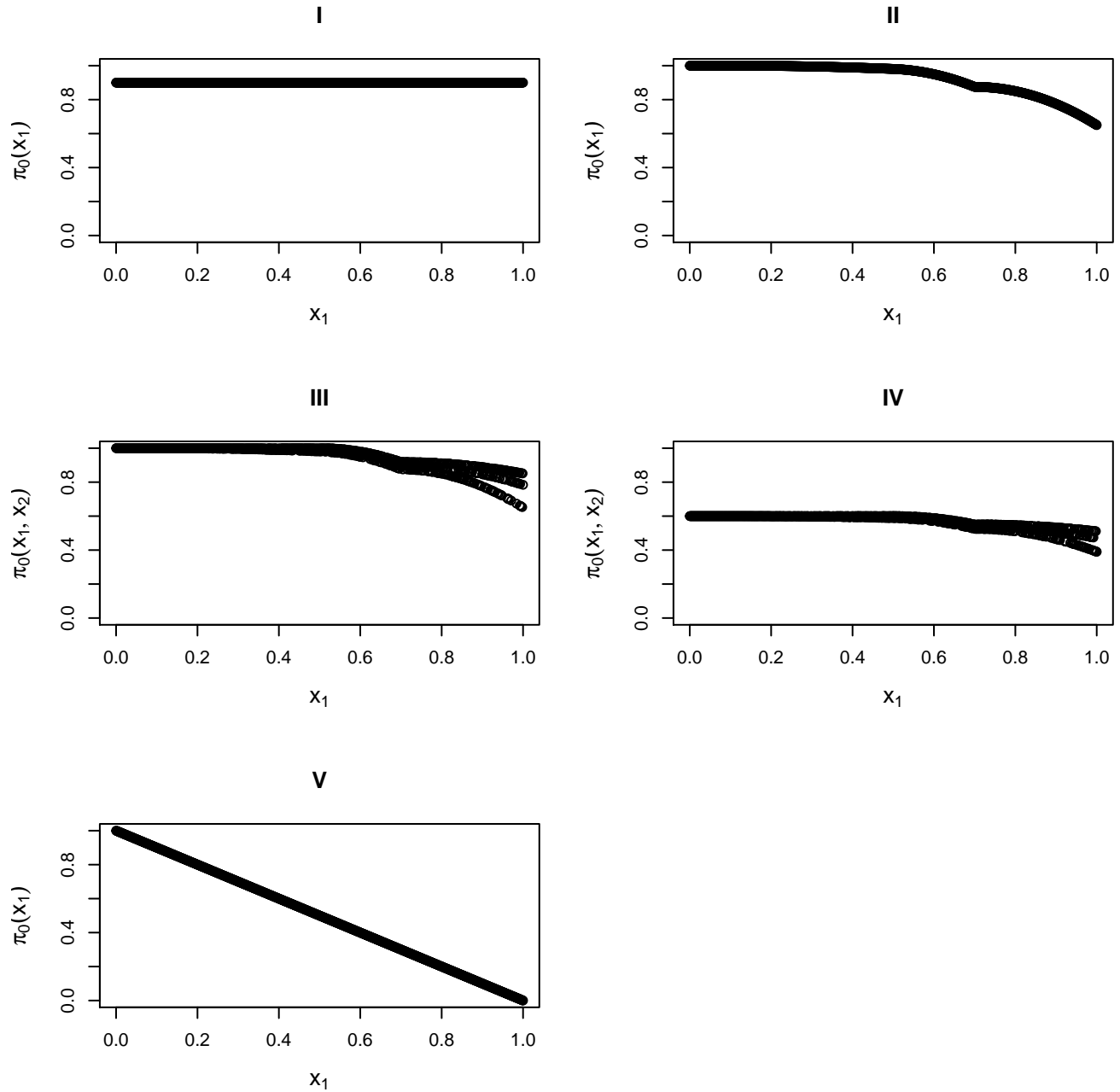


Simulations: Overview

The following 5 functions are considered for $\pi_0(x)$:



We performed 200 simulations in each scenario.

We estimated false discovery rates (FDR) and true positive rates (TPR) percentages for a nominal FDR of 5%. We considered both the theoretical and empirical nulls for the Scott method. For III and IV, a dummy variable was used for x_2 , along with linear or spline terms (with 3 df) for x_1 .

Independent test statistics

We first generated independent test statistics.

For the beta distribution, we generated the p-values directly from $\text{Beta}(1,20)$. For the other distributions, we generated the test statistics and calculated the p-values from them. For the t-test, we considered 2 groups of 6 (so $2 \times 6 = 10$ df) and used the t-statistics instead of the z-statistics for the Scott method. For the chisquared test, 1 df corresponds to a 2×2 table, 4 df to a 3×3 table.

BL = Boca-Leek, Scott T = Scott theoretical null, Scott E = Scott empirical null

1,000 tests

```
## Warning: package 'bindrcpp' was built under R version 3.3.3
```

$\pi_0(x)$	Dist. under H_1	Reg. model	FDR					TPR				
			BL	Scott T	Scott E	Storey	BH	BL	Scott T	Scott E	Storey	BH
I	Beta(1,20)	Linear	5.0			5.2	3.9	0.2			0.2	0.1
II	Beta(1,20)	Linear	4.8			4.8	4.1	0.2			0.1	0.1
II	Beta(1,20)	Spline	6.5			4.8	4.1	0.2			0.1	0.1
III	Beta(1,20)	Linear	5.2			5.4	5.4	0.2			0.2	0.2
III	Beta(1,20)	Spline	6.2			5.4	5.4	0.3			0.2	0.2
IV	Beta(1,20)	Linear	6.4			5.1	3.4	12.2			5.4	0.3
IV	Beta(1,20)	Spline	7.9			5.1	3.4	15.4			5.4	0.3
V	Beta(1,20)	Linear	3.5			4.9	3.1	66.6			20.6	0.4
I	Norm	Linear	5.0	5.2	6.6	4.9	4.4	51.0	50.9	49.7	50.8	49.7
II	Norm	Linear	5.4	5.7	8.1	5.3	4.9	48.5	63.5	61.3	47.6	47.0
II	Norm	Spline	5.6	5.9	8.3	5.3	4.9	49.3	63.5	61.5	47.6	47.0
III	Norm	Linear	5.8	5.9	9.9	5.4	5.1	45.1	60.3	57.9	44.0	43.4
III	Norm	Spline	5.9	6.0	10.1	5.4	5.1	45.6	60.9	58.2	44.0	43.4
IV	Norm	Linear	5.0	4.9	2.4	4.7	2.8	71.6	71.8	60.6	71.2	65.4
IV	Norm	Spline	5.2	5.0	2.4	4.7	2.8	72.0	71.9	60.7	71.2	65.4
V	Norm	Linear	4.4	4.8	21.4	4.7	2.4	79.2	83.2	73.4	74.1	67.1
I	T	Linear	5.7	21.3	23.4	5.5	4.8	15.7	55.4	56.9	15.2	13.6
II	T	Linear	4.8	20.7	23.8	5.0	4.4	13.0	64.5	65.5	11.6	10.6
II	T	Spline	4.7	21.1	24.5	5.0	4.4	13.8	64.8	65.6	11.6	10.6
III	T	Linear	6.2	26.8	31.0	5.9	5.4	9.4	54.6	54.7	8.2	7.6
III	T	Spline	6.8	27.3	31.3	5.9	5.4	10.0	55.2	55.3	8.2	7.6
IV	T	Linear	5.0	9.3	2.8	4.7	2.9	52.5	72.9	44.4	52.0	40.3
IV	T	Spline	5.4	9.3	2.8	4.7	2.9	53.0	73.0	44.6	52.0	40.3
V	T	Linear	4.1	7.4	7.8	4.7	2.5	66.4	80.3	50.0	57.1	43.3
I	Chisq 1 df	Linear	5.0			4.8	4.4	51.2			50.9	49.7
II	Chisq 1 df	Linear	4.8			4.8	4.4	48.3			47.1	46.3
II	Chisq 1 df	Spline	5.0			4.8	4.4	48.9			47.1	46.3
III	Chisq 1 df	Linear	5.0			4.9	4.8	44.3			43.1	42.5
III	Chisq 1 df	Spline	5.3			4.9	4.8	44.8			43.1	42.5
IV	Chisq 1 df	Linear	5.1			4.7	2.8	71.6			71.1	65.1
IV	Chisq 1 df	Spline	5.3			4.7	2.8	71.9			71.1	65.1
V	Chisq 1 df	Linear	4.4			4.8	2.5	78.9			73.9	66.8
I	Chisq 4 df	Linear	5.3			5.4	4.8	30.8			30.6	29.6
II	Chisq 4 df	Linear	5.3			5.3	5.0	28.4			27.5	26.7
II	Chisq 4 df	Spline	5.4			5.3	5.0	29.2			27.5	26.7
III	Chisq 4 df	Linear	5.9			5.4	5.3	24.8			24.0	23.4
III	Chisq 4 df	Spline	5.9			5.4	5.3	25.2			24.0	23.4
IV	Chisq 4 df	Linear	5.1			4.7	2.8	52.3			51.7	44.5
IV	Chisq 4 df	Spline	5.5			4.7	2.8	52.7			51.7	44.5
V	Chisq 4 df	Linear	4.0			4.6	2.4	62.8			55.3	46.2