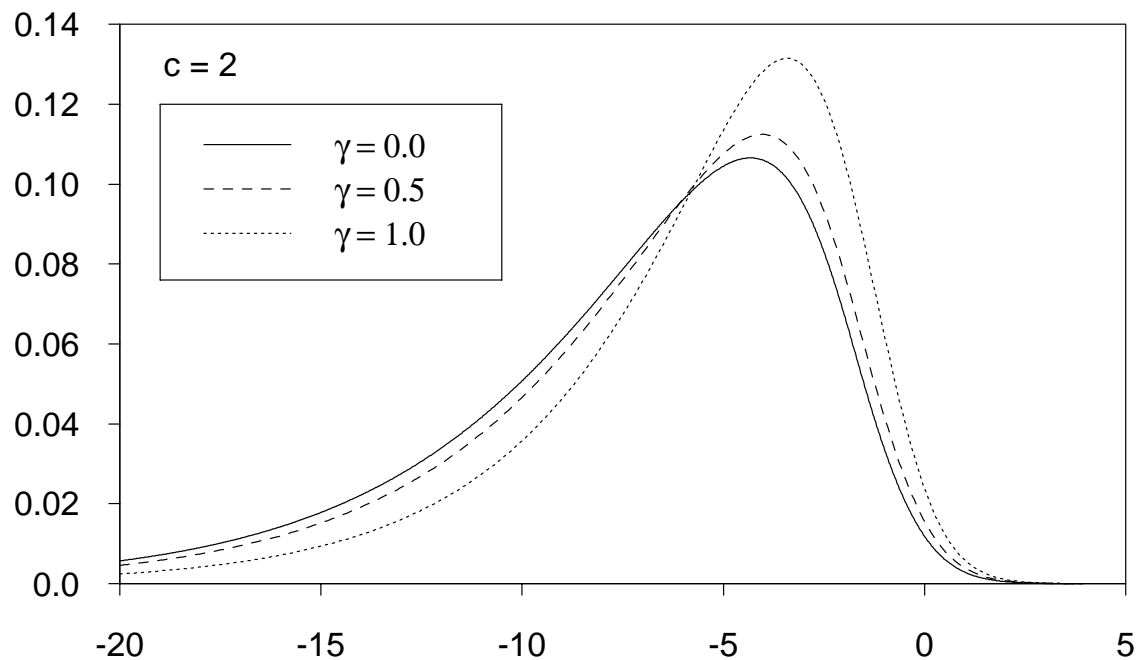


Figure 7.4 Limiting distributions of $T(\hat{\rho} - 1)$ in Model B (Stationary case)

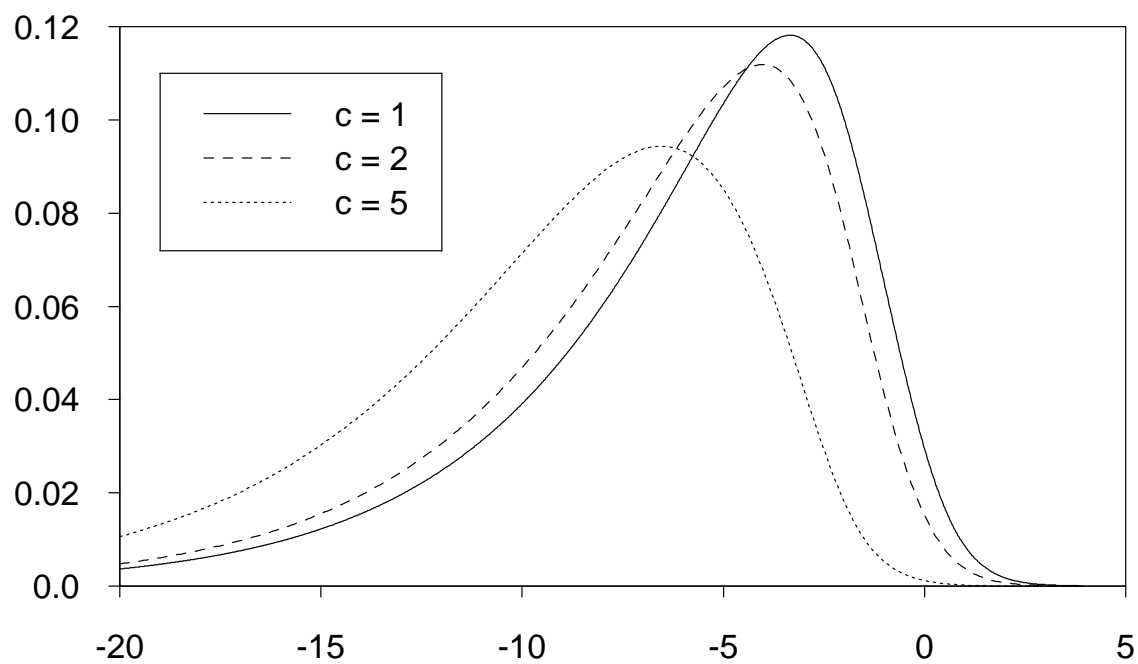


Figure 7.5 Limiting distributions of $T(\hat{\rho} - 1)$ in Model C
(Fixed initial value case)

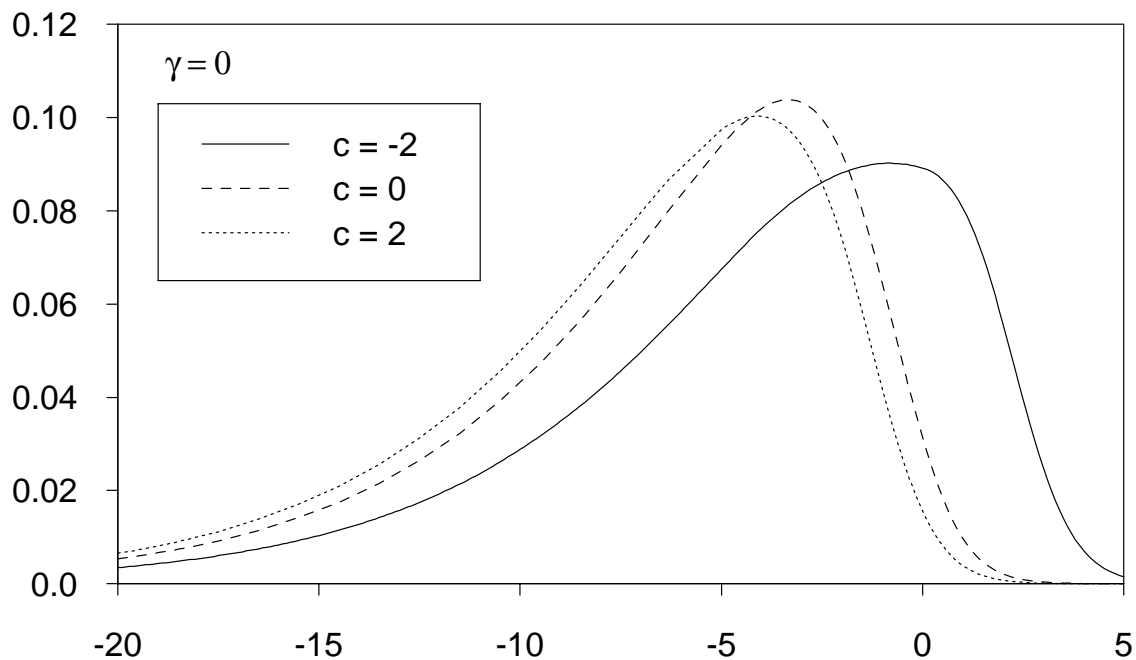


Figure 7.6 Limiting distributions of $T(\hat{\rho} - 1)$ in Model D
(Fixed initial value case)

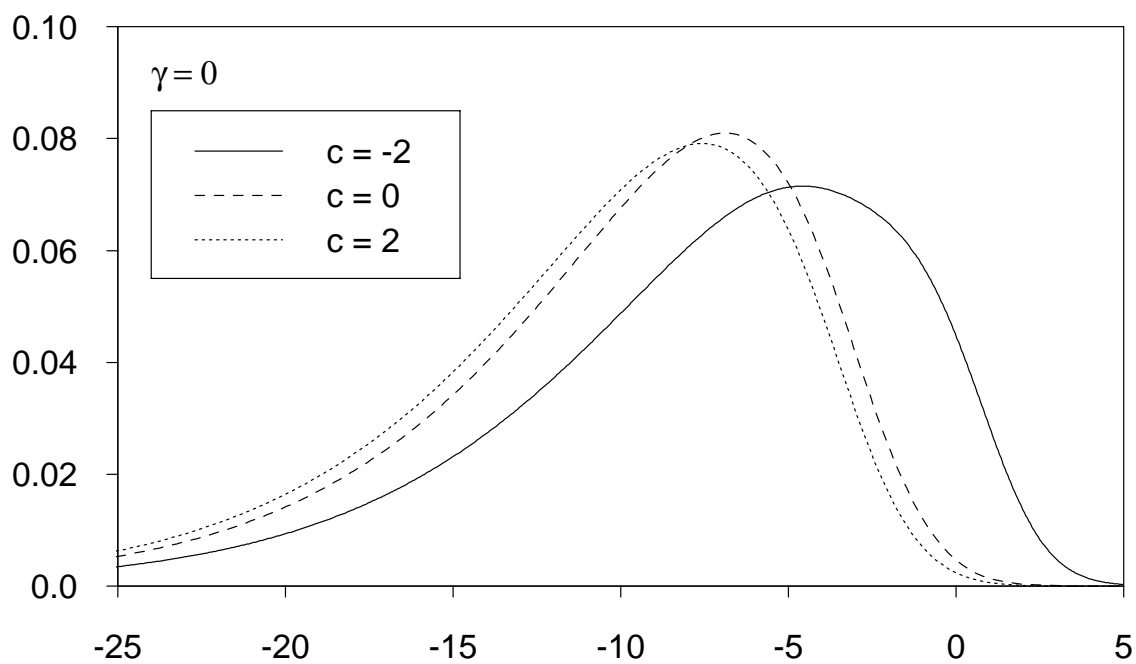


Figure 7.7 Distribution functions of $T(\tilde{\rho}_1 - \rho)$ in Model A (Case 1)

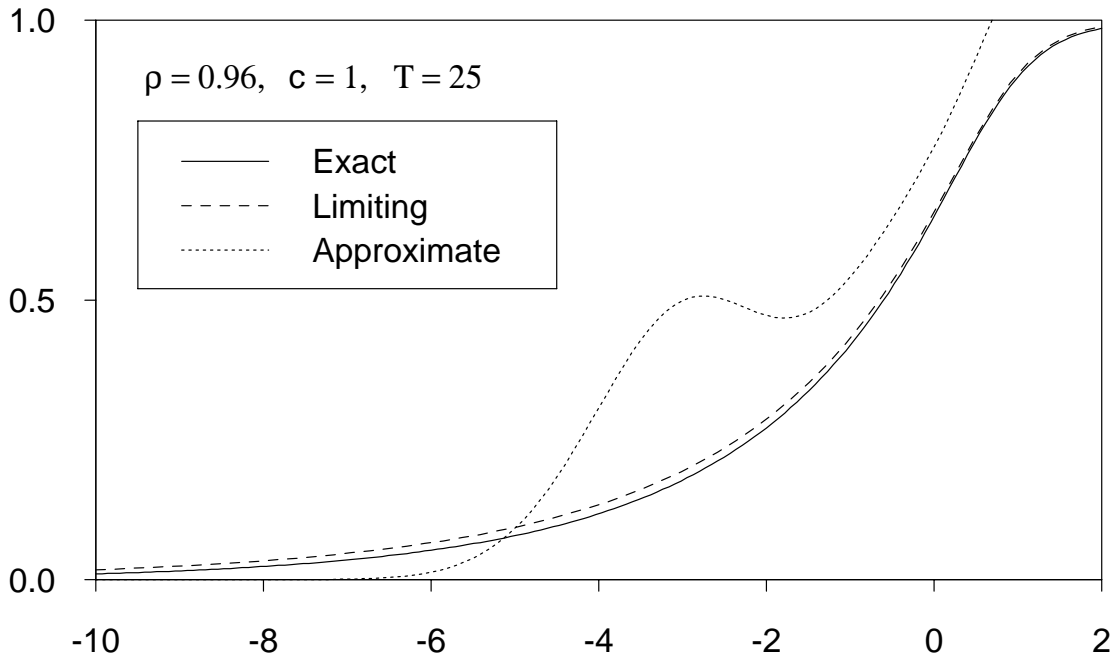


Figure 7.8 Distribution functions of $T(\tilde{\rho}_1 - \rho)$ in Model A (Case 2)

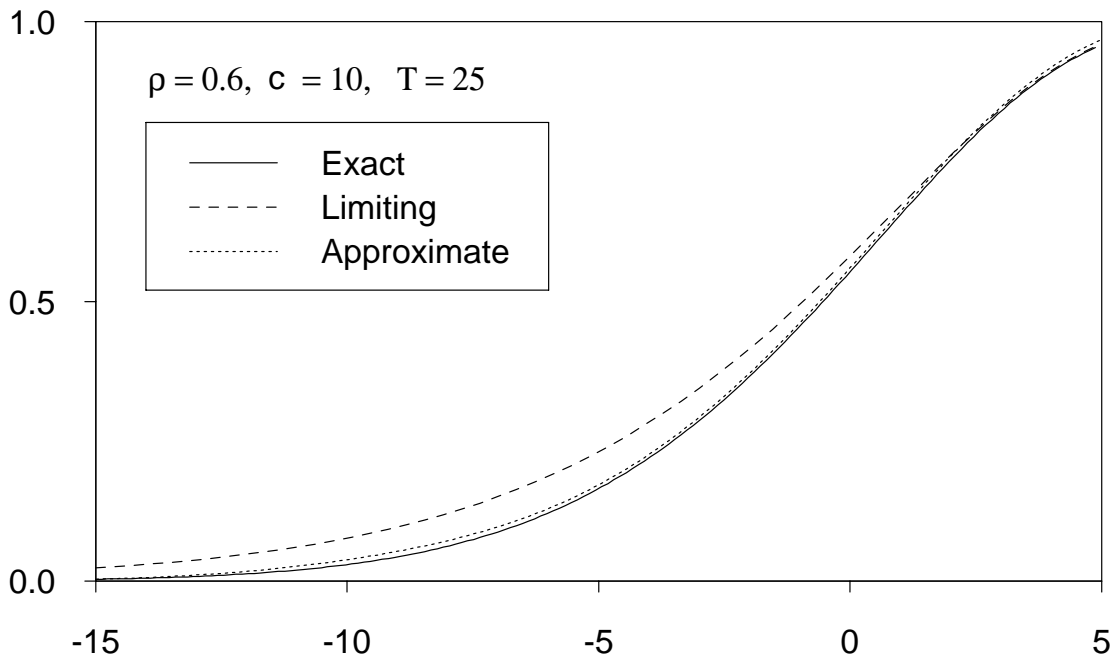


Figure 7.9 Distribution functions of $T(\tilde{\rho}_2 - \rho)$ in Model B (Case 1)

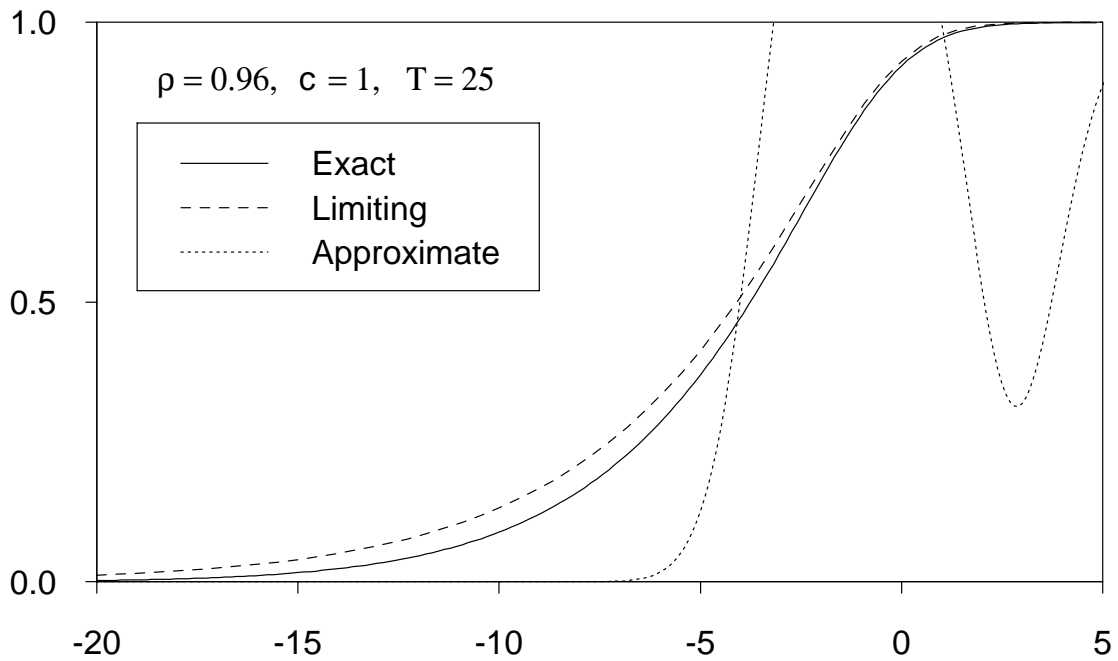


Figure 7.10 Distribution functions of $T(\tilde{\rho}_2 - \rho)$ in Model B (Case 2)

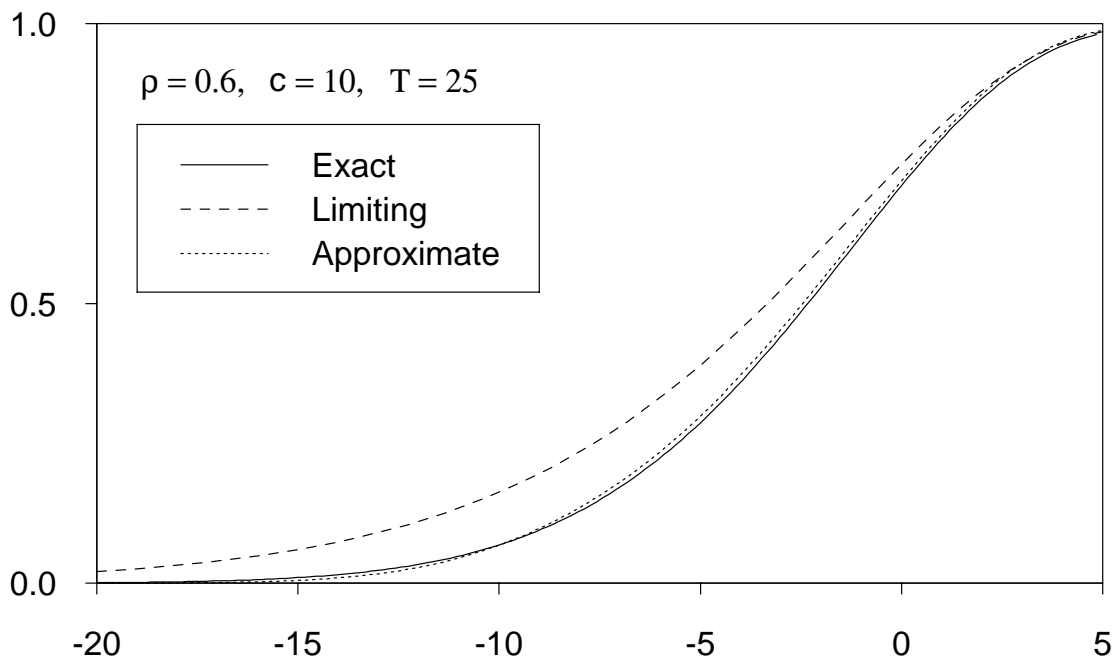


Figure 7.11 Unit root distributions for $d = 2$ & 3

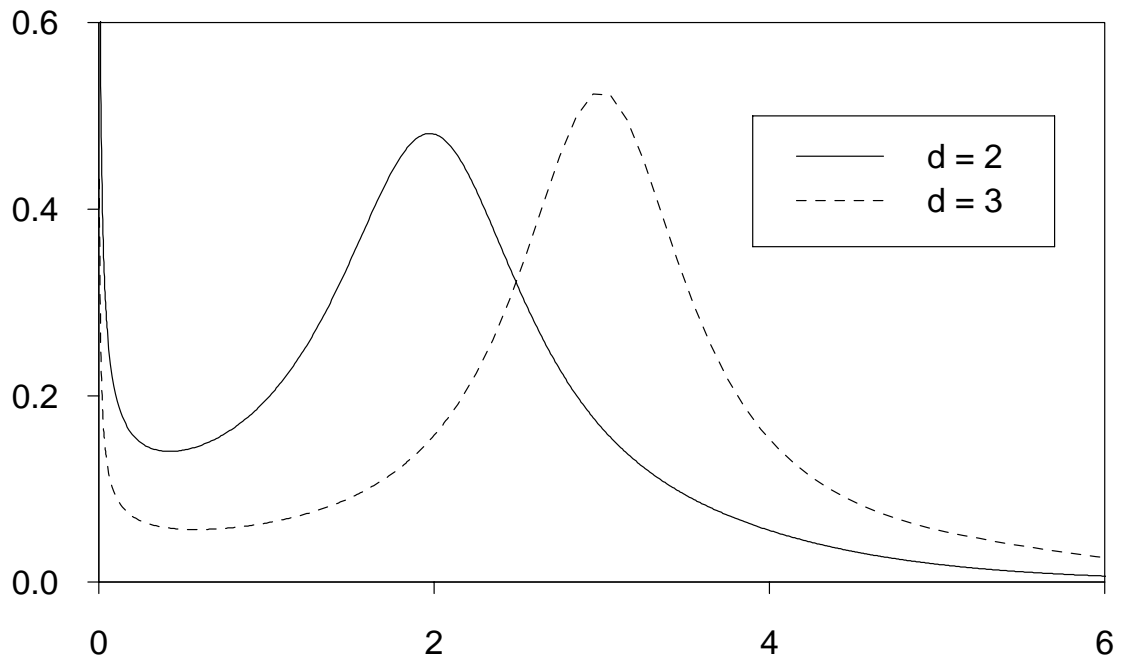


Table 8.1 Approximate percent points of $\lim_{T \rightarrow \infty} P(T(\hat{\alpha} - 1) \leq x)$

		Probability of a smaller value				
		0.01	0.05	0.1	0.2	0.3
$c = 0$						
	F_1	-12.309	-6.970	-4.950	-3.002	-1.430
	D - D	-11.253	-6.522	-4.736	-2.892	
$c = 5$						
	F_1	-16.118	-11.507	-9.569	-7.486	-6.051
	D - D	-15.913	-11.245	-9.373	-7.240	
$c = 10$						
	F_1	-22.599	-17.943	-15.787	-13.345	-11.639
	D - D	-22.704	-17.972	-15.699	-13.226	
$c = 15$						
	F_1	-29.282	-24.299	-21.885	-19.091	-17.124
	D - D	-29.407	-24.472	-21.897	-19.019	

Table 8.2 Finite sample probabilities of the local MLE at unity

	N	$\alpha_0 = 0$	0.5	0.8	0.9	1
$m = 1$						
P_1	50	0.001	0.013	0.130	0.333	0.653
	100	0.000	0.001	0.027	0.136	0.655
P_2	50	0.059	0.070	0.122	0.206	0.678
	100	0.041	0.046	0.071	0.121	0.680
$m = 4$						
P_1	10	0.001	0.041	0.350	0.509	0.572
	25	0.000	0.000	0.062	0.299	0.579
P_2	10	0.002	0.009	0.074	0.207	0.580
	25	0.000	0.001	0.009	0.049	0.588
$m = 12$						
P_1	5	0.000	0.052	0.408	0.503	0.533
	10	0.000	0.001	0.185	0.431	0.542
P_2	5	0.000	0.001	0.048	0.188	0.537
	10	0.000	0.000	0.003	0.047	0.546

Table 8.3 Limiting probabilities of the local MLE at unity

	$c = 0$	0.5	1	2	5	10
$m = 1$						
P_1	0.6574	0.6510	0.6326	0.5698	0.3474	0.1431
P_2	0.6827	0.5732	0.4873	0.3690	0.2083	0.1194
$m = 2$						
P_1	0.6167	0.6071	0.5795	0.4864	0.2016	0.0389
P_2	0.6321	0.4682	0.3486	0.2061	0.0674	0.0223
$m = 4$						
P_1	0.5841	0.5700	0.5296	0.3970	0.0814	0.0036
P_2	0.5940	0.3601	0.2119	0.0788	0.0089	0.0010
$m = 12$						
P_1	0.5489	0.5238	0.4528	0.2405	0.0037	0.0000
P_2	0.5543	0.1829	0.0470	0.0030	0.0000	0.0000

Table 8.4 Limiting probabilities (8.102) and (8.112)

	$c = 0$	0.5	1	5	10	20	40
(8.102)	0.6778	0.6543	0.5952	0.2126	0.0830	0.0196	0.0021
(8.112)	0.6574	0.6510	0.6326	0.3474	0.1431	0.0290	0.0020

Figure 8.1 Distributions of $T(\hat{\alpha}-1)$ in the stationary case
($\alpha_0 = 1, T = 50$)

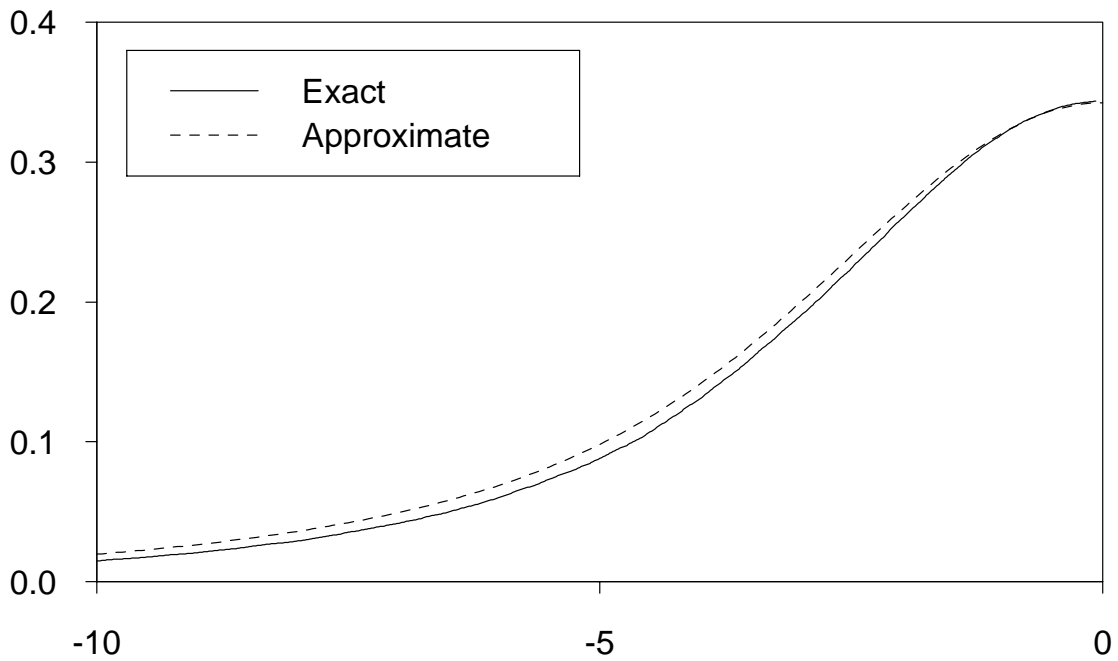


Figure 8.2 Distributions of $T(\hat{\alpha}-1)$ in the stationary case
($\alpha_0 = 0.9, T = 50$)

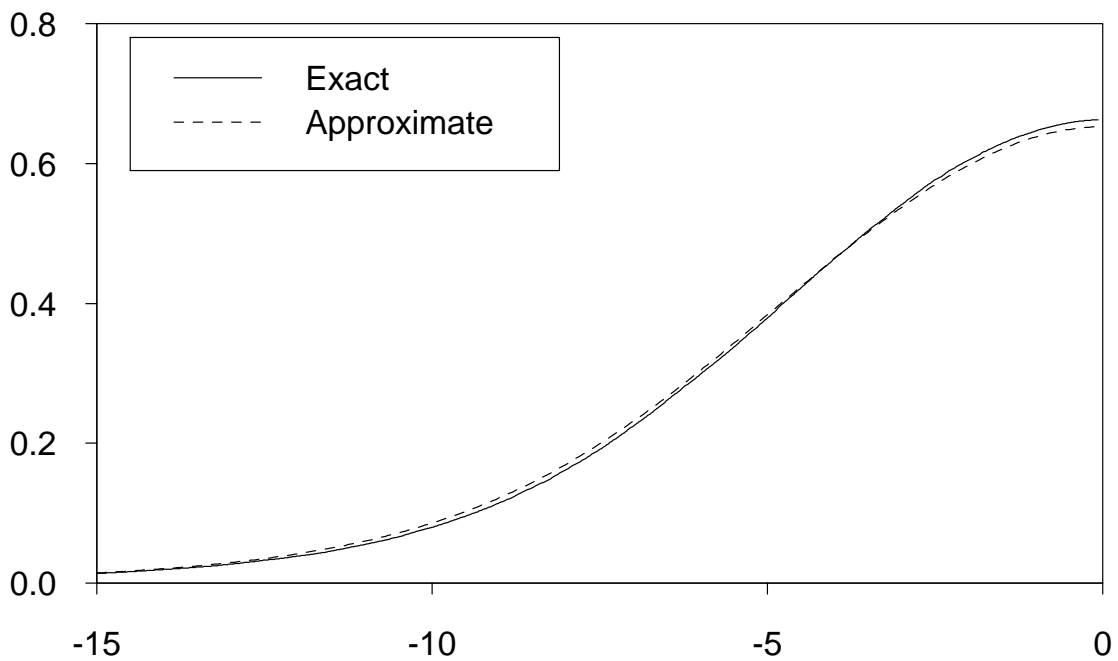


Figure 8.3 Distributions of $T(\hat{\alpha}-1)$ in the stationary case ($\alpha_0 = 0.8, T = 50$)

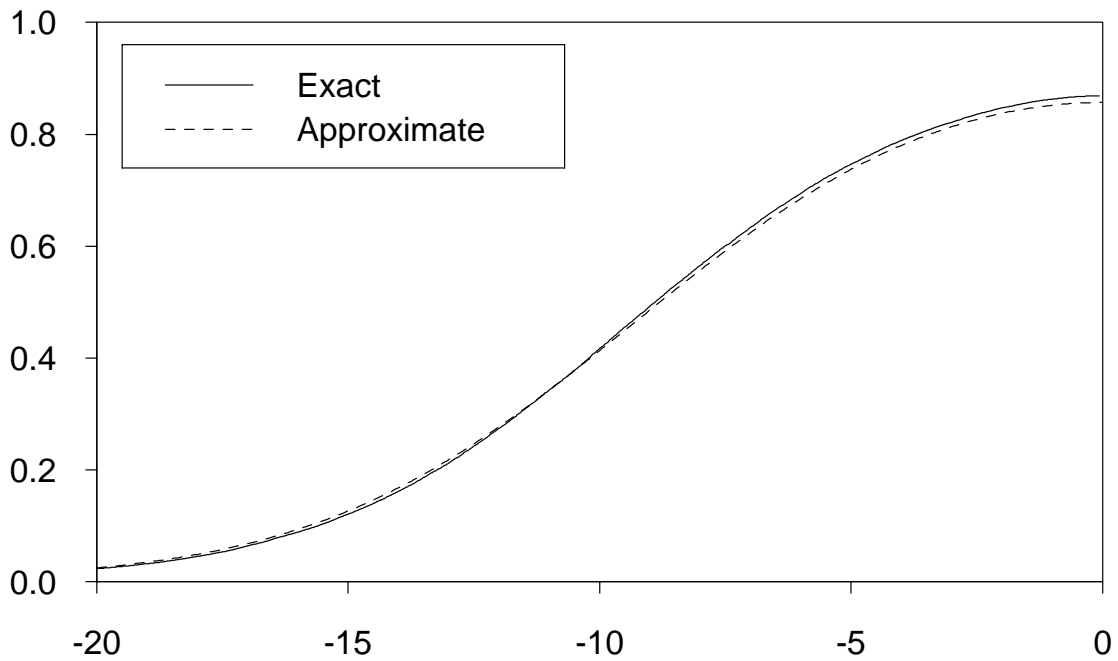


Figure 8.4 Distributions of $T(\hat{\alpha}-1)$ in the stationary case ($\alpha_0 = 0.6, T = 50$)

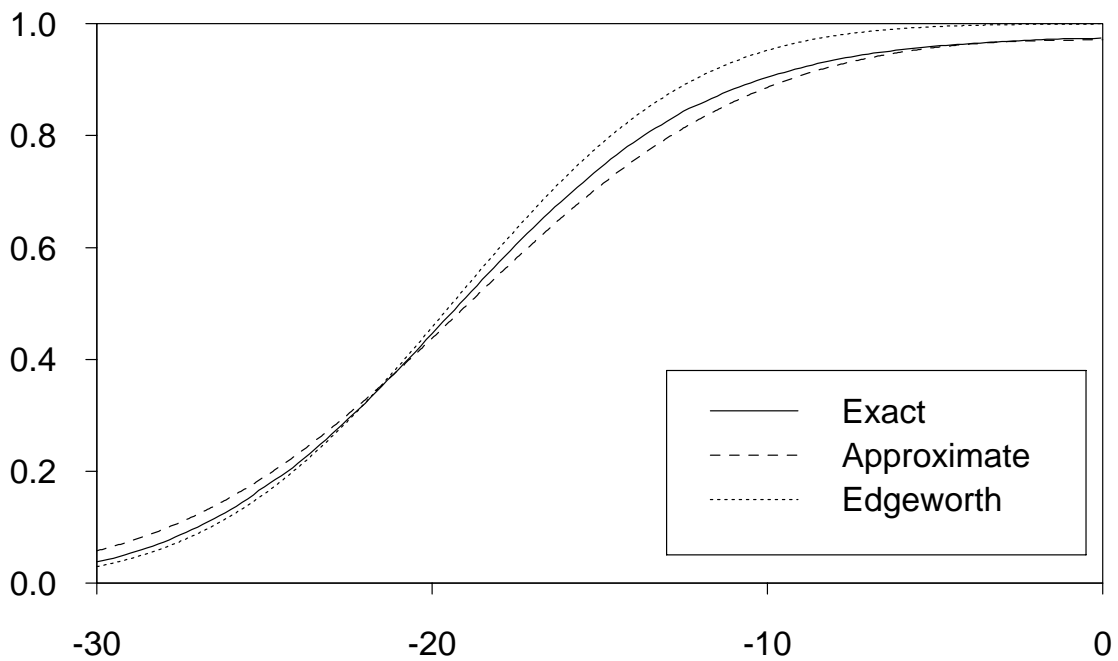


Figure 8.5 Limiting approximate densities of $T(\hat{\alpha}-1)$ in the stationary case

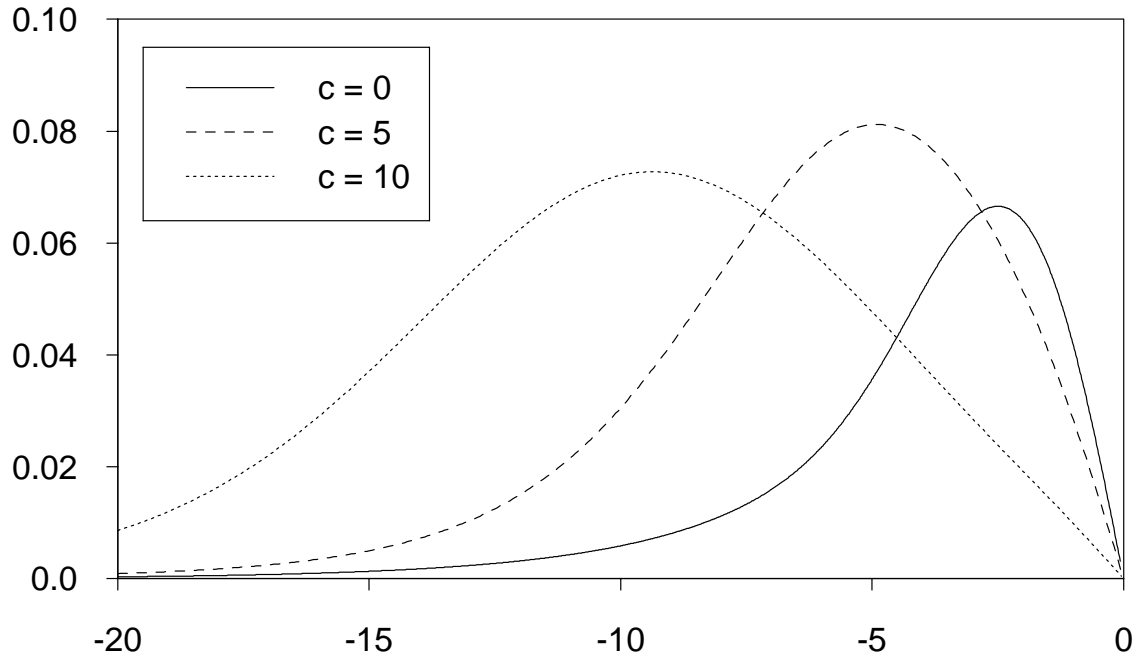


Figure 8.6 Limiting approximate density of $T(\hat{\alpha}-1)$ in the stationary case and normal probability density

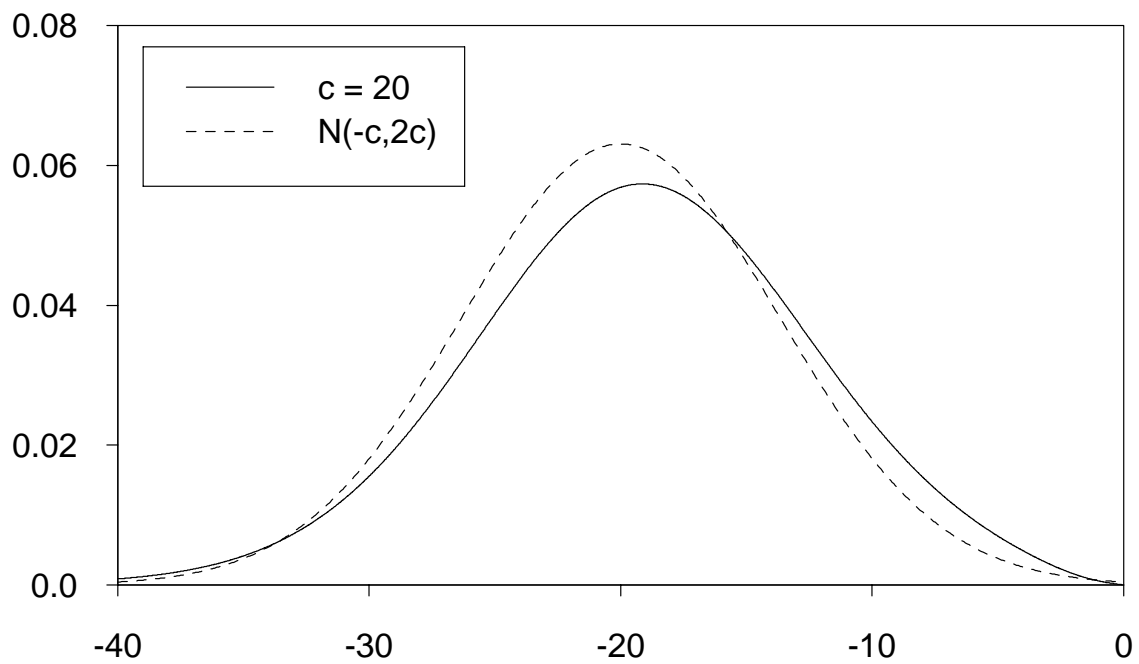


Figure 8.7 Distributions of $T(\hat{\alpha}-1)$ in the conditional case ($\alpha_0 = 1, T = 50$)

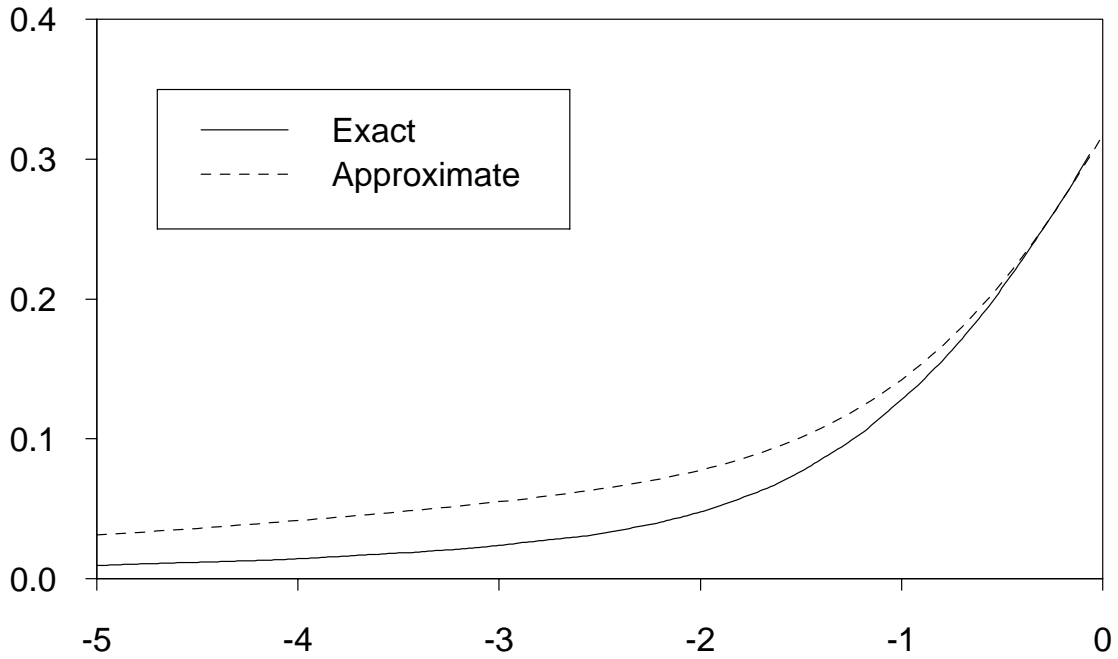


Figure 8.8 Distributions of $T\sqrt{\hat{\rho}}$ based on (8.98) ($\rho_0 = 0, T = 50$)

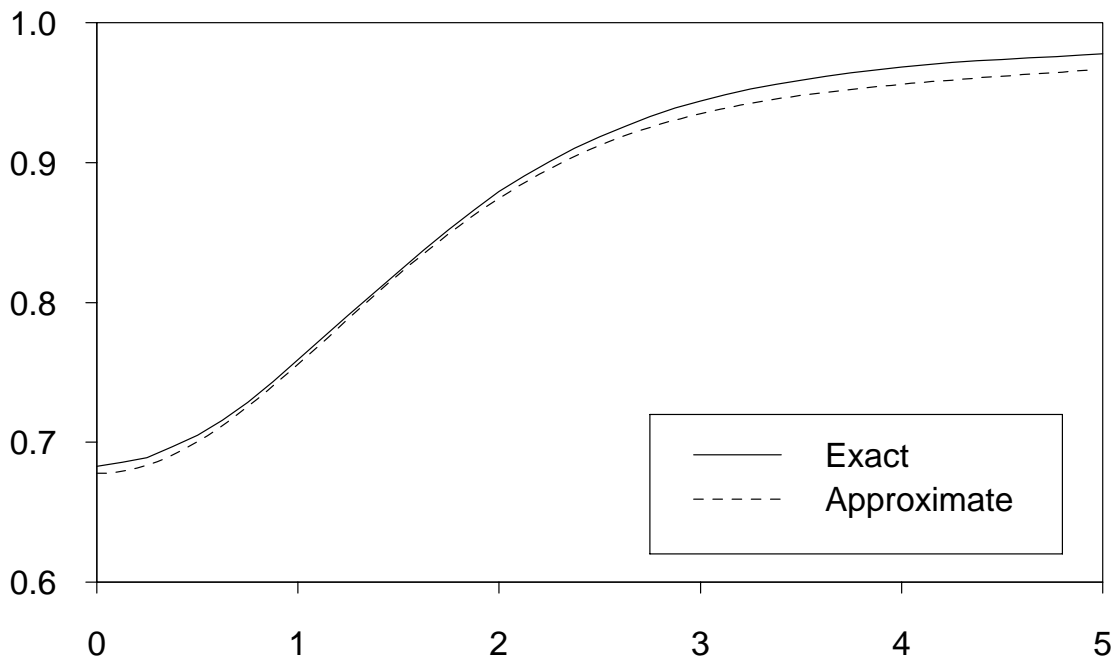


Figure 8.9 Distributions of $T\sqrt{\hat{\rho}}$ based on (8.108)
($\rho_0 = 0, T = 50$)

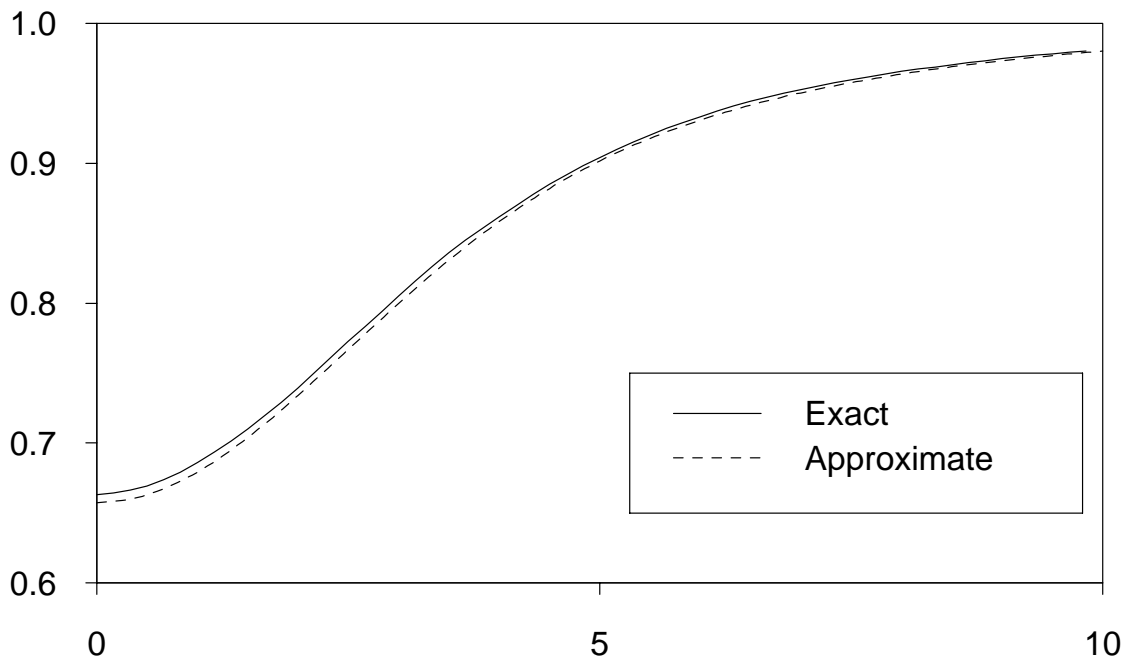


Table 9.1 Percent points of the limiting null distributions of R_k ($k = 1, \dots, 6$)

	R_1	R_2	R_3	R_4	R_5	R_6
			Model A			
1%	0.000157	0.0345	0.0248	-13.695	0.0345	0.0345
5%	0.00393	0.0565	0.0366	-8.039	0.0565	0.0565
			Model B			
1%	0.000157	0.0345	0.0248	-20.626	0.0248	0.0233
5%	0.00393	0.0565	0.0366	-14.094	0.0366	0.0336
			Model C			
1%		0.0248	0.0197	-23.736	0.0203	0.0203
5%		0.0366	0.0274	-16.636	0.0286	0.0286
			Model D			
1%		0.0248	0.0197	-29.359	0.0173	0.0166
5%		0.0366	0.0274	-21.711	0.0234	0.0222

Table 9.2 Limiting percent powers of the tests based on R_k ($k = 1, \dots, 6$) at the 5% significance level

c	R_1	R_2	R_3	R_4	R_5	R_6
Model A						
0.2	5.507	5.474	5.449	5.492	5.474	5.474
0.5	6.286	6.253	6.162	6.302	6.253	6.253
1	7.598	7.741	7.452	7.858	7.741	7.741
10	22.085	73.115	52.350	75.570	73.115	73.115
20	30.833	99.830	96.439	99.882	99.830	99.830
Model B						
0.5	6.286	6.253	6.162	6.074	6.162	6.051
1	7.598	7.741	7.452	7.187	7.452	7.144
10	22.085	73.115	52.350	45.925	52.350	44.863
20	30.833	99.830	96.439	94.367	96.439	93.699
Model C						
0.5		5.084	5.074	5.081	5.078	5.078
1		5.319	5.283	5.309	5.298	5.298
10		29.781	26.909	30.660	29.722	29.722
20		76.536	84.603	85.403	84.112	84.112
Model D						
0.5		5.084	5.074	5.070	5.073	5.067
1		5.319	5.283	5.265	5.279	5.257
10		29.781	26.909	23.255	25.520	22.852
20		76.536	84.603	70.703	74.639	69.533

Table 9.3 Limiting percent power envelopes and limiting percent powers of the POI tests at the 5% level

	$c = 1$	5	7	10	13	20
		Models	A	and	B	
$x_{c,0.05}^{(M)}$	0.9061	3.2391	3.6945	3.5135	2.3043	-4.4922
$z_{c,0.05}^{(M)}$	0.0939	0.0704	0.0675	0.0649	0.0633	0.0612
Envelope	7.972	31.948	49.940	75.818	91.975	99.885
$\theta = 5$	7.931	31.948	49.815	74.948	90.461	99.384
$\theta = 7$	7.912	31.892	49.940	75.613	91.433	99.700
$\theta = 10$	7.890	31.730	49.825	75.818	91.895	99.834
		Models	C	and	D	
$x_{c,0.05}^{(M)}$	0.9641	4.1677	5.4033	6.8138	7.6988	7.7389
$z_{c,0.05}^{(M)}$	0.0359	0.0333	0.0326	0.0319	0.0314	0.0307
Envelope	5.319	11.485	17.600	31.005	48.367	85.526
$\theta = 5$	5.318	11.485	17.588	30.850	47.763	83.314
$\theta = 10$	5.315	11.463	17.585	31.005	48.322	85.034
$\theta = 13$	5.314	11.443	17.555	30.983	48.367	85.352

Table 9.4 5% points of the null distributions of the Dickey-Fuller (R_4) statistic

T	Model			
	A	B	C	D
25	-7.371	-12.527	-14.210	-18.047
50	-7.692	-13.278	-15.356	-19.776
100	-7.862	-13.677	-15.978	-20.716
∞	-8.039	-14.094	-16.636	-21.711

Table 9.5 Percent powers of the Dickey-Fuller (R_4) test at the 5% significance level

c	T	ρ	Model			
			A	B	C	D
1	25	0.96	7.7	6.9	5.2	5.1
1	50	0.98	8.0	7.3	5.4	5.5
1	100	0.99	7.6	7.1	5.2	5.6
1	∞		7.9	7.2	5.3	5.3
10	25	0.6	81.4	51.1	36.3	26.0
10	50	0.8	78.0	47.9	32.9	24.8
10	100	0.9	76.4	47.6	32.6	24.8
10	∞		75.6	45.9	30.7	23.3
20	25	0.2	99.9	97.2	93.6	83.3
20	50	0.6	99.9	96.1	90.4	77.5
20	100	0.8	99.9	95.4	88.3	73.1
20	∞		99.9	94.4	85.4	70.7

Table 9.6 Limiting percent powers of the $\hat{\rho}(\delta)$ -test at the 5% significance level

δ	5% point	$c = 0.2$	0.5	1	5	10	20
-10	-4.275	5.51	6.36	7.96	28.4	54.2	77.9
-5	-5.274	5.51	6.36	7.97	30.4	63.5	89.5
-2	-6.400	5.51	6.35	7.96	31.7	71.9	97.5
0	-8.039	5.49	6.30	7.86	31.4	75.6	99.9
0.5	-8.856	5.47	6.25	7.74	30.0	73.1	99.8
1	-10.107	5.43	6.12	7.44	26.6	66.5	99.5
2	-13.942	5.23	5.62	6.34	16.9	44.4	94.7
5	-29.262	4.94	4.87	4.83	6.0	10.3	34.6

Table 9.7 Percent powers of the normal and Dickey-Fuller tests for Model A ($T = 100$)

nominal level		1%			5%			10%		
ρ		1	0.9	0.8	1	0.95	0.85	1	0.95	0.9
normal test	sampling	1.3	11.7	40.3	6.4	15.4	48.5	12.6	25.2	42.7
	approx.	1.0	9.2	37.2	5.0	12.6	44.2	10.0	21.7	38.9
D-F test	sampling	0.9	30.5	91.5	4.9	31.0	97.1	9.8	52.8	92.8
	approx.	1.0	30.9	91.1	5.0	31.4	96.9	10.0	52.8	92.5

Table 9.8 Limiting percent powers of seasonal unit root tests
at the 5% significance level

Test	5% point	$m = 4$			$m = 12$				
		$c = 1$	5	10	5% point	$c = 0.5$	1	5	
				Model	A				
R_{A1}	0.711	19.9	87.0	99.3	5.226	23.6	56.1	100.0	
R_{A3}	-2.268	20.0	99.2	100.0	-0.965	23.3	57.7	100.0	
				Model	B				
R_{B1}	0.711	19.9	87.0	99.3	5.226	23.6	56.1	100.0	
R_{B3}	-6.961	13.1	66.7	99.6	-4.929	14.6	28.1	99.4	
				Model	C				
R_{C2}	0.301	5.99	34.2	89.6	1.271	5.53	7.21	80.4	
R_{C3}	-8.715	5.94	34.8	94.4	-6.347	5.51	7.11	82.4	
				Model	D				
R_{D2}	0.301	5.99	34.2	89.6	1.271	5.53	7.21	80.4	
R_{D3}	-13.067	5.74	23.8	76.7	-10.360	5.39	6.55	56.8	

Table 9.9 Limiting percent power envelopes and limiting percent powers of the POI tests at the 5% level : the seasonal case

	$m = 4$				$m = 12$			
	$c = 1$	2	5	10	$c = 0.5$	1	2	5
	Models A and B							
$z_{cm,0.05}^{(M)}$	1.532	1.132	0.862	0.759	14.105	8.816	6.118	4.435
Envelope	20.84	49.98	99.19	100.00	23.85	58.30	97.89	100.00
$\theta = 1$	20.84	49.16	97.08	100.00	23.73	58.30	97.63	100.00
$\theta = 1.5$	20.77	49.83	98.14	100.00	23.50	58.10	97.84	100.00
$\theta = 2$	20.65	49.98	98.65	100.00	23.25	57.65	97.89	100.00
	Models C and D							
$z_{cm,0.05}^{(M)}$	0.290	0.278	0.254	0.238	1.250	1.214	1.147	1.029
Envelope	5.99	9.01	35.48	94.53	5.53	7.21	15.46	83.04
$\theta = 4$	5.98	8.99	35.45	93.74	5.53	7.19	15.40	82.98
$\theta = 5$	5.98	8.98	35.48	94.08	5.52	7.17	15.34	83.04
$\theta = 6$	5.97	8.96	35.46	94.29	5.52	7.16	15.28	83.00

Figure 9.1 Limiting power functions and power envelope for Model A

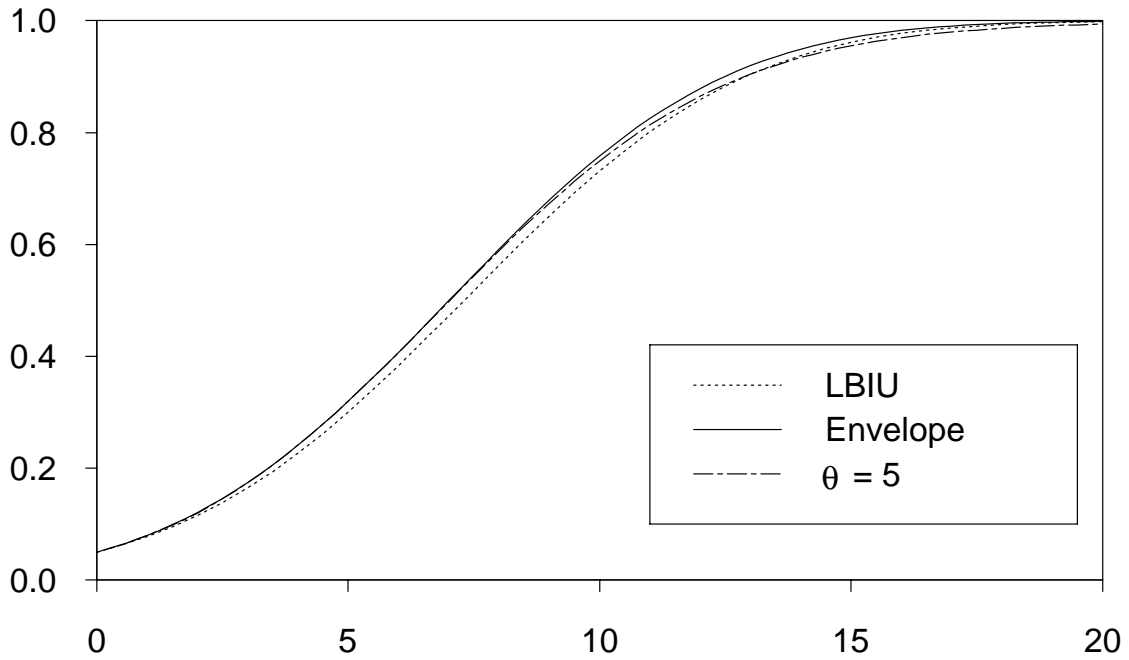


Figure 9.2 Limiting power functions and power envelope for Model B

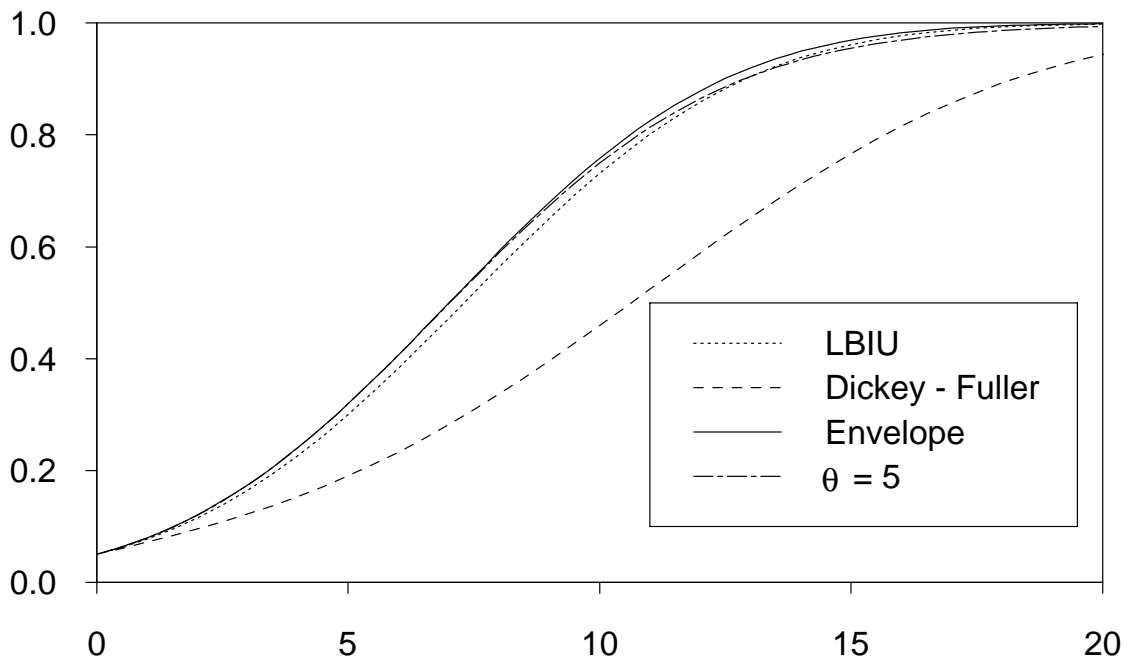


Figure 9.3 Limiting power functions and power envelope for Model C

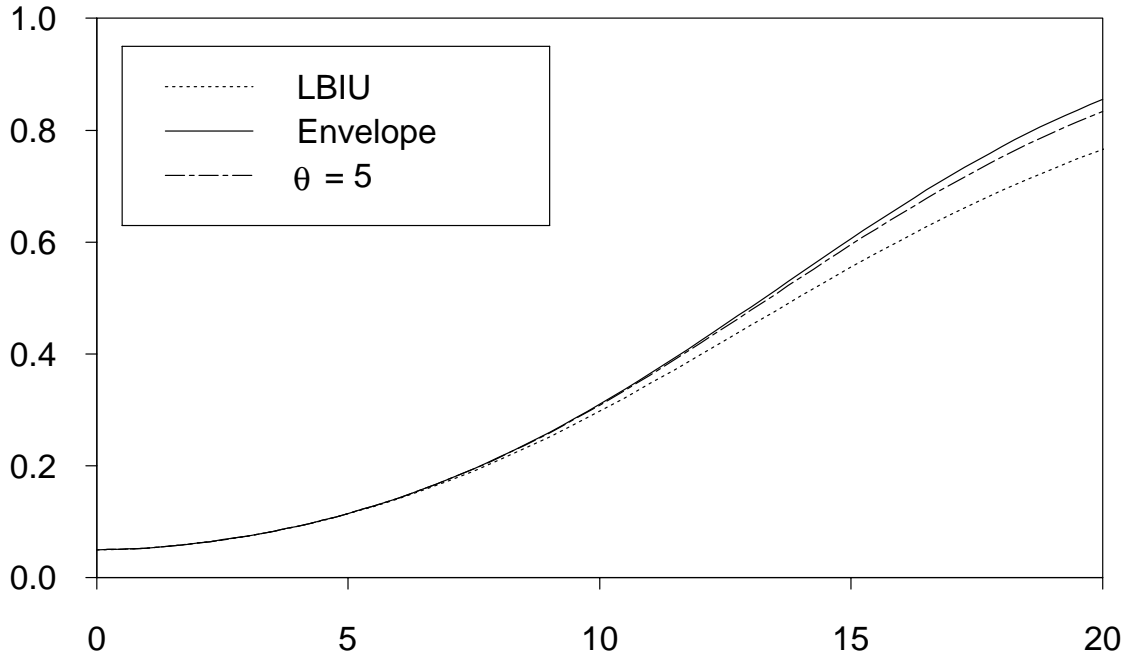


Figure 9.4 Limiting power functions and power envelope for Model D

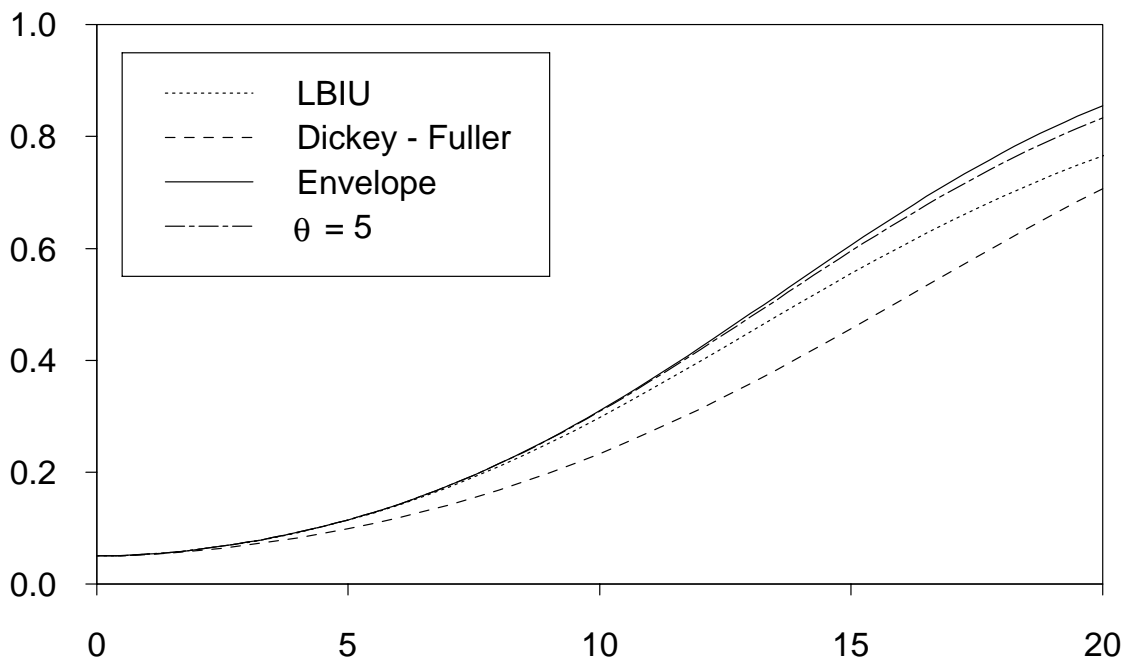


Figure 9.5 Limiting power functions of the $\hat{\rho}(\delta)$ -test

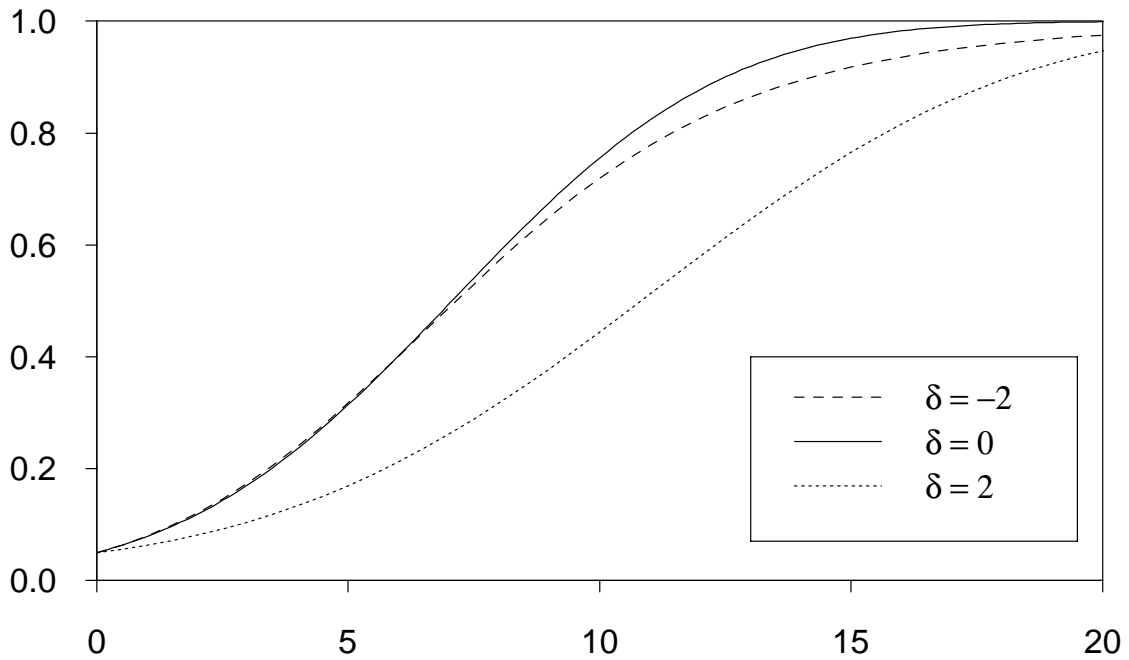


Figure 9.6 Limiting power functions and power envelope for Model B with $m=4$

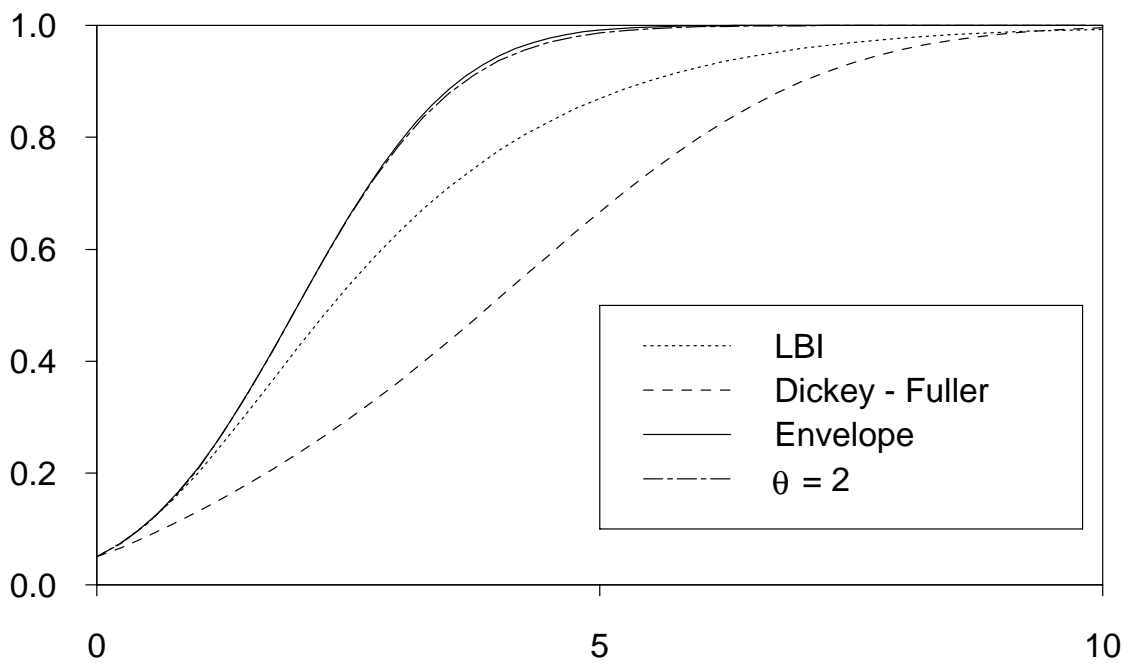


Figure 9.7 Limiting power functions and power envelope for Model D with $m=4$

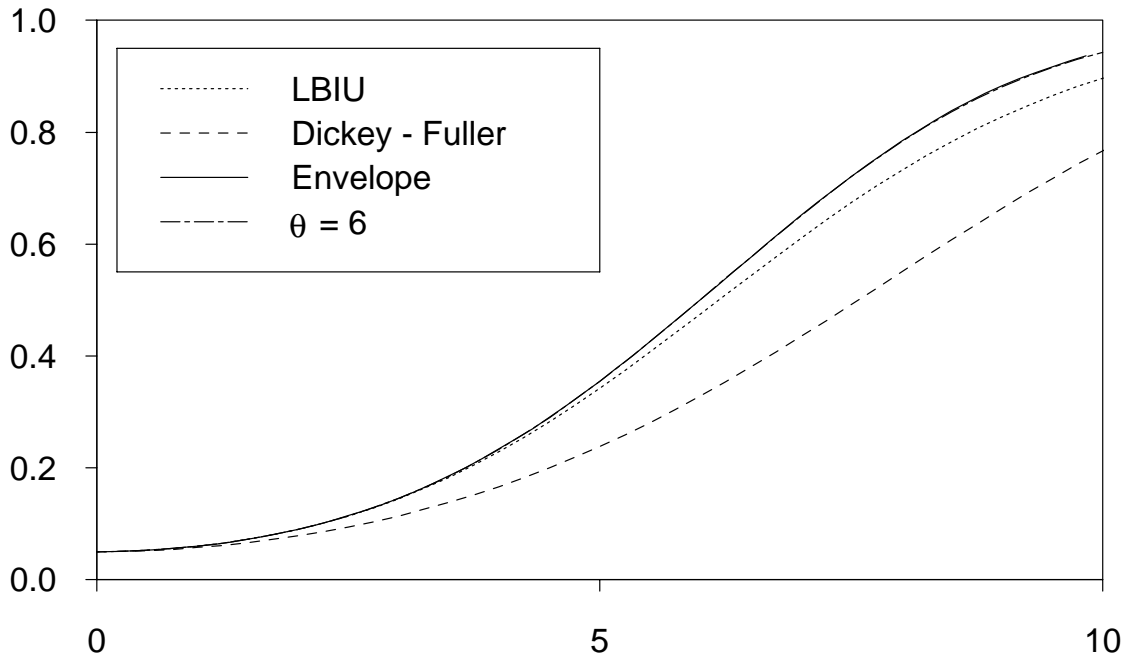


Figure 9.8 Null distributions of $\tilde{r}R_2$ ($l=4$, MA(1) error)

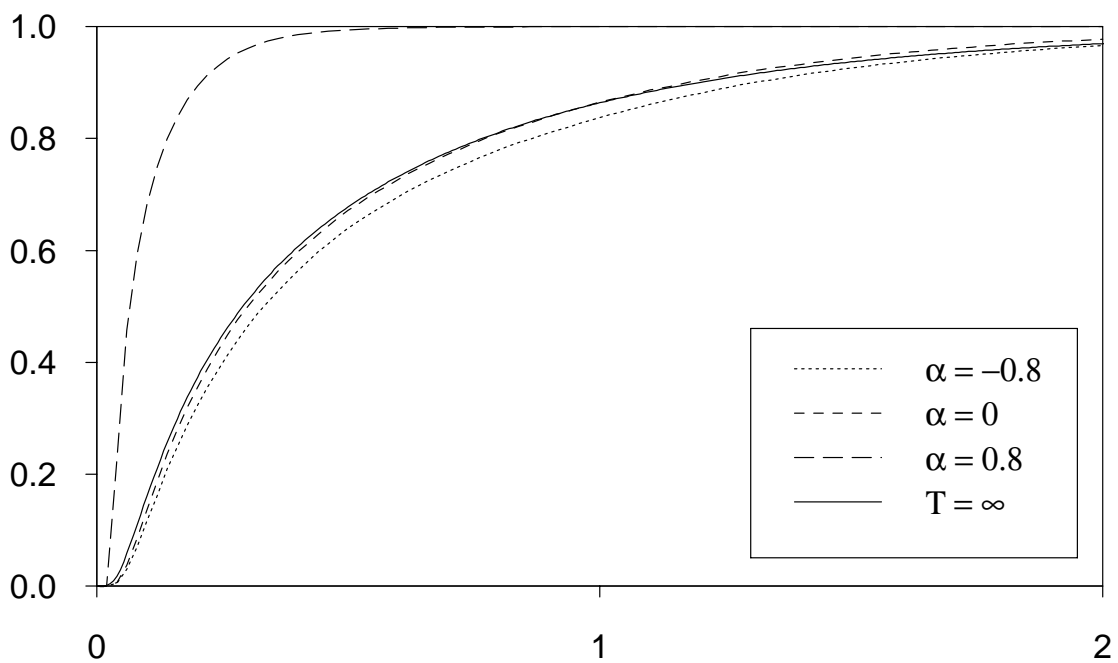


Figure 9.9 Null distributions of $\tilde{r}R_2$ ($l=8$, MA(1) error)

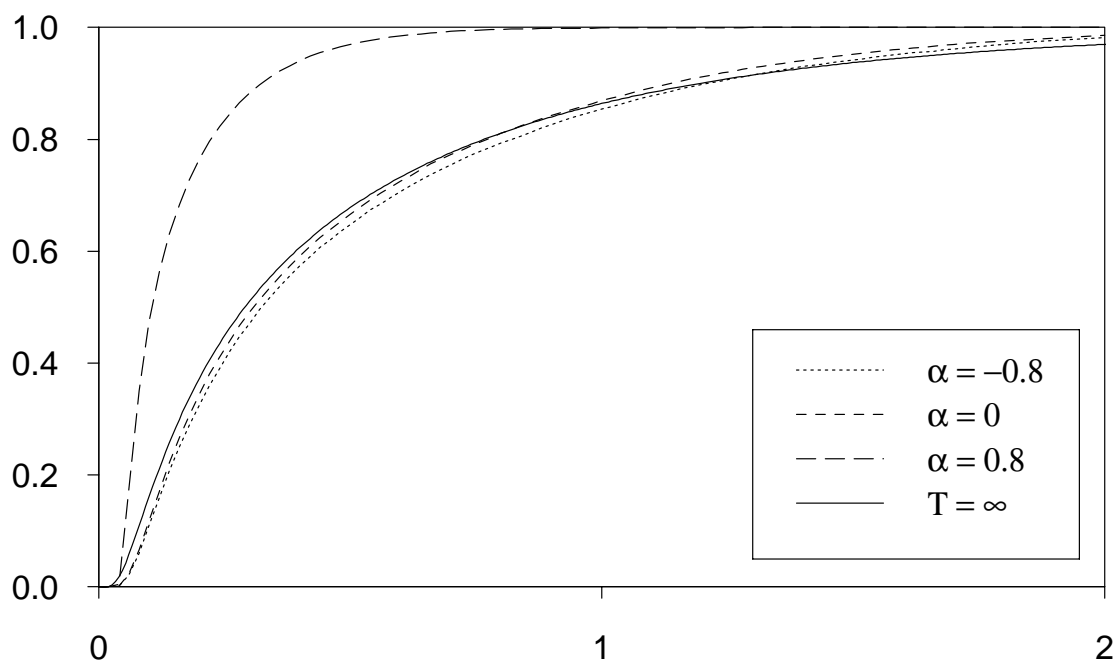


Figure 9.10 Null distributions of $\tilde{r}R_2$ ($l=8$, AR(1) error)

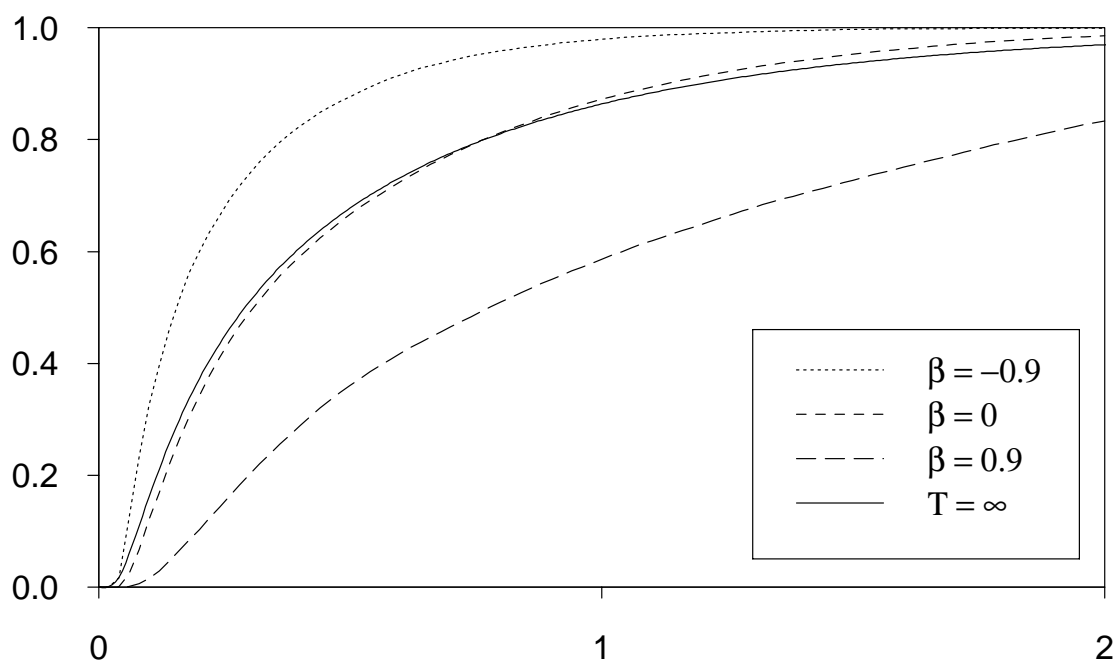


Table 10.1 Limiting percent powers of the LBI tests

	x	$c = 1$	5	10	20	50	60
$\gamma = 0.01$							
A	6.6349	9.17	49.63	69.89	83.57	93.10	94.22
B	6.6349	2.30	14.24	32.44	55.80	79.35	82.52
C	6.6349	3.64	24.97	46.78	67.79	85.61	87.87
D	6.6349	1.50	5.44	14.11	33.14	64.02	69.09
$\gamma = 0.05$							
A	3.8415	19.95	60.47	76.85	87.46	94.75	95.60
B	3.8415	8.36	26.43	45.34	65.58	84.21	86.65
C	3.8415	11.14	38.11	58.07	75.20	89.03	90.75
D	3.8415	6.41	14.33	26.28	45.98	72.21	76.22
$\gamma = 0.1$							
A	2.7055	28.16	66.40	80.49	89.47	95.59	96.31
B	2.7055	14.65	34.89	52.92	70.83	86.72	88.78
C	2.7055	18.16	46.23	64.29	79.08	90.78	92.24
D	2.7055	12.02	21.94	34.73	53.51	76.53	79.95

Table 10.2 Limiting percent power envelope at the 5% level in Model A :
Conditional case

c	1	5	10	20	50	60
x	1.3577	1.0434	-0.3360	-3.7760	-15.7197	-19.9299
Envelope	20.16	66.31	88.29	98.59	100.00	100.00
LBI	19.95	60.47	76.85	87.46	94.75	95.60

Table 10.3 Limiting percent powers of the LBIU tests

	x	$c = 1$	5	10	20	50	60
$\gamma = 0.01$							
A	0.7435	1.41	17.72	47.42	78.10	97.68	98.80
B	0.2177	1.10	4.76	20.89	60.27	96.60	98.48
C	0.2472	1.12	5.49	22.95	60.85	96.22	98.24
D	0.1205	1.05	2.65	10.85	44.52	94.45	97.58
$\gamma = 0.05$							
A	0.4614	6.20	31.10	61.06	86.65	99.09	99.59
B	0.1479	5.31	13.69	36.71	74.77	98.73	99.51
C	0.1642	5.36	14.86	38.62	75.08	98.59	99.44
D	0.0860	5.16	9.46	24.15	62.17	97.82	99.19
$\gamma = 0.1$							
A	0.3473	11.74	40.19	68.80	90.61	99.53	99.80
B	0.1192	10.48	21.69	46.95	81.62	99.33	99.76
C	0.1305	10.55	23.01	48.68	81.90	99.26	99.73
D	0.0715	10.25	16.39	34.11	71.27	98.81	99.60

Table 10.4 Finite sample percent powers of the LBIU and MPI tests for Model A at the 5% level : Stationary case

α	$T = 25$				$T = 50$			
	$T(1 - \alpha)$	LBIU	MPI	x	$T(1 - \alpha)$	LBIU	MPI	x
0.95	1.25	6.91	6.92	-0.5946	2.5	12.93	12.97	-0.5224
0.9	2.5	13.12	13.16	-0.4726	5	31.99	33.20	-0.5267
0.8	5	32.86	34.24	-0.4251	10	61.78	69.80	-1.6047
0.7	7.5	50.13	55.60	-0.8350	15	77.27	88.55	-3.3017
0.6	10	62.03	72.11	-1.5001	20	85.50	96.16	-5.3992
0.5	12.5	70.14	83.48	-2.3536	25	90.04	98.84	-7.8642

Table 10.5 Limiting percent power envelope at the 5% level in Model A :
Stationary case

c	1	5	7	10	20	50
x	-0.5747	-0.6218	-0.9533	-1.6857	-4.9261	-16.7111
Envelope	6.20	32.13	48.18	67.39	94.47	99.99
LBIU	6.20	31.10	45.11	61.06	86.65	99.09
$\theta = 5$	6.15	32.13	47.87	65.91	91.65	99.79
$\theta = 7$	6.08	31.89	48.18	66.96	92.84	99.88
$\theta = 10$	5.97	31.00	47.76	67.39	93.76	99.93

Table 10.6 Limiting percent powers of the LBI tests
at the 5% level for $m = 4, 12$

$m = 4$	$c = 1$	2	5	10	15	20	
	A	39.71	70.10	95.59	99.47	99.87	99.95
	B	11.65	21.39	54.50	84.62	94.18	97.44
	C	18.06	35.91	75.51	94.45	98.25	99.30
	D	7.59	11.05	25.89	54.17	74.08	85.30
$m = 12$	$c = 0.5$	1	2	5	8	10	
	A	34.90	70.20	96.27	99.99	100.00	100.00
	B	9.99	17.43	37.83	86.93	98.16	99.50
	C	15.13	30.90	64.50	97.96	99.88	99.98
	D	6.95	9.44	16.19	46.82	75.19	86.65

Table 10.7 Limiting percent powers of the LBIU tests at the 5% level for $m = 4, 12$

$m = 4$	x	$c = 1$	2	5	10	15	20
A	1.2373	7.20	15.34	64.71	96.28	99.62	99.96
B	0.4227	5.56	7.40	24.85	74.96	95.70	99.44
C	0.4647	5.65	7.80	27.79	77.71	96.13	99.47
D	0.2538	5.28	6.19	14.43	51.24	85.11	97.06
$m = 12$	x	$c = 0.5$	1	2	5	8	10
A	2.9422	5.83	8.76	25.38	94.33	99.91	100.00
B	1.0592	5.22	5.91	9.19	46.16	90.04	98.29
C	1.1541	5.25	6.05	9.92	51.75	92.52	98.80
D	0.6517	5.09	5.44	7.00	24.01	63.69	85.91

Table 10.8 Limiting percent powers of the LBI tests based on (10.68) at the 5% level

	x	$c = 1$	5	10	20	50	60
$m = 0$	0.4614	6.20	31.10	61.06	86.65	99.09	99.59
1	0.3831	5.97	27.57	57.57	85.28	99.05	99.58
2	0.3621	5.91	26.54	56.45	84.82	99.04	99.58
3	0.3523	5.89	26.05	55.90	84.59	99.03	99.58
4	0.3467	5.87	25.76	55.58	84.45	99.03	99.57
∞	0.3258	5.81	24.66	54.29	83.89	99.01	99.57

Table 10.9 Limiting percent powers of the LBI tests based on (10.72) at the 5% level

	x	$c = 1$	5	10	20	50	60
$m = 1$	0.1479	5.31	13.69	36.71	74.77	98.73	99.51
2	0.1642	5.36	14.86	38.62	75.08	98.59	99.44
3	0.1939	5.45	16.91	42.00	76.18	98.42	99.33
4	0.2225	5.54	18.78	44.89	77.35	98.33	99.27

Table 10.10 Limiting percent power envelope at the 5% level for the model (10.77)

c	1	5	10	20	50	60
x	1.2059	5.5720	9.2639	15.8711	33.9668	39.7623
Envelope	9.85	59.05	85.80	98.29	100.00	100.00
LBI	9.84	56.48	78.24	92.07	99.12	99.52
$\theta = 5$	9.40	59.05	84.79	97.14	99.94	99.98

Figure 10.1 Limiting power functions of the LBI tests

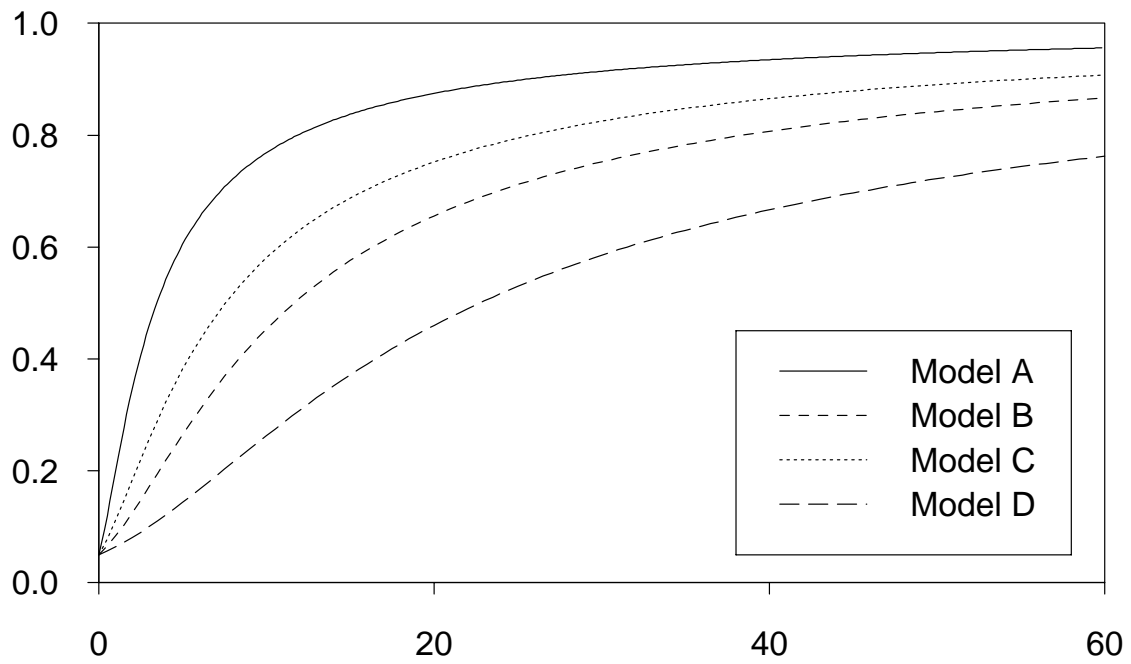


Figure 10.2 Limiting power envelope : Conditional case

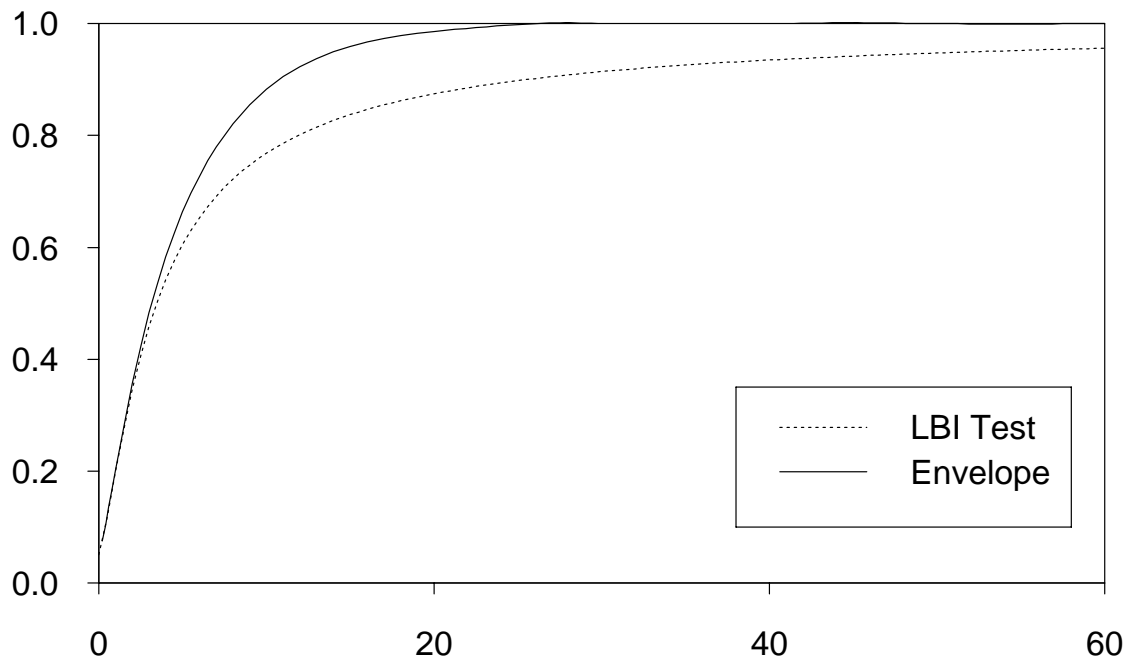


Figure 10.3 Limiting probability densities of the LBIU statistics

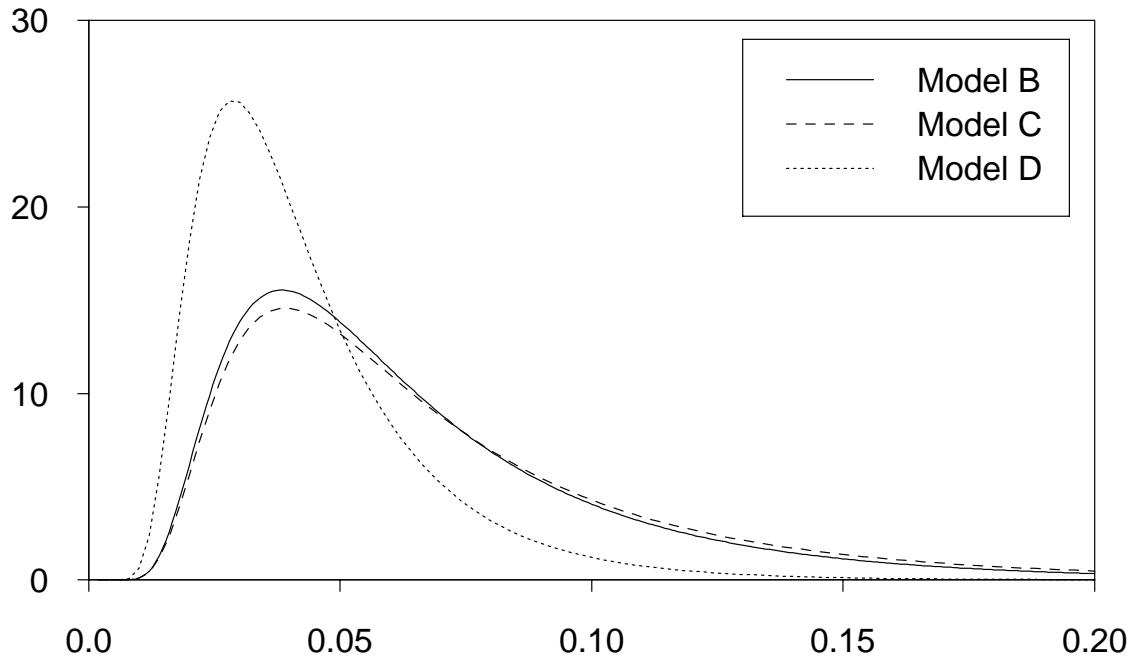


Figure 10.4 Limiting power functions of the LBIU tests

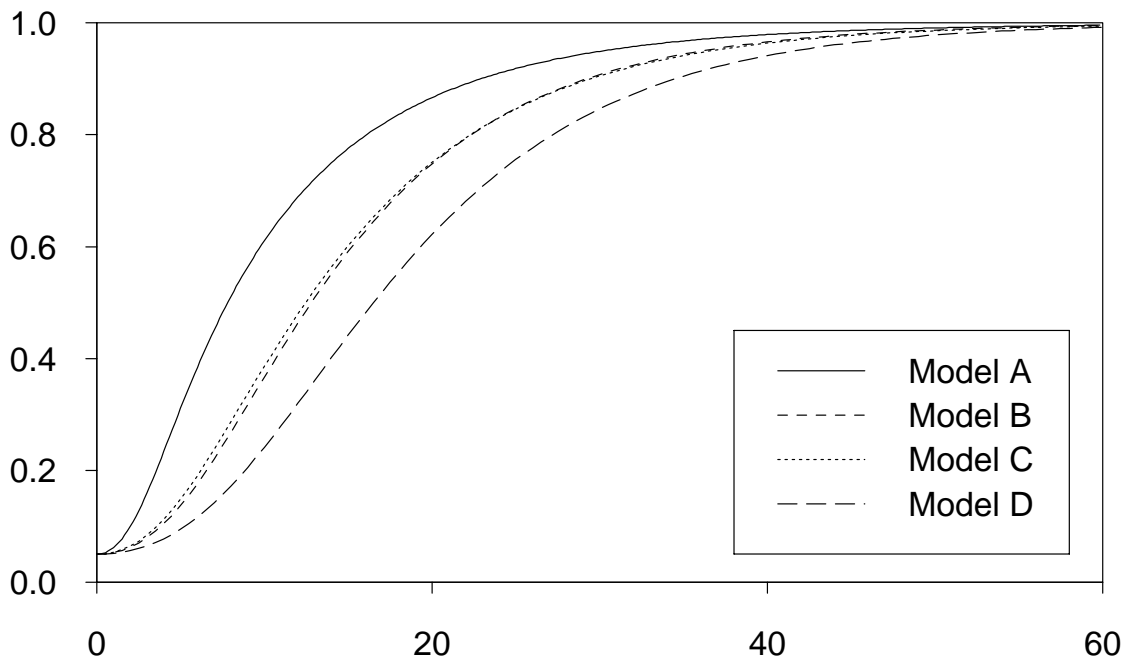


Figure 10.5 Limiting power envelope : Stationary case

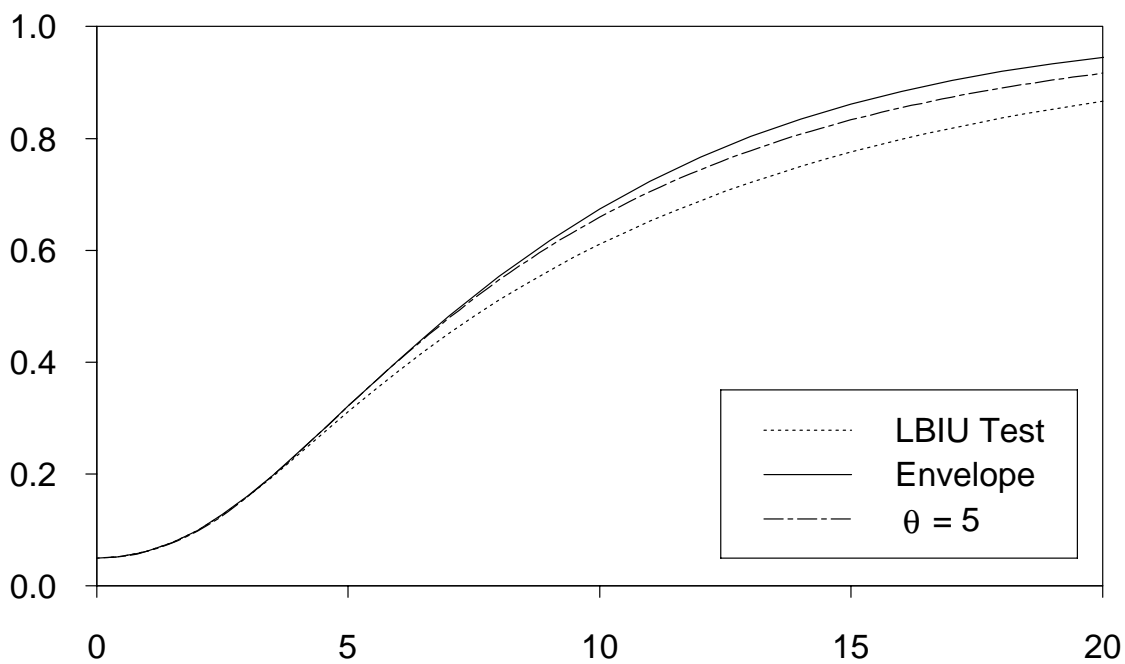


Figure 10.6 Limiting power functions of the LBI tests : $m=4$

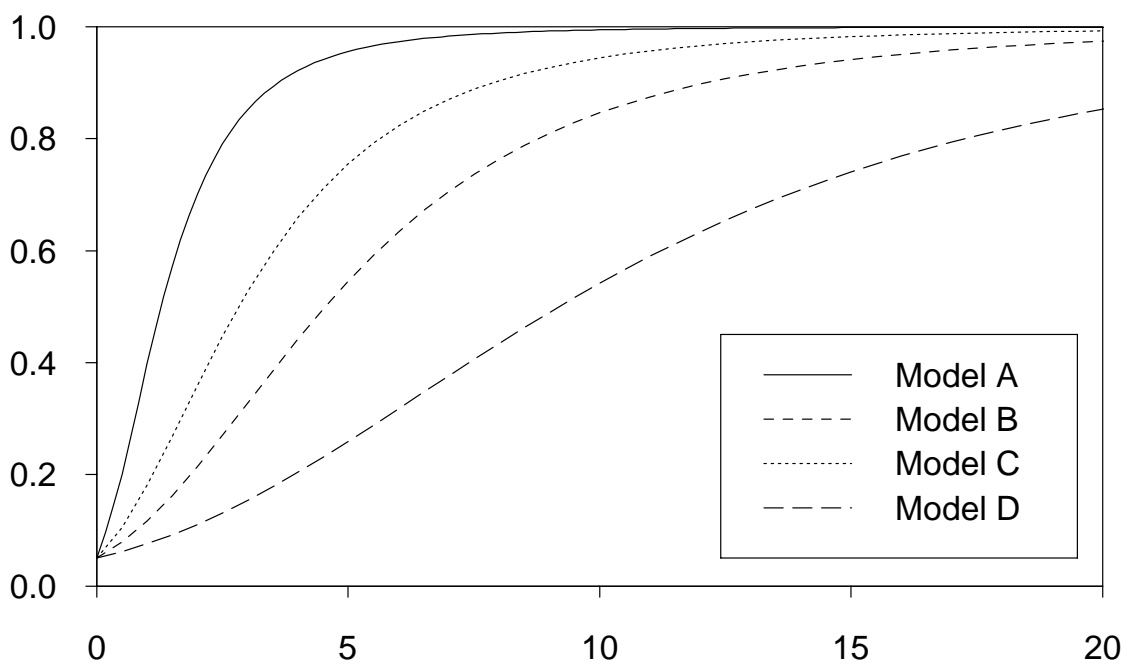


Figure 10.7 Limiting power functions of the LBI tests : $m=12$

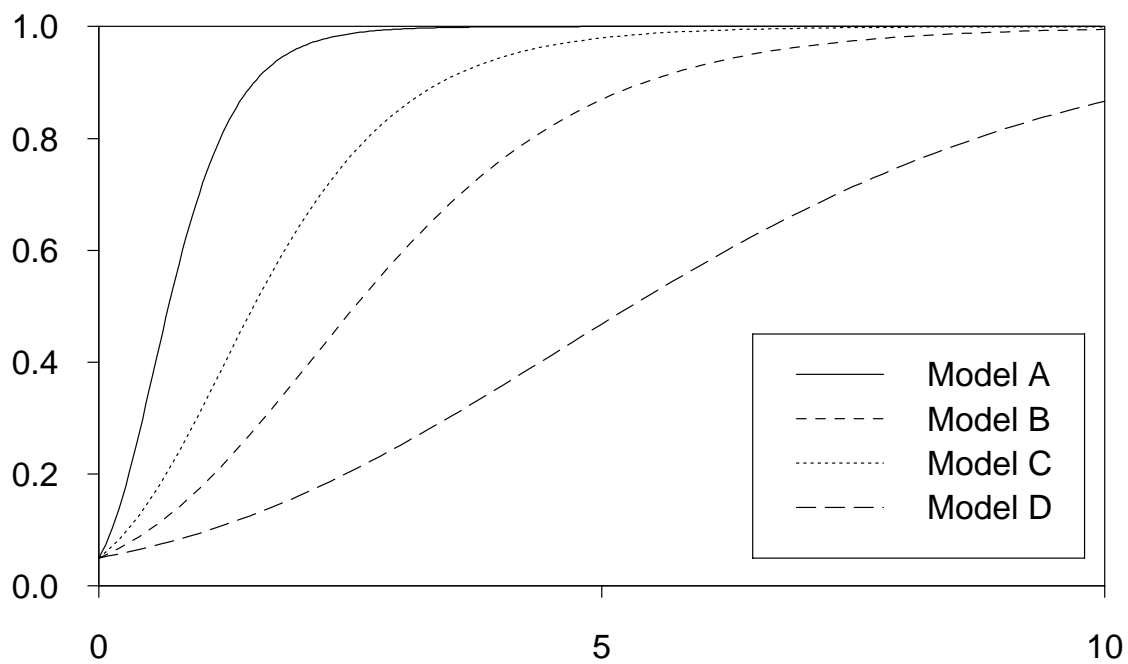


Figure 10.8 Limiting power envelope : Conditional case ($m=4$)

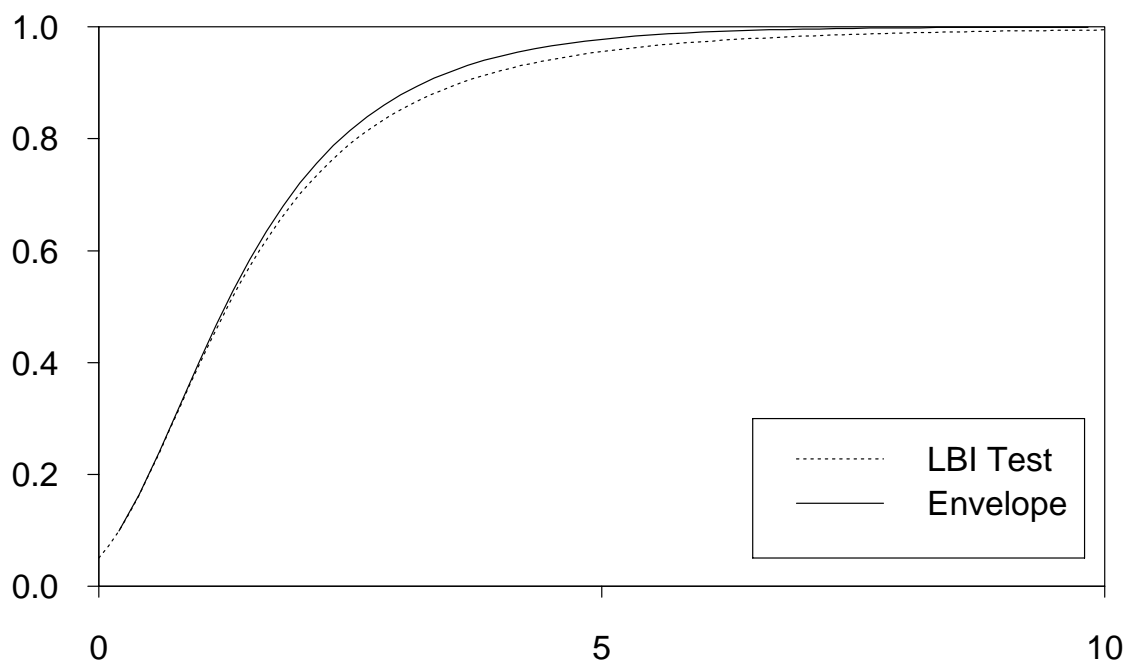


Figure 10.9 Limiting power envelope : Conditional case ($m=12$)

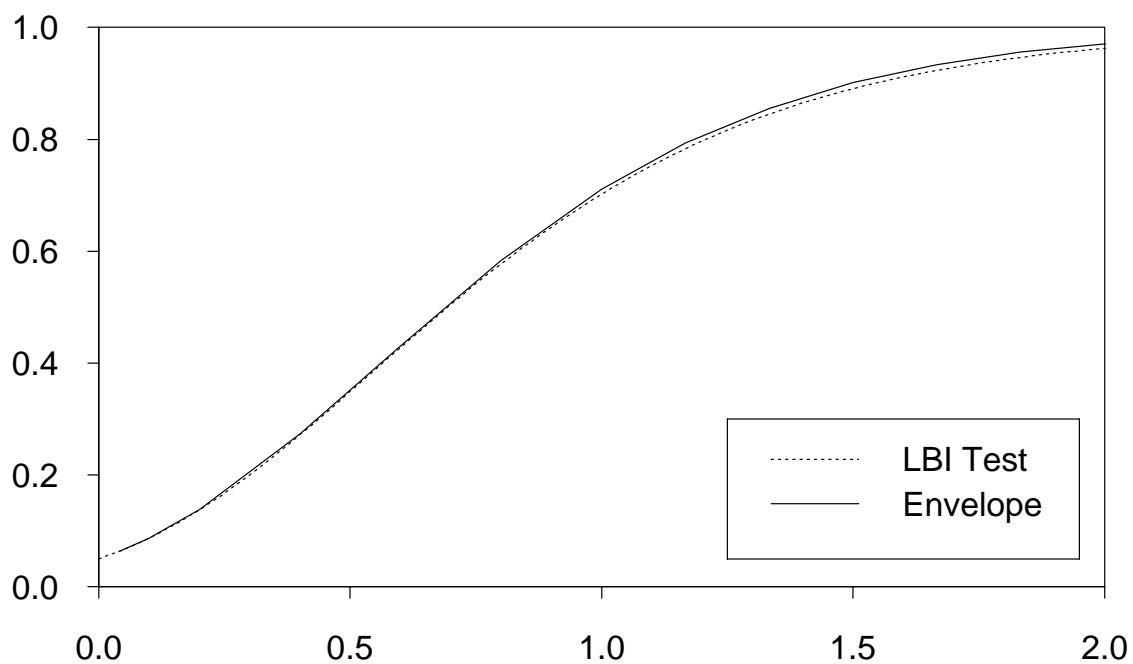


Figure 10.10 Limiting probability densities of the seasonal LBIU statistics

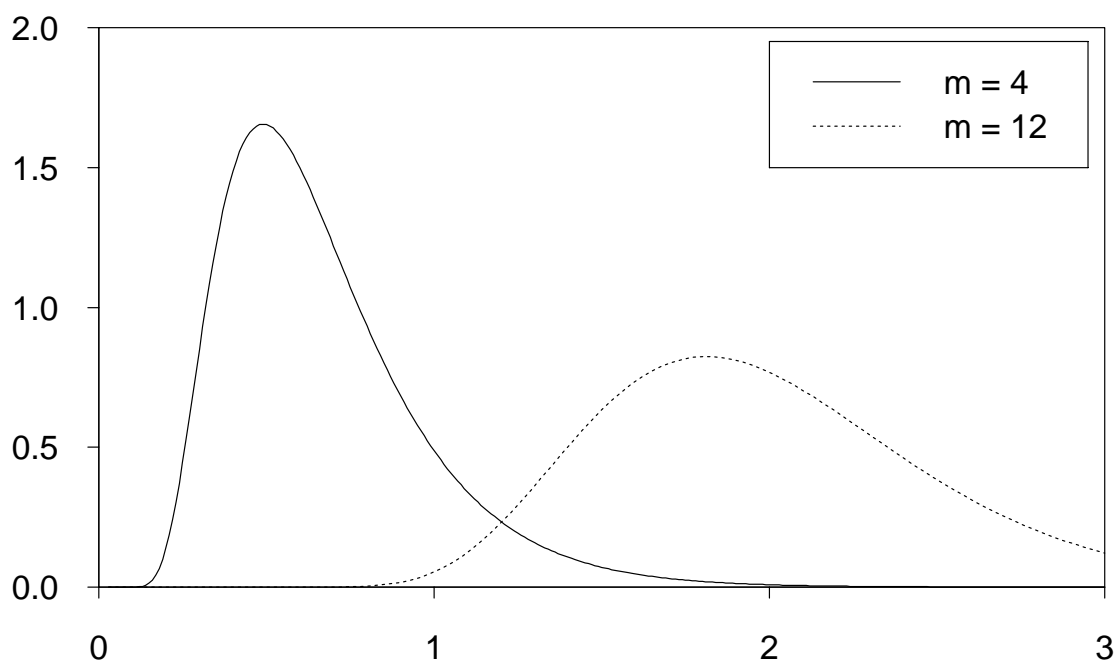


Figure 10.11 Limiting power functions of the LBIU tests : $m=4$

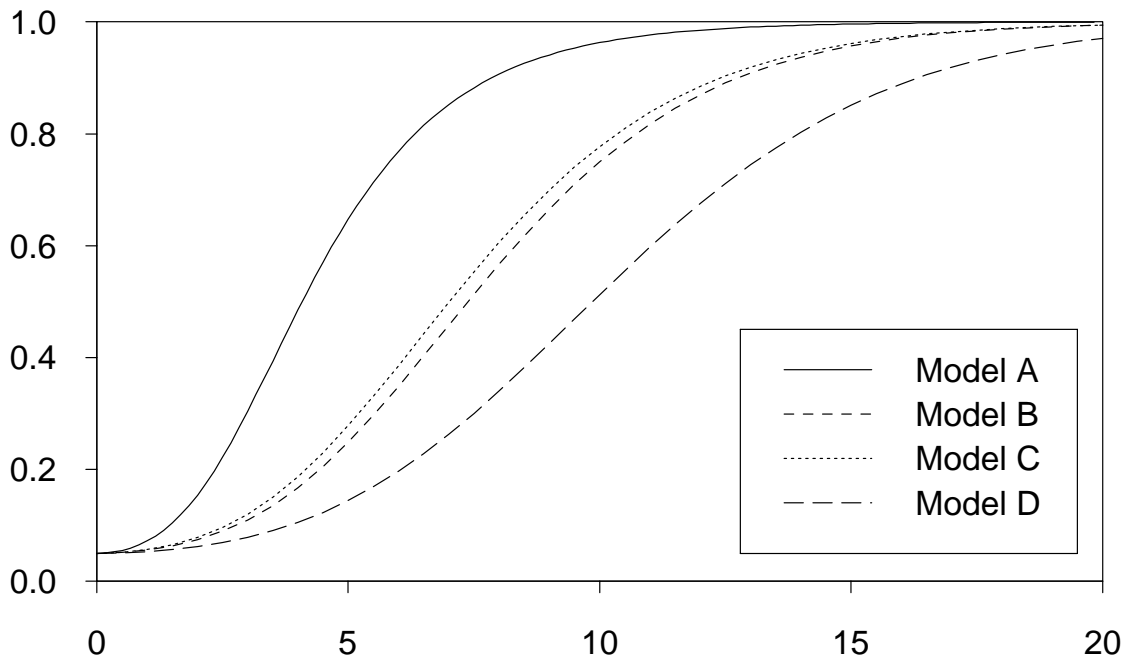


Figure 10.12 Limiting power functions of the LBIU tests : $m=12$

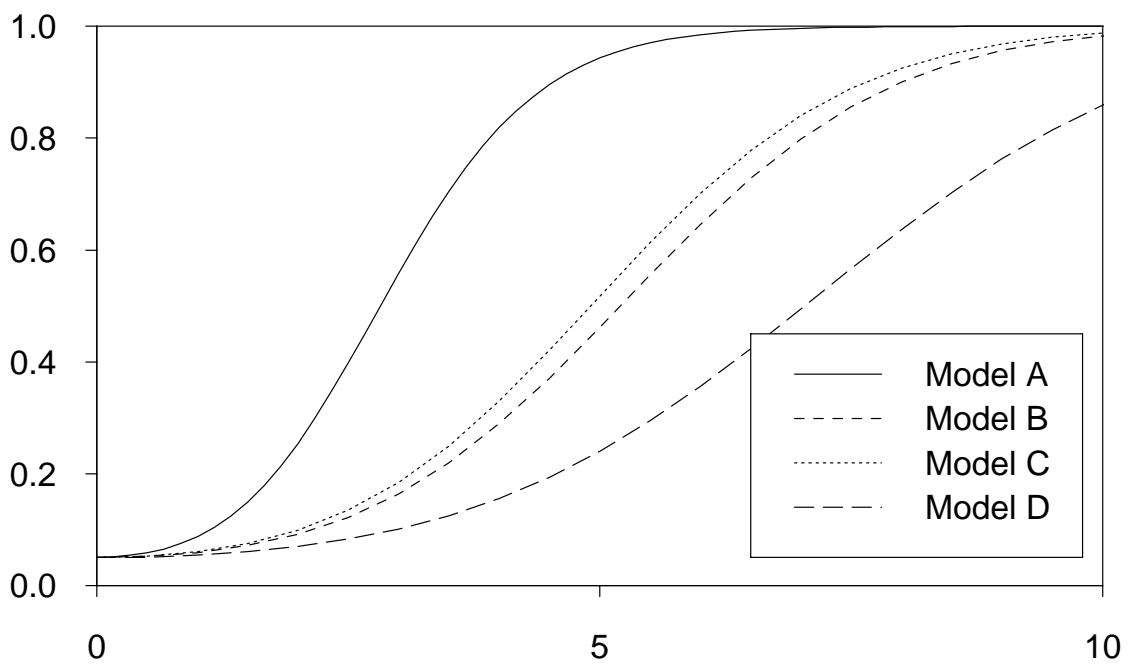


Figure 10.13 Limiting power envelope : Stationary case ($m=4$)

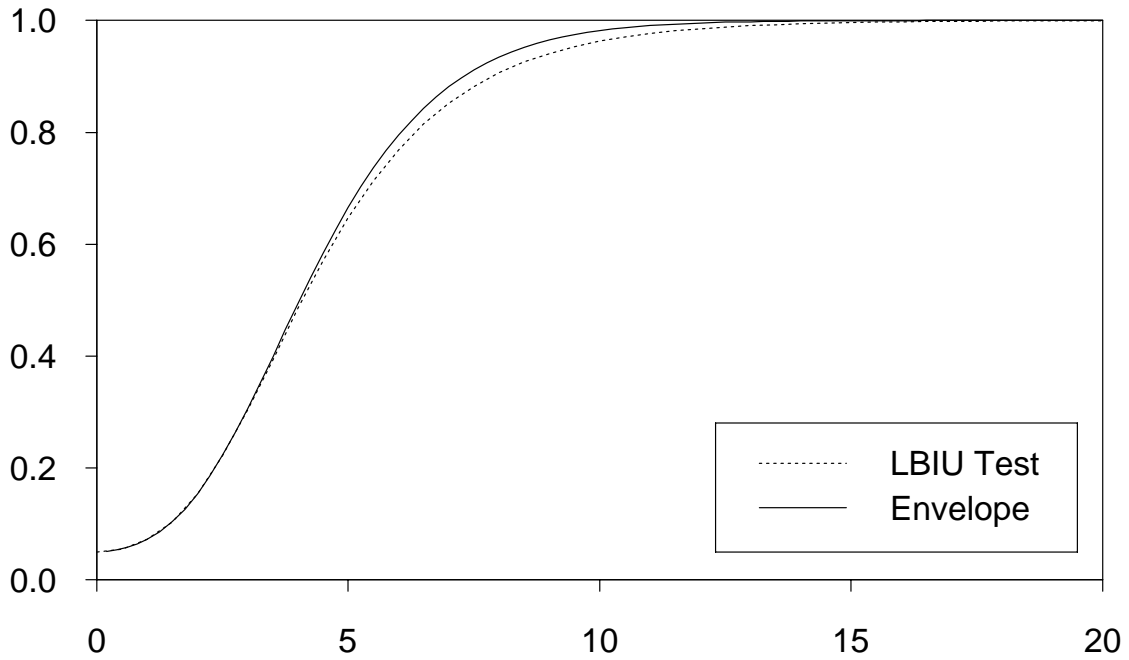


Figure 10.14 Limiting power envelope : Stationary case ($m=12$)

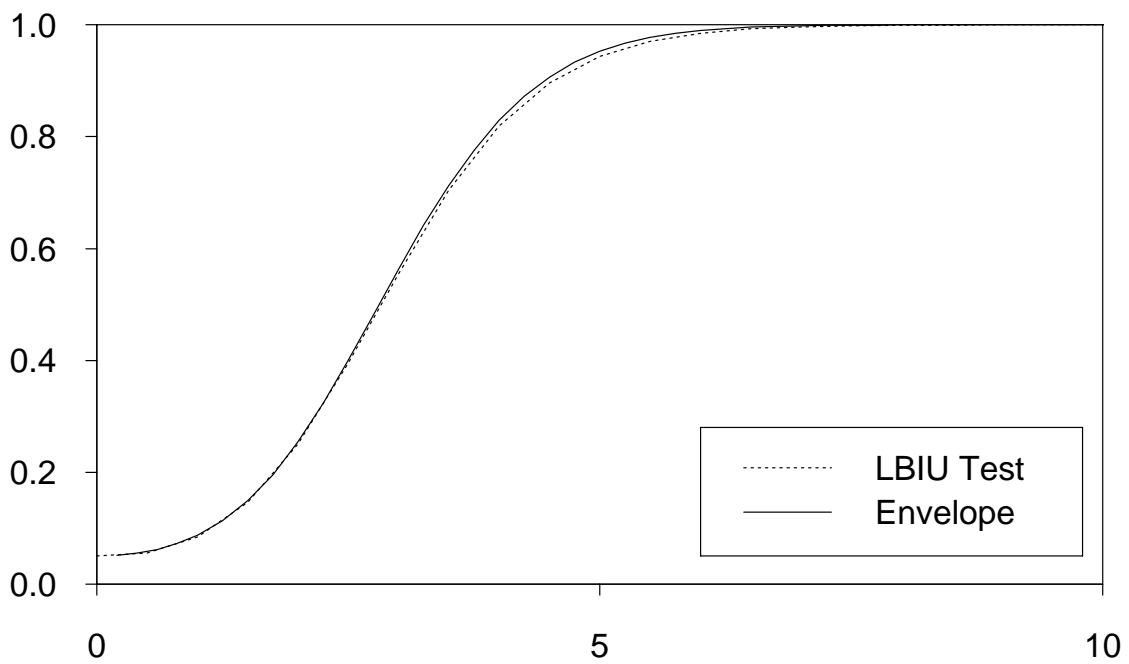


Figure 10.15 Null distributions of $\tilde{r}S_{T_1}^{(A)}$

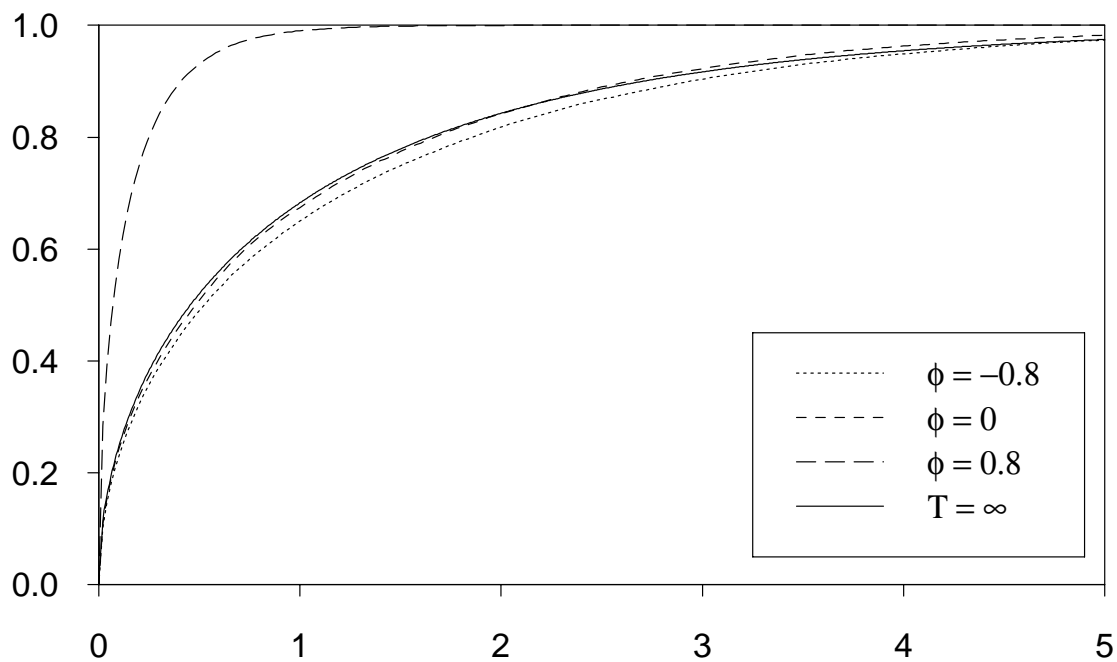


Figure 10.16 Null distributions of $\hat{r}S_{T_2}^{(A)}$

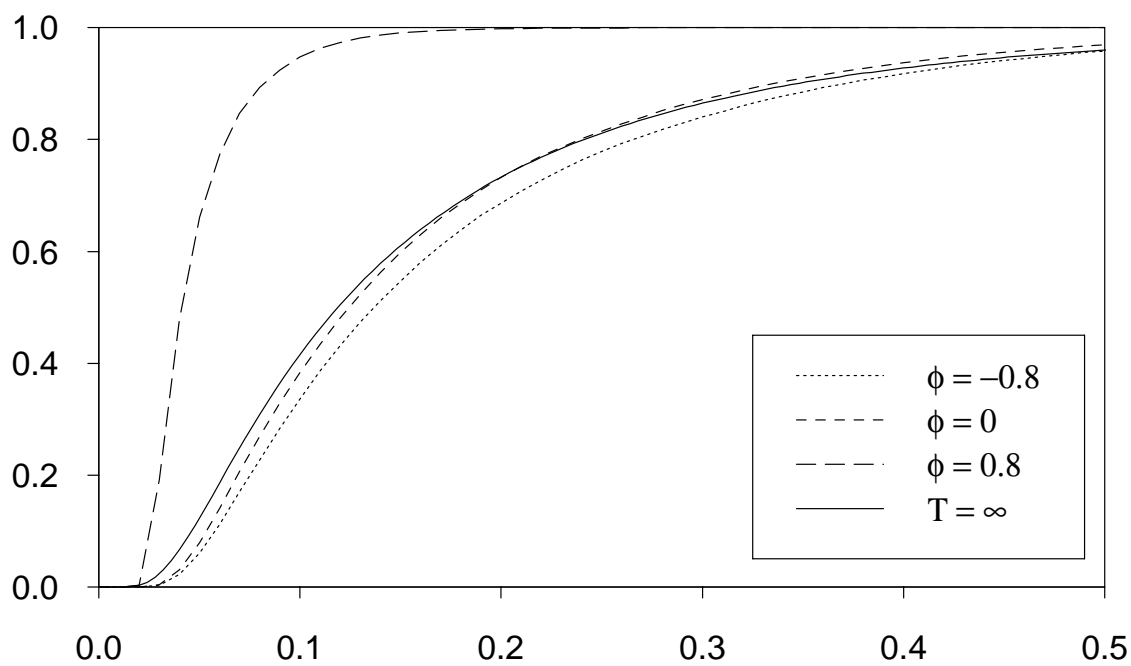


Figure 10.17 Limiting probability densities of $(m + 1)^2 R_{Tm}^{(I)}$

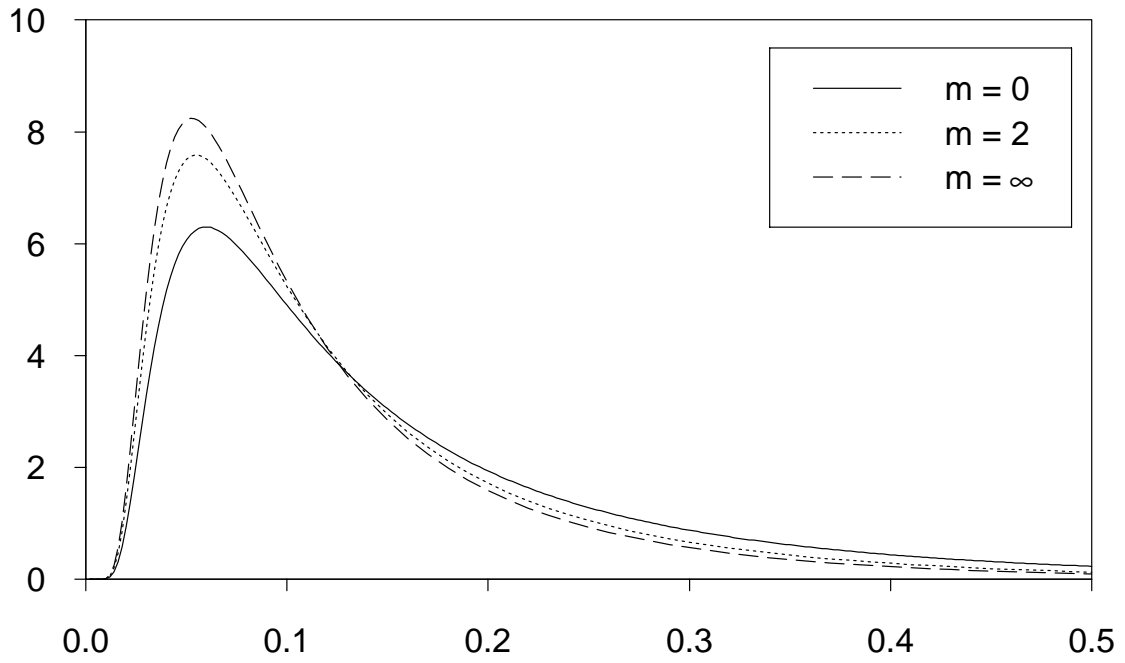


Figure 10.18 Limiting probability densities of $R_{Tm}^{(II)}$

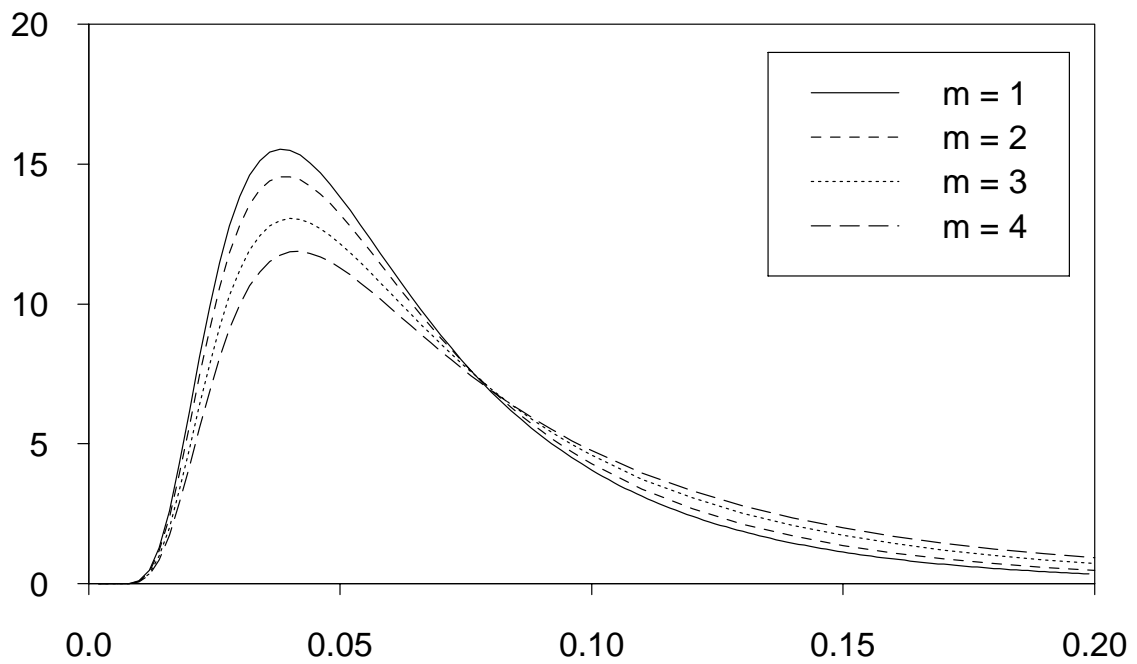


Figure 10.19 Limiting power envelope : $\beta_0=0$

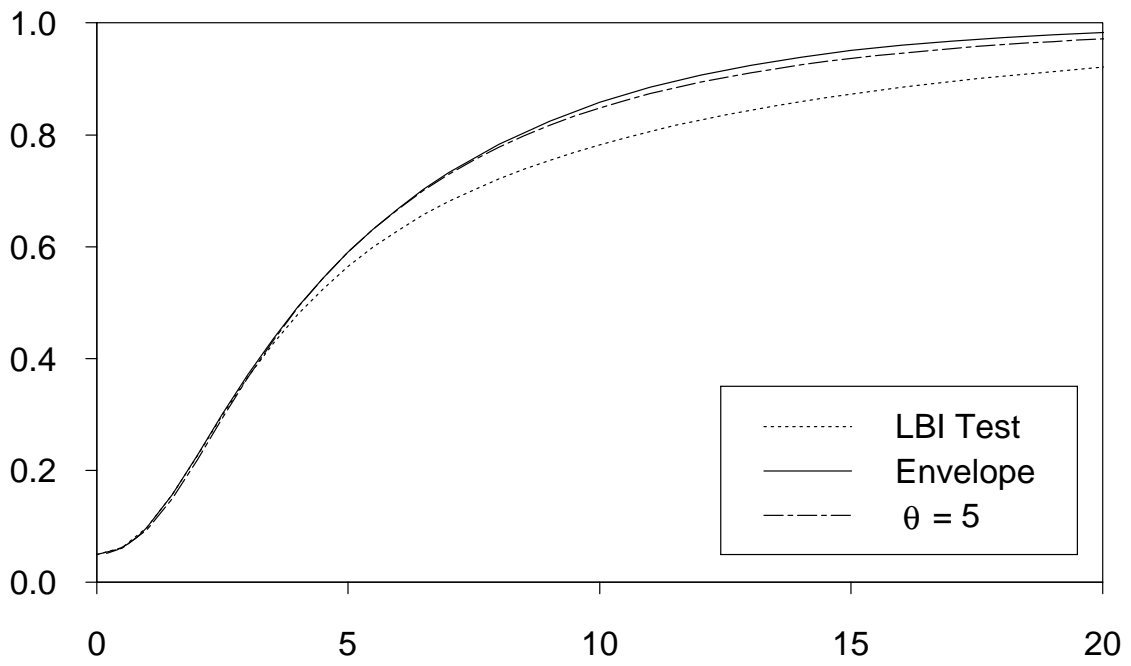


Table 11.1 Parameter values used to compute distributions in Table 11.2

Case	γ_1	γ_2	ρ	a	b	c	d
1	0	1/2	0	1	-2	2	-2
2	0	1/2	1/4	4/3	-2	2	-120/53
3	0	1/2	1/2	2	-2	2	-12/5
4	0	1/2	3/4	4	-2	2	-56/31
5	0	1/5	0	1	-5	5	-5
6	0	1/5	1/4	4/3	-5	5	-1500/241
7	0	1/5	1/2	2	-5	5	-150/19
8	0	1/5	3/4	4	-5	5	-700/83
9	-1/2	1/2	0	$1/\sqrt{2}$	0	$\sqrt{2}$	-1
10	-1/2	1/2	1/4	$2\sqrt{2}/3$	0	$\sqrt{2}$	-10/9
11	-1/2	1/2	1/2	$\sqrt{2}$	0	$\sqrt{2}$	-3/2
12	-1/2	1/2	3/4	$2\sqrt{2}$	0	$\sqrt{2}$	-14/5
13	-1/5	1/5	0	$1/\sqrt{2}$	0	$5/\sqrt{2}$	-25/16
14	-1/5	1/5	1/4	$2\sqrt{2}/3$	0	$5/\sqrt{2}$	-125/63
15	-1/5	1/5	1/2	$\sqrt{2}$	0	$5/\sqrt{2}$	-75/26
16	-1/5	1/5	3/4	$2\sqrt{2}$	0	$5/\sqrt{2}$	-175/31

Table 11.2 Distributions of $T(\hat{\beta}_{OLS} - \beta)$ for model (11.55)

Case	T	Probability of a smaller value							Moments	
		0.05	0.1	0.25	0.5	0.75	0.9	0.95	Mean	S.D.
1	200	-24.24	-18.07	-10.72	-5.64	-2.60	-0.54	0.33	-7.93	8.47
	∞	-23.01	-17.36	-10.29	-5.43	-2.56	-0.56	0.65	-7.56	7.92
2	200	-14.31	-10.93	-6.52	-3.46	-1.36	0.07	1.10	-4.66	5.24
	∞	-13.91	-10.52	-6.27	-3.29	-1.34	0.22	1.25	-4.41	4.96
3	200	-6.18	-4.77	-2.86	-1.37	-0.18	1.04	1.85	-1.69	2.64
	∞	-6.13	-4.65	-2.77	-1.32	-0.09	1.22	2.20	-1.56	2.61
4	200	-2.63	-1.91	-1.13	-0.35	0.52	1.55	2.47	-0.25	1.64
	∞	-1.63	-1.22	-0.64	-0.01	0.88	2.11	3.09	0.26	1.52
5	200	-59.96	-44.70	-26.52	-13.96	-6.44	-1.34	0.81	-19.60	20.94
	∞	-57.54	-43.39	-25.74	-13.58	-6.39	-1.39	1.63	-18.91	19.80
6	200	-41.35	-30.95	-18.43	-9.83	-4.32	-0.64	1.57	-13.44	14.61
	∞	-39.44	-29.75	-17.69	-9.32	-4.19	-0.39	1.98	-12.80	13.72
7	200	-21.69	-16.81	-10.07	-5.23	-1.86	0.52	2.12	-6.92	8.10
	∞	-21.20	-16.00	-9.55	-4.96	-1.81	0.89	2.72	-6.53	7.72
8	200	-3.73	-2.63	-1.50	-0.29	1.16	3.06	4.88	0.03	2.70
	∞	-5.61	-4.24	-2.45	-0.87	0.86	3.05	4.85	-0.71	3.23
9	200	-35.38	-27.79	-16.01	-7.09	-2.79	-0.78	-0.03	-11.22	12.40
	∞	-37.06	-27.22	-15.00	-6.84	-2.70	-0.65	0.30	-11.13	13.03
10	200	-22.16	-17.55	-9.82	-4.36	-1.67	-0.24	0.34	-7.02	7.96
	∞	-23.58	-17.29	-9.49	-4.26	-1.57	-0.14	0.58	-6.95	8.38
11	200	-13.65	-10.50	-6.01	-2.61	-0.93	-0.05	0.35	-4.21	4.87
	∞	-14.34	-10.50	-5.74	-2.56	-0.89	0.04	0.52	-4.17	5.13
12	200	-5.97	-4.79	-2.75	-1.23	-0.51	-0.16	-0.05	-1.95	2.13
	∞	-6.76	-4.95	-2.70	-1.19	-0.40	0.06	0.31	-1.95	2.43
13	200	-59.92	-44.27	-25.88	-10.78	-3.41	0.89	2.95	-17.59	21.18
	∞	-61.48	-44.93	-24.40	-10.63	-3.20	1.30	3.81	-17.38	22.34
14	200	-42.76	-31.98	-18.51	-7.67	-2.25	0.99	2.60	-12.57	15.34
	∞	-44.32	-32.37	-17.54	-7.59	-2.17	1.19	3.10	-12.42	16.19
15	200	-27.86	-20.62	-12.12	-4.98	-1.39	0.70	1.89	-8.12	10.00
	∞	-28.83	-21.03	-11.38	-4.90	-1.35	0.88	2.17	-8.02	10.56
16	200	-12.50	-9.83	-5.50	-2.43	-0.91	-0.10	0.27	-3.91	4.48
	∞	-14.54	-10.38	-5.59	-2.40	-0.64	0.47	1.12	-3.93	5.20

Table 11.3 Means and standard deviations of distributions of $T(\hat{\beta}_{OLS} - \beta)$ and $T(\hat{\beta}_{FM} - \beta)$

	T	$\theta = 0.8$	$\theta = 0.4$	$\theta = 0.0$
$\delta = -0.8$				
OLS	50	-6.85(6.25)	-4.50(4.45)	-2.75(3.05)
	∞	-4.85(5.31)	-3.43(3.39)	-2.36(2.14)
FM	50	-1.25(6.35)	-1.40(3.95)	-1.25(2.60)
	∞	0 (2.95)	0 (1.87)	0 (1.15)
$\delta = -0.4$				
OLS	50	-3.35(4.05)	-2.85(3.95)	-2.00(3.05)
	∞	-1.96(3.11)	-1.92(2.78)	-1.65(2.18)
FM	50	-2.10(4.70)	-1.35(4.05)	-0.75(3.15)
	∞	0 (2.38)	0 (2.19)	0 (1.76)
$\delta = 0.4$				
OLS	50	-1.20(2.00)	-1.00(2.30)	-0.55(2.50)
	∞	-0.38(1.44)	-0.34(1.62)	-0.24(1.79)
FM	50	-1.15(2.40)	-0.60(2.60)	0.20(3.00)
	∞	0 (1.23)	0 (1.50)	0 (1.76)
$\delta = 0.8$				
OLS	50	-0.75(1.25)	-0.50(1.40)	-0.20(1.80)
	∞	-0.05(0.84)	0.12(0.96)	0.47(1.21)
FM	50	-0.80(1.40)	-0.25(1.50)	0.75(2.15)
	∞	0 (0.65)	0 (0.85)	0 (1.15)

Table 11.4 Estimated percent points of the limiting null distributions of \hat{S}_{T_1} and \tilde{S}_{T_2}

	Probability of a smaller value				
	0.1	0.5	0.9	0.95	0.99
	\hat{S}_{T_1}				
$q - 1 = 1$	0.006	0.18	1.34	2.08	4.25
2	0.004	0.10	0.76	1.21	2.54
3	0.002	0.07	0.50	0.76	1.55
4	0.002	0.05	0.36	0.54	1.08
5	0.001	0.04	0.29	0.43	0.83
	\tilde{S}_{T_2}				
$q - 1 = 1$	0.035	0.083	0.24	0.31	0.53
2	0.030	0.063	0.16	0.22	0.37
3	0.025	0.050	0.12	0.16	0.27
4	0.022	0.042	0.09	0.12	0.21
5	0.020	0.036	0.08	0.10	0.16

Figure 11.1 Probability densities of $G_k(x)$ in (11.22) and $N(0,1)$

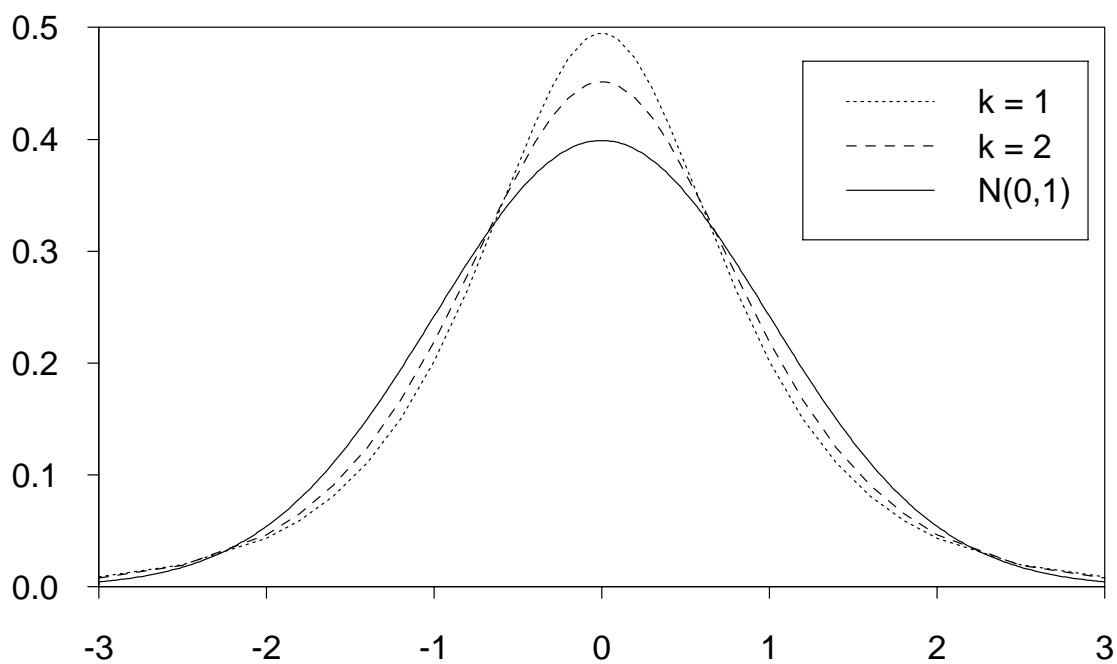


Figure 11.2 Probability densities of $H_k(\sigma_k x)$ in Theorems 11.4 and 11.6 and $N(0,1)$

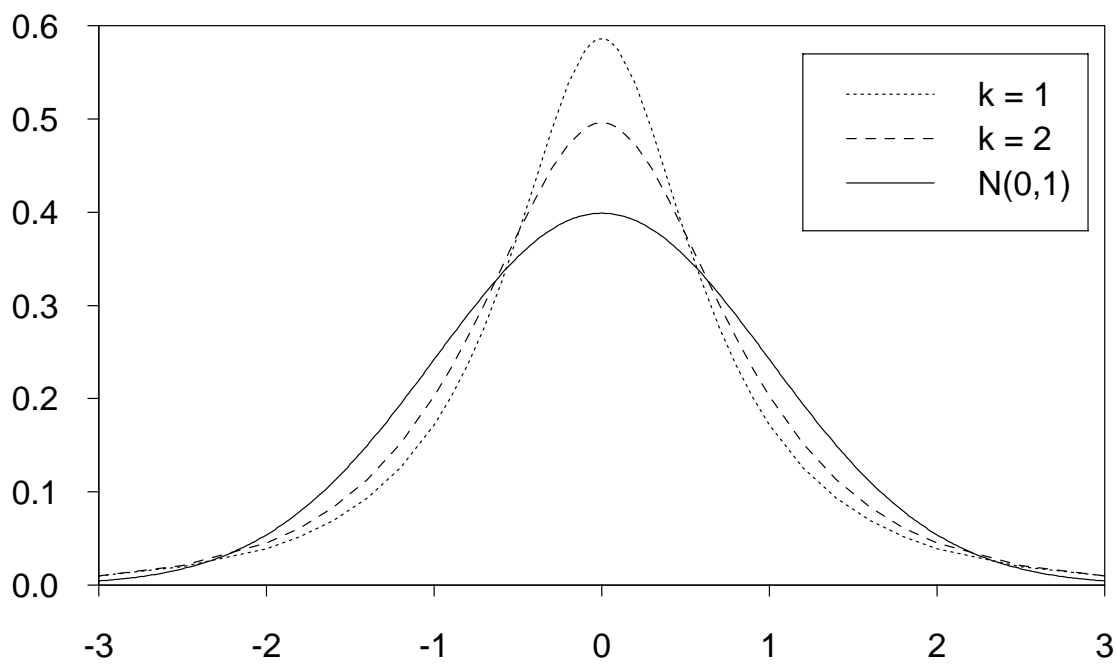


Figure 11.3 Limiting densities of $T(\hat{\beta}_{OLS}-\beta)$ and $T(\hat{\beta}_{FM}-\beta)$ for $(\delta, \theta) = (-0.8, 0.8)$

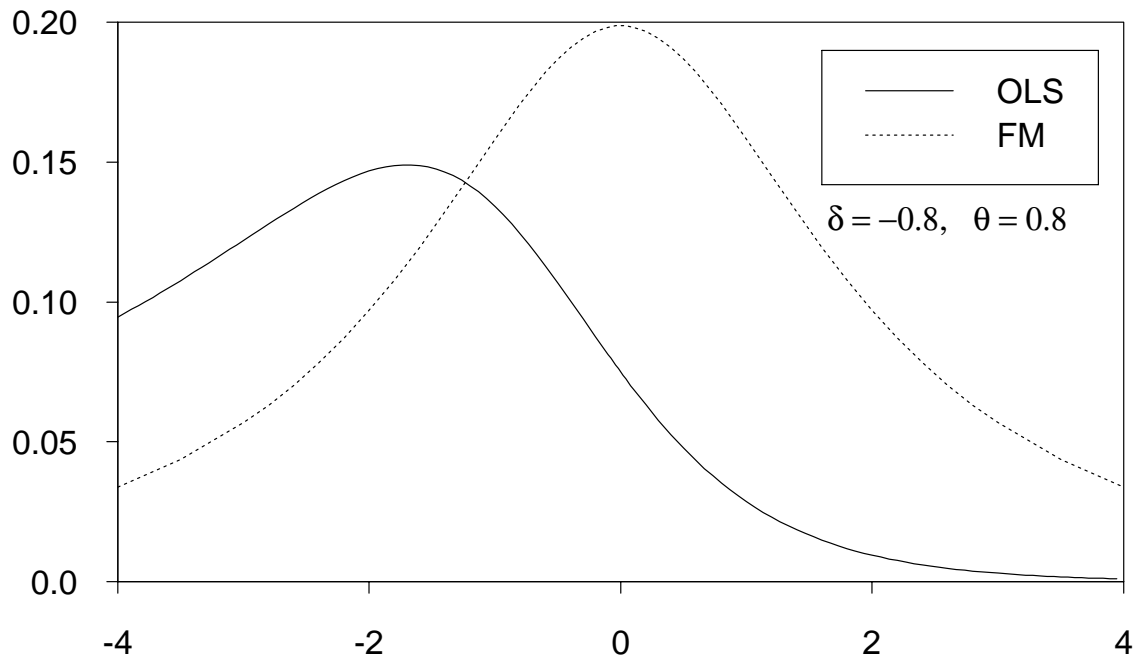


Figure 11.4 Limiting densities of $T(\hat{\beta}_{OLS}-\beta)$ and $T(\hat{\beta}_{FM}-\beta)$ for $(\delta, \theta) = (-0.8, 0)$

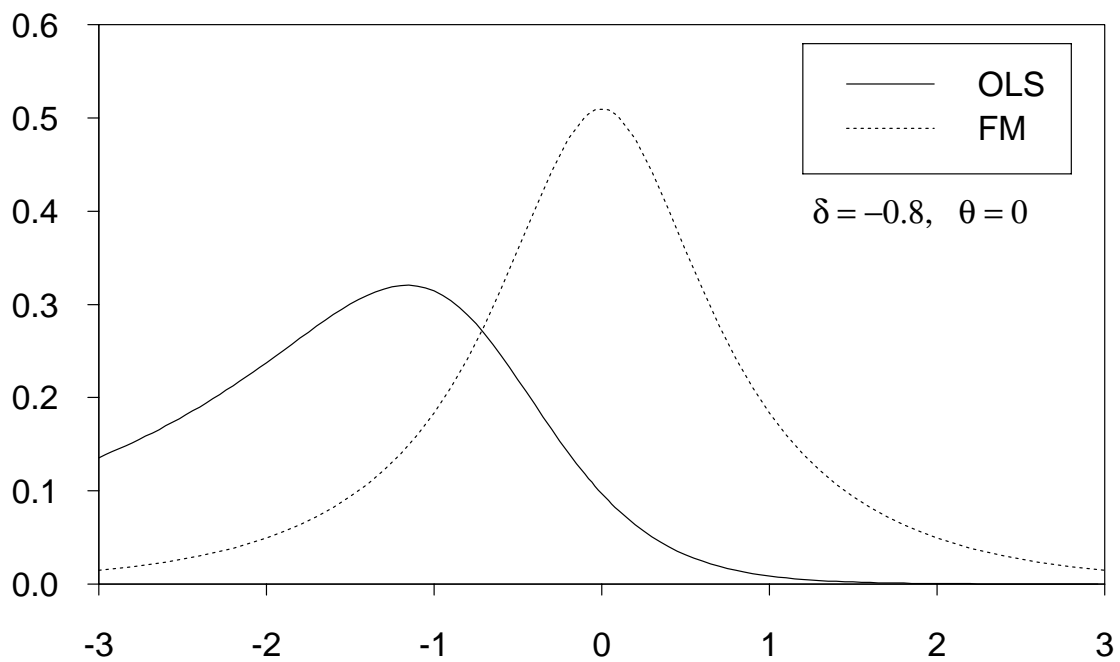


Figure 11.5 Limiting densities of $T^d(\hat{\beta}_{ML}-\beta)$ with $c/a=1$

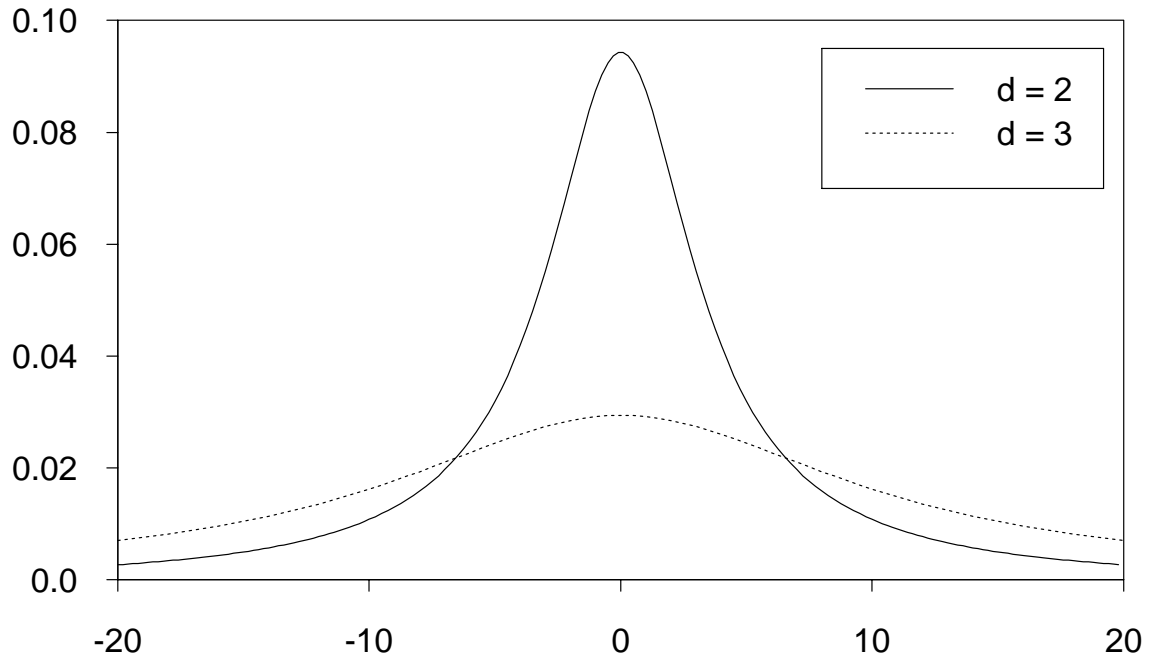


Figure 11.6 Limiting densities of $N(\hat{\beta}_{OLS}-\beta)$ with $a=c=1$ and $b=d=0$

