

Supplementary material to: Adequate sample size for developing prediction models is not simply related to events per variable

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Appendix

A.1. Tables A.1.1 - A.1.4: Number of occasion each variable was significant as the number of model predictors increases

Table A.1.1: Number and percentage of occasions in which each variable was statistically significant at 0.05 level of significance using the five predictors model.

	EPV=2	EPV=5	EPV=10	EPV=15	EPV=20	EPV=25	EPV=50
Variable	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)
Converged ^a	999	1,000	1,000	1,000	1,000	1,000	1,000
BMI	84 (8.4)	88 (8.8)	110 (11)	174 (17.4)	184 (18.4)	208 (20.8)	380 (38.0)
AGE	807 (80.8)	997 (99.7)	1000 (100.0)	1000 (100.0)	1000 (100.0)	1000 (100.0)	1000 (100.0)
SEX	87 (8.7)	216 (21.6)	369 (36.9)	519 (51.9)	608 (60.8)	717 (71.7)	943 (94.3)
RATIO	72 (7.2)	86 (8.6)	105 (10.5)	107 (10.7)	141 (14.1)	141 (14.1)	196(19.6)
SBP	91 (9.1)	115 (11.5)	181 (18.1)	250 (25)	326 (32.6)	368 (36.8)	620 (62.0)

^aNumber of models that converged out of 1,000 samples.

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Table A.1.2: Number and percentage of occasions in which each variable was statistically significant at 0.05 level of significance using the seven predictors model.

	EPV=2	EPV=5	EPV=10	EPV=15	EPV=20	EPV=25	EPV=50
Variable	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)
Converged ^a	581	884	989	998	999	999	1,000
BMI	54 (9.3)	91 (10.3)	121 (12.2)	170 (17.0)	181 (18.1)	213 (21.3)	343 (34.3)
AGE	508 (87.4)	884 (100.0)	989 (100.0)	998 (100.0)	999 (100.0)	999 (100.0)	1000 (100.0)
SEX	90 (15.5)	233 (26.4)	485 (49.0)	644 (64.5)	763 (76.4)	851 (85.2)	991 (99.1)
RATIO	57 (9.8)	85 (9.6)	108 (10.9)	136 (13.6)	140 (14.0)	182 (18.2)	267 (26.7)
SBP	55 (9.5)	141 (16.0)	224 (22.7)	301 (30.2)	362 (36.2)	443 (44.3)	710 (71.0)
HYPERS	40 (6.9)	73 (8.3)	117 (11.8)	157 (15.7)	181 (18.1)	226 (22.6)	353 (35.3)
TYPE2	123 (21.2)	158 (17.9)	226 (22.9)	298 (29.9)	339 (33.9)	367 (36.7)	602 (60.2)

^aNumber of models that converged out of 1,000 samples.

Table A.1.3: Number and percentage of occasions in which each variable was statistically significant at 0.05 level of significance using the ten predictors model.

	EPV=2	EPV=5	EPV=10	EPV=15	EPV=20	EPV=25	EPV=50
Variable	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)
Converged ^a	146	532	794	895	959	986	999
BMI	19 (13.0)	44 (8.3)	135 (17.0)	210 (23.5)	280 (29.2)	350 (35.5)	587 (58.8)
AGE	144 (98.6)	532 (100.0)	794 (100.0)	895 (100.0)	959 (100.0)	986 (100.0)	999 (100.0)
SEX	30 (20.5)	199 (37.4)	492 (62.0)	707 (79.0)	869 (90.6)	924 (93.7)	998 (99.9)
RATIO	15 (10.3)	47 (8.8)	98 (12.3)	78 (8.7)	120 (12.5)	137 (13.9)	231 (23.1)
SBP	23 (15.8)	75 (14.1)	220 (27.7)	340 (38.0)	421 (43.9)	534 (54.2)	813 (81.4)
HYPERS	10 (6.8)	69 (13.0)	135 (17.0)	188 (21.0)	225 (23.5)	296 (30.0)	482 (48.2)
TYPE2	35 (24.0)	101 (19.0)	218 (27.5)	341 (38.1)	428 (44.6)	497 (50.4)	734 (73.5)
SMK	20 (13.7)	134 (25.2)	319 (40.2)	475 (53.1)	604 (63.0)	736 (74.6)	957 (95.8)
FHCVD	45 (30.8)	192 (36.1)	465 (58.6)	630 (70.4)	770 (80.3)	868 (88.0)	987 (98.8)
BRA	53 (36.3)	97 (18.2)	90 (11.3)	109 (12.2)	107 (11.2)	139 (14.1)	165 (16.5)

^aNumber of models that converged out of 1,000 samples.

Table A.1.4: Number and percentage of occasions in which each variable was statistically significant at 0.05 level of significance using the 12 predictors model.

	EPV=2	EPV=5	EPV=10	EPV=15	EPV=20	EPV=25	EPV=50
Variable	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)
Converged ^a	7	73	264	389	483	608	883
BMI	1 (14.3)	8 (11.0)	53 (20.1)	97 (24.9)	168 (34.8)	246 (40.5)	528 (63.4)
AGE	6 (85.7)	73 (100.0)	264 (100.0)	389 (100.0)	483 (100.0)	608 (100.0)	833 (100.0)
SEX	2 (28.6)	22 (30.1)	182 (68.9)	338 (86.9)	445 (92.1)	591 (97.2)	833 (100.0)
RATIO	0 (0.0)	6 (8.2)	30 (11.4)	37 (9.5)	81 (16.8)	113 (18.6)	209 (25.1)
SBP	3 (42.9)	14 (19.2)	79 (29.9)	195 (50.1)	252 (52.2)	409 (67.3)	748 (89.8)
HYPERT	2 (28.6)	4 (5.5)	48 (18.2)	89 (22.9)	139 (28.8)	176 (28.9)	429 (51.5)
TYPE2	2 (28.6)	17 (23.3)	86 (32.6)	129 (33.2)	217 (44.9)	344 (56.6)	677 (81.3)
SMK	0 (0.0)	17 (23.3)	122 (46.2)	243 (62.5)	365 (75.6)	496 (81.6)	809 (97.1)
FHCVD	3 (42.9)	28 (38.4)	164 (62.1)	304 (78.1)	405 (83.9)	560 (92.1)	830 (99.6)
BRA	1 (14.3)	10 (13.7)	28 (10.6)	44 (11.3)	63 (13.0)	86 (14.1)	150 (18.0)
BAF	2 (28.6)	22 (30.1)	64 (24.2)	99 (25.4)	141 (29.2)	216 (35.5)	427 (51.3)
RENAL	5 (71.4)	39 (53.4)	107 (40.5)	127 (32.6)	124 (25.7)	156 (25.7)	174 (20.9)

^aNumber of models that converged out of 1,000 samples.

Table A.1.5: Frequency of variable selection at varying EPV

EPV	Method	BMI	RATIO	SBP	AGE	SEX	All
2	BE(pval(0.05))	10.2	12.2	16.9	99.8	25.1	0.1
	BE(aic)	26.2	25.7	34.6	100.0	45.0	1.1
5	BE(pval(0.05))	19.0	14.6	30.2	100.0	53.0	0.0
	BE(aic)	33.6	28.7	47.2	100.0	71.8	2.0
10	BE(pval(0.05))	34.7	18.3	48.6	100.0	82.4	0.5
	BE(aic)	50.6	33.8	65.9	100.0	91.2	5.8
15	BE(pval(0.05))	42.0	22.1	60.7	100.0	93.7	1.6
	BE(aic)	57.9	37.7	78.9	100.0	98.0	10.9
20	BE(pval(0.05))	49.0	29.9	74.4	100.0	97.9	3.5
	BE(aic)	64.8	46.4	87.0	100.0	99.4	19.2
25	BE(pval(0.05))	60.1	28.3	79.2	100.0	99.7	7.2
	BE(aic)	76.0	45.0	90.1	100.0	99.9	25.6
50	BE(pval(0.05))	79.8	46.7	98.1	100.0	99.9	29.8
	BE(aic)	90.8	65.3	99.4	100.0	100.0	56.5

BE, backward elimination;

All, percentage of cases where all five main predictors are selected;

pval, p-value.

B.1. Figures B.1.1 - B.1.3: Predictive accuracy measures

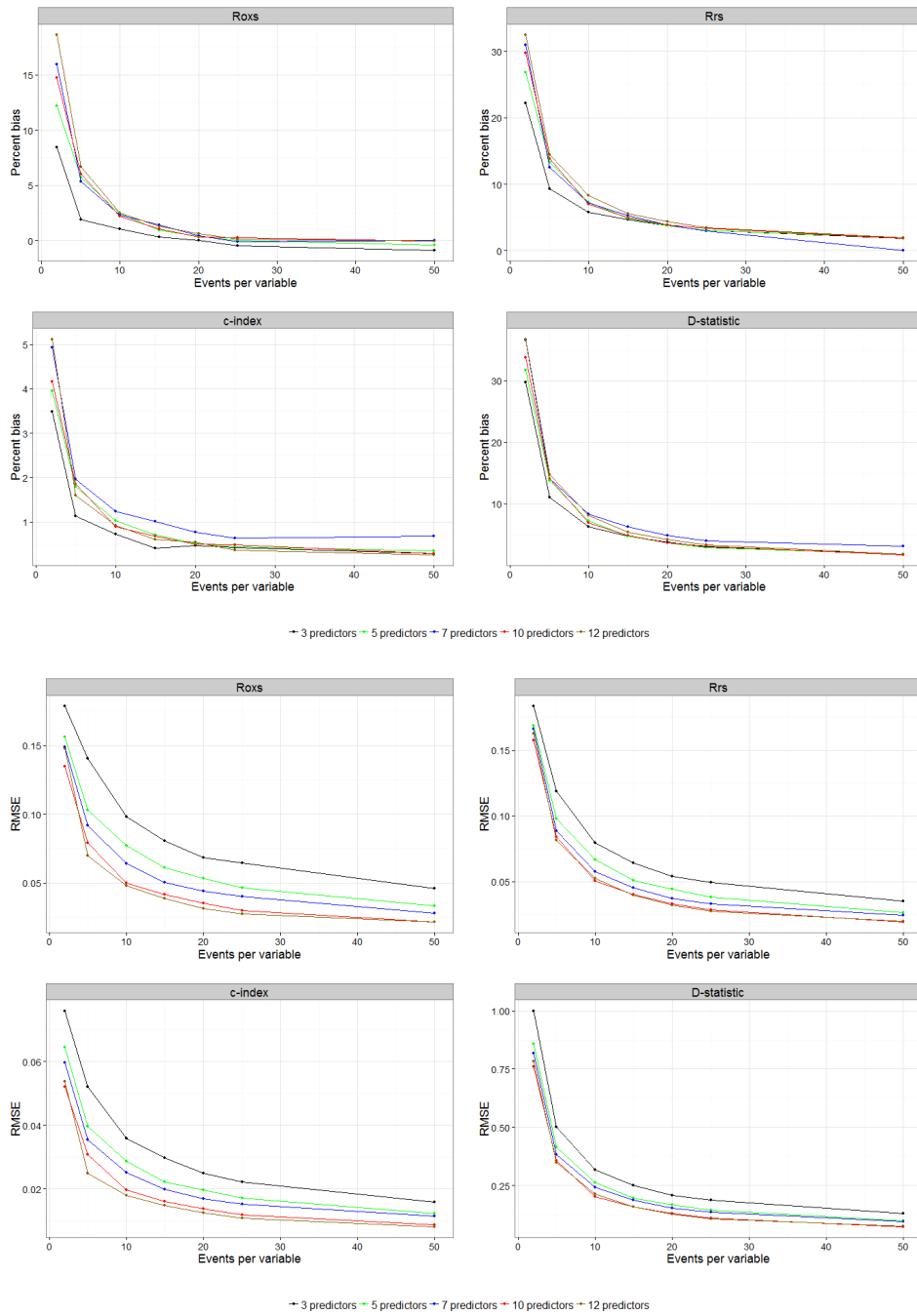


Figure B.1.1: Predictive accuracy measures for Cox models with varying EPV and number of covariates

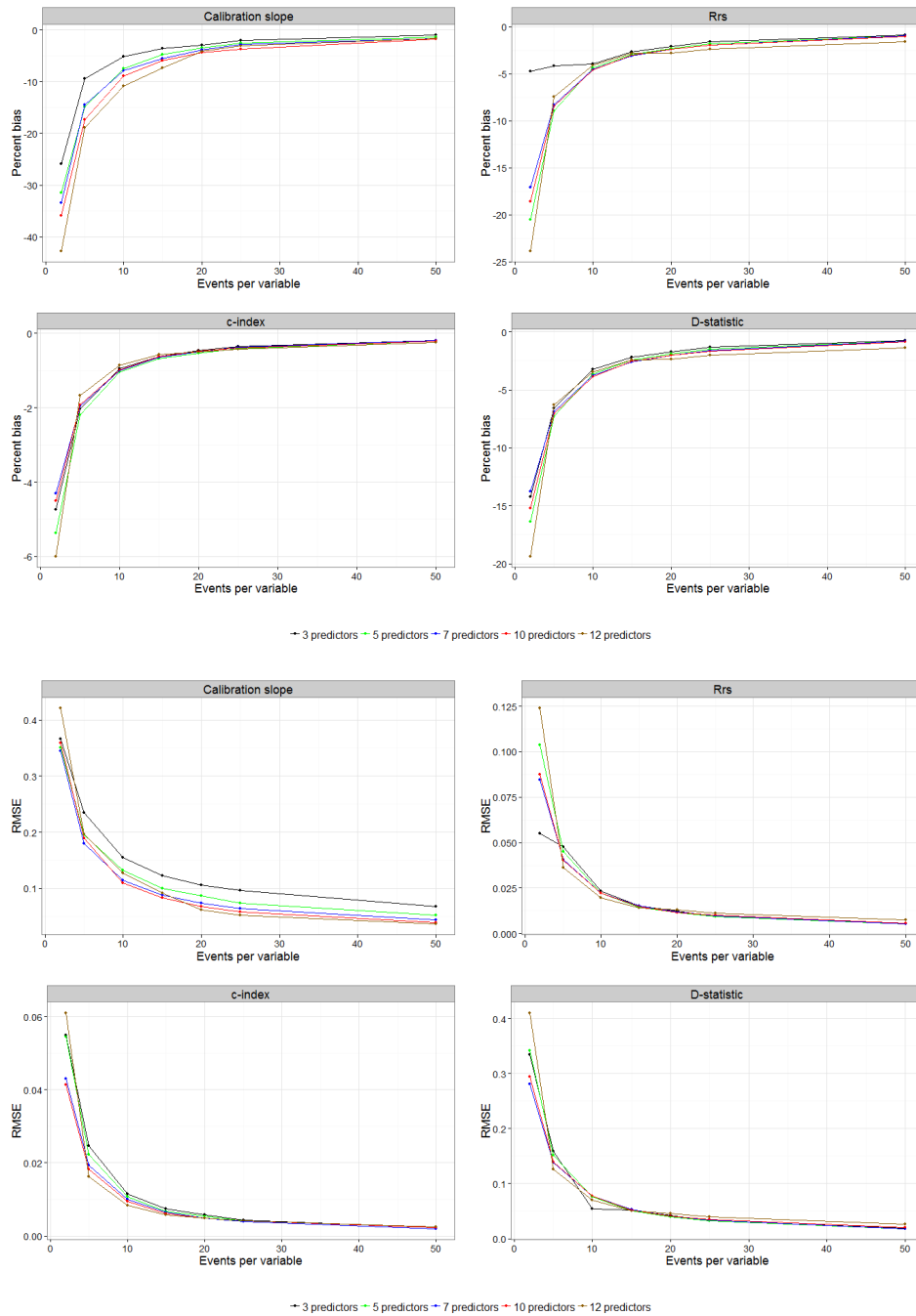


Figure B.1.2: Predictive accuracy measures for Cox models with varying EPV and number of covariates in external validation

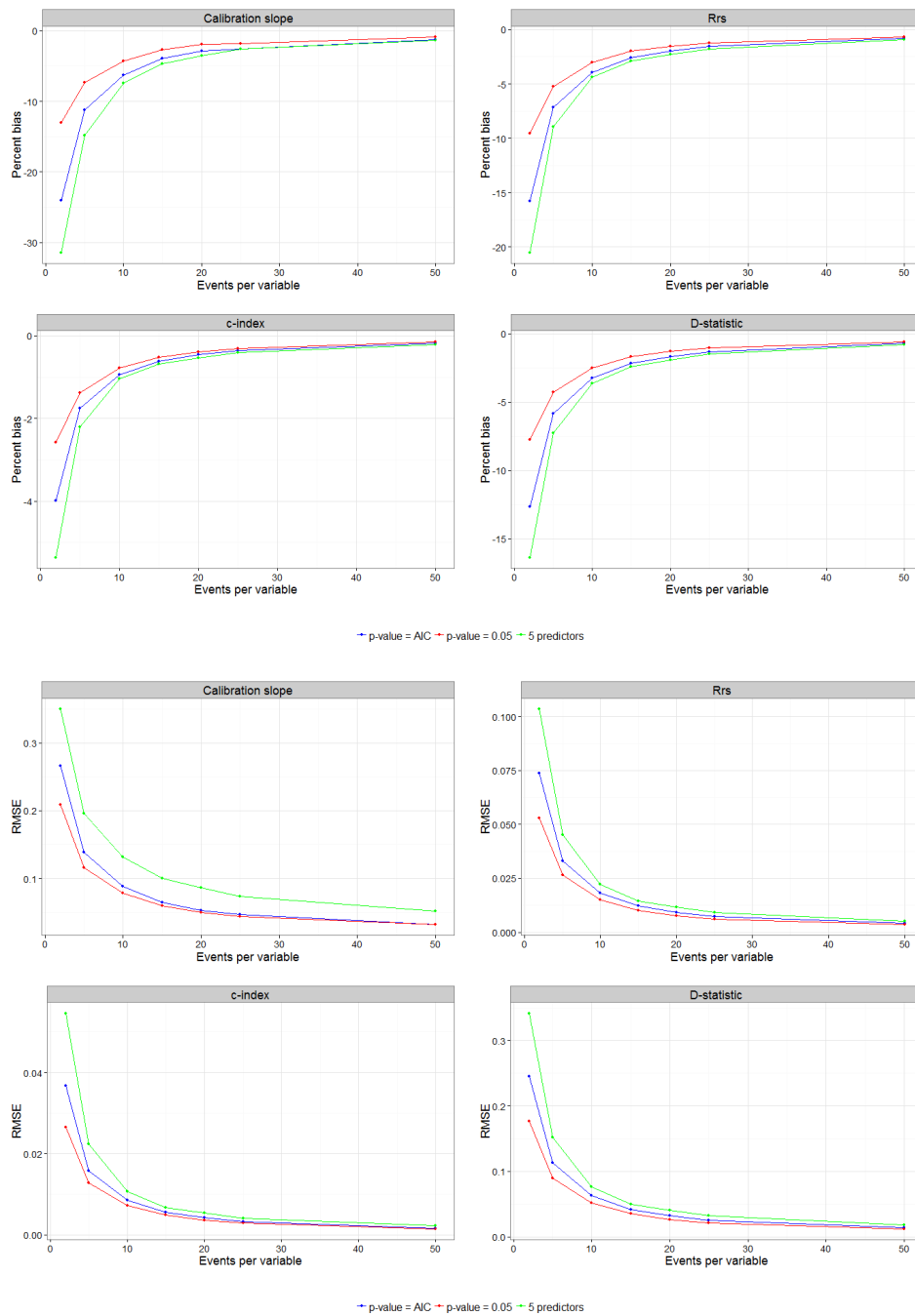


Figure B.1.3: Predictive accuracy measures for Cox models with varying EPV and number of covariates using variable selection

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...

```
1.189 ...degraphics[width = 5in]{biasscotland.png}
                                          }\\
```

Try typing <return> to proceed.
If that doesn't work, type X <return> to quit.

File: biasscotland.png Graphic file (type eps)

<biasscotland.png>

! LaTeX Error: Cannot determine size of graphic in rmsescotland.png (no BoundingBox).

See the LaTeX manual or LaTeX Companion for explanation.
Type H <return> for immediate help.

...

```
1.190 ...degraphics[width = 5in]{rmsescotland.png}
}
```

Try typing <return> to proceed.
If that doesn't work, type X <return> to quit.

File: rmsescotland.png Graphic file (type eps)
<rmsescotland.png>

LaTeX Warning: Float too large for page by 81.73932pt on input line 193.

LaTeX Warning: `h' float specifier changed to `ht'.

! LaTeX Error: Cannot determine size of graphic in biaspval.png (no BoundingBox).

See the LaTeX manual or LaTeX Companion for explanation.
Type H <return> for immediate help.

...

```
1.198 {\includegraphics[width = 5in]{biaspval.png}
} \\
```

Try typing <return> to proceed.
If that doesn't work, type X <return> to quit.

File: biaspval.png Graphic file (type eps)
<biaspval.png>

! LaTeX Error: Cannot determine size of graphic in rmsepval.png (no BoundingBox).

See the LaTeX manual or LaTeX Companion for explanation.
Type H <return> for immediate help.

...

```
1.199 {\includegraphics[width = 5in]{rmsepval.png}
}
```

Try typing <return> to proceed.
If that doesn't work, type X <return> to quit.

File: rmsepval.png Graphic file (type eps)
<rmsepval.png>

LaTeX Warning: Float too large for page by 81.73932pt on input line 202.

LaTeX Warning: `h' float specifier changed to `ht'.

[4

] [5] [6] [7] (./appendix.aux))

Here is how much of TeX's memory you used:

3856 strings out of 493118
54253 string characters out of 6139011
141204 words of memory out of 5000000
7231 multiletter control sequences out of 15000+600000
20735 words of font info for 79 fonts, out of 8000000 for 9000
1141 hyphenation exceptions out of 8191
36i,19n,38p,956b,465s stack positions out of
5000i,500n,10000p,200000b,80000s

Output written on appendix.dvi (7 pages, 14808 bytes).

LaTeX Source Files

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