

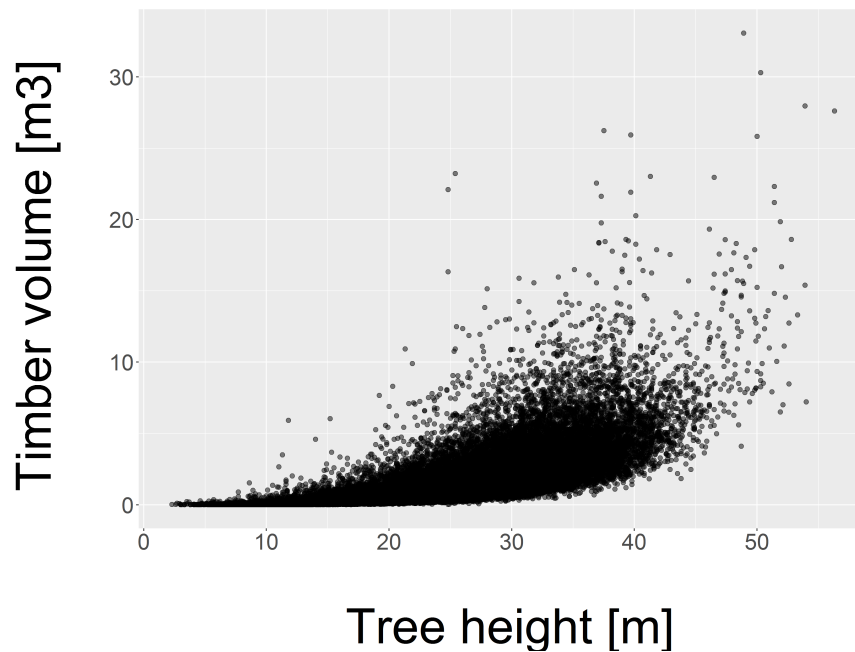
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Supplementary Material

**Combining canopy height and tree species information
for large scale timber volume estimations under strong
heterogeneity of auxiliary data and variable sample plot
sizes**

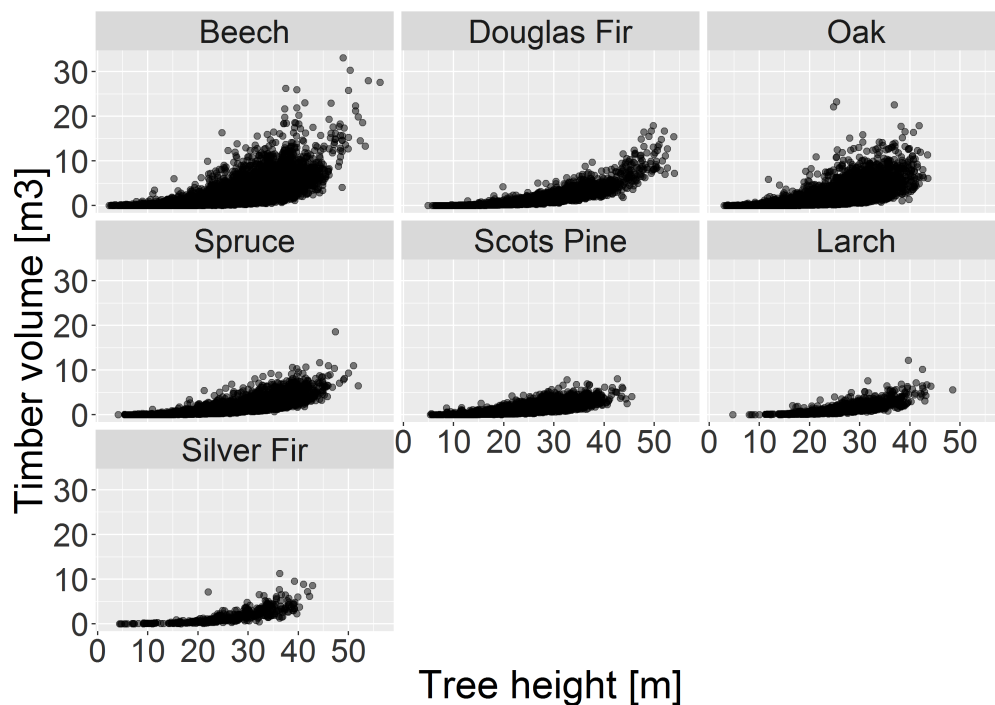
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1: Timber volume - height relationship on single tree level



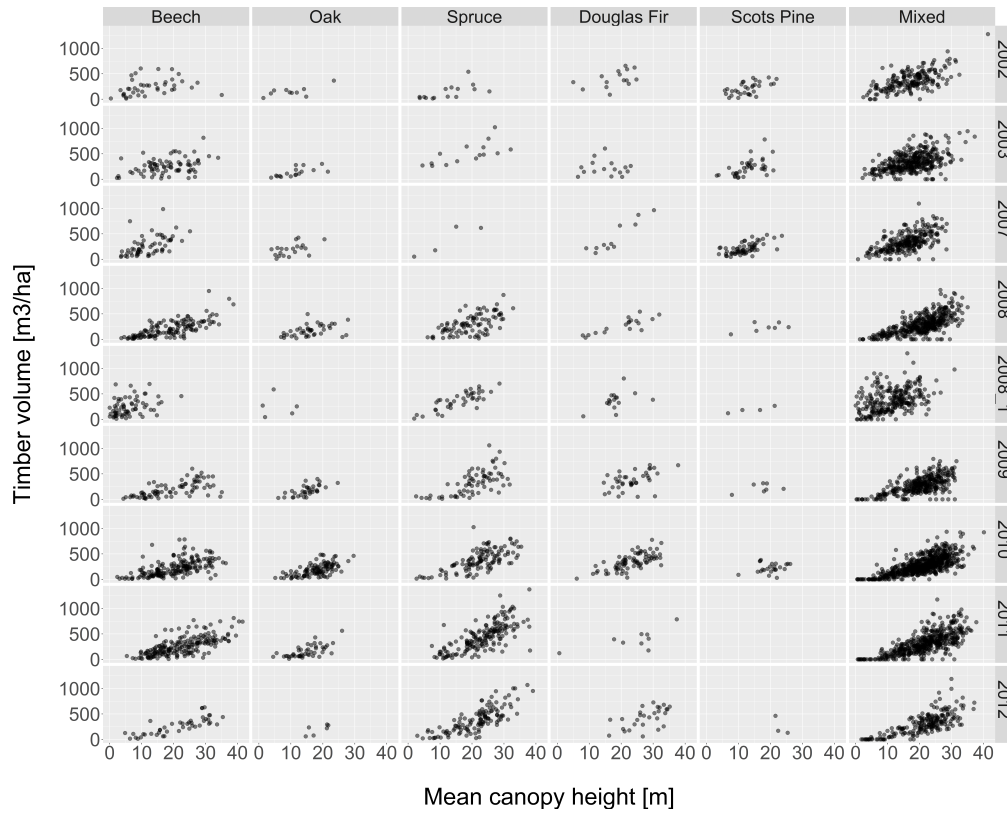
(a) Timber volume vs. tree height



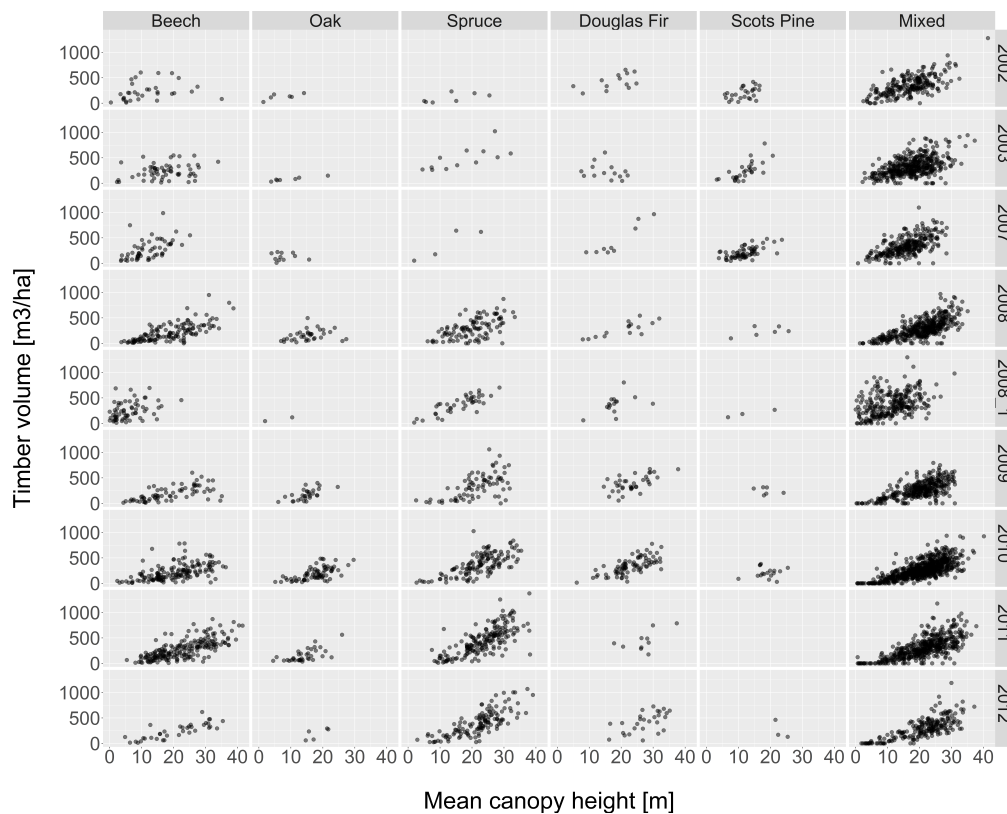
(b) Timber volume of sample trees plotted against tree height and tree species used in the BWI3 taper functions

Figure 1: Timber volume relationships on single tree level of all BWI3 sample trees within RLP

2: Timber volume on plot level vs. predictor variables



(a) Timber volume on plot level vs. LiDAR *meanheight* stratified by the error-free *treespecies* variable



(b) Timber volume on plot level vs. LiDAR *meanheight* stratified by calibrated *treespecies* variable

Figure 2: Timber volume on sample plot level stratified by the *lidaryears* and *treespecies*

3: Classification accuracies of *treespecies* variable

Table 1: User’s accuracies realized under various support choices for deriving the major tree species of a sample location. *class*: major tree species class of sample plot, *prod.acc*: producer’s accuracy, *use.acc*: user’s accuracy, *oaa*: overall accuracy, *prod.acc_{cal}*: producer’s accuracy after calibration (use.acc and oaa respectively), *n.ref*: number of validation data per tree species.

class	support	threshold	prod.acc	<i>prod.acc_{cal}</i>	use.acc	<i>use.acc_{cal}</i>	oaa	<i>oaa_{cal}</i>	n.ref
Beech	ind	0%	51.00	69.95	66.36	58.02	52.20	56.67	1857
Douglas Fir	ind	0%	54.66	44.33	43.75	50.00	52.20	56.67	397
Oak	ind	0%	65.53	39.20	41.67	47.57	52.20	56.67	824
Spruce	ind	0%	58.92	68.66	64.38	62.35	52.20	56.67	1037
Scots pine	ind	0%	67.45	62.06	45.51	59.93	52.20	56.67	593
Mixed	ind	0%	2.87	16.48	8.20	42.16	52.20	56.67	522
Beech	ind	50%	51.60	69.30	64.14	55.93	50.31	54.07	1723
Douglas Fir	ind	50%	56.45	45.97	44.21	49.71	50.31	54.07	372
Oak	ind	50%	66.24	39.95	40.70	46.90	50.31	54.07	776
Spruce	ind	50%	58.87	67.64	63.48	60.83	50.31	54.07	992
Scots pine	ind	50%	67.95	60.44	44.32	59.67	50.31	54.07	546
Mixed	ind	50%	7.67	18.51	18.05	35.02	50.31	54.07	821
Beech	ind	60%	48.56	68.79	62.12	54.52	47.55	52.33	1631
Douglas Fir	ind	60%	53.74	43.49	44.29	47.29	47.55	52.33	361
Oak	ind	60%	64.20	39.51	39.56	46.15	47.55	52.33	729
Spruce	ind	60%	57.90	68.19	63.95	61.54	47.55	52.33	962
Scots pine	ind	60%	66.53	55.92	41.69	58.17	47.55	52.33	490
Mixed	ind	60%	14.19	22.71	22.03	35.35	47.55	52.33	1057
Beech	ind	80%	44.16	37.47	50.15	50.24	45.45	53.77	1121
Douglas Fir	ind	80%	48.32	37.25	42.99	48.47	45.45	53.77	298
Oak	ind	80%	63.61	21.45	28.06	40.45	45.45	53.77	415
Spruce	ind	80%	54.70	61.17	60.70	64.78	45.45	53.77	788
Scots pine	ind	80%	65.70	35.74	30.33	55.00	45.45	53.77	277
Mixed	ind	80%	36.94	69.11	51.96	53.33	45.45	53.77	2331
Beech	ind	100%	38.58	19.90	41.42	48.80	50.82	63.86	819
Douglas Fir	ind	100%	46.70	23.35	38.13	49.53	50.82	63.86	227
Oak	ind	100%	61.69	10.73	21.73	40.00	50.82	63.86	261
Spruce	ind	100%	50.86	49.45	55.38	65.22	50.82	63.86	637
Scots pine	ind	100%	60.11	22.47	22.96	50.00	50.82	63.86	178
Mixed	ind	100%	52.90	88.19	68.59	65.95	50.82	63.86	3108
Beech	q25	0%	50.03	72.02	66.99	58.83	52.14	56.88	1919
Douglas Fir	q25	0%	55.36	43.39	42.37	50.00	52.14	56.88	401
Oak	q25	0%	65.69	40.49	41.77	49.22	52.14	56.88	857
Spruce	q25	0%	59.16	67.75	63.85	61.42	52.14	56.88	1048
Scots pine	q25	0%	68.35	61.11	45.52	59.51	52.14	56.88	594
Mixed	q25	0%	3.75	12.92	10.81	37.30	52.14	56.88	534
Beech	q25	50%	51.07	73.54	65.07	56.94	50.36	55.56	1784
Douglas Fir	q25	50%	56.65	46.54	42.43	49.72	50.36	55.56	376
Oak	q25	50%	66.38	40.17	40.53	50.00	50.36	55.56	809
Spruce	q25	50%	59.80	69.45	63.40	61.44	50.36	55.56	1005
Scots pine	q25	50%	68.74	60.88	43.87	60.22	50.36	55.56	547
Mixed	q25	50%	6.97	15.75	18.07	36.59	50.36	55.56	832
Beech	q25	60%	49.62	72.71	62.27	54.04	47.97	52.55	1693
Douglas Fir	q25	60%	55.07	41.92	42.49	47.96	47.97	52.55	365
Oak	q25	60%	65.49	36.35	38.77	47.59	47.97	52.55	762
Spruce	q25	60%	59.49	68.51	63.46	59.86	47.97	52.55	975
Scots pine	q25	60%	68.02	56.62	40.78	59.53	47.97	52.55	491
Mixed	q25	60%	10.68	19.31	22.31	34.86	47.97	52.55	1067
Beech	q25	80%	43.39	36.95	50.05	47.86	43.98	51.93	1180
Douglas Fir	q25	80%	48.01	36.75	42.27	54.41	43.98	51.93	302
Oak	q25	80%	63.12	22.40	27.79	40.74	43.98	51.93	442
Spruce	q25	80%	55.12	62.25	60.66	62.09	43.98	51.93	800
Scots pine	q25	80%	65.11	35.97	29.05	55.25	43.98	51.93	278
Mixed	q25	80%	33.86	65.33	48.74	51.00	43.98	51.93	2351
Beech	q25	100%	36.72	16.42	41.55	48.81	48.65	62.58	877
Douglas Fir	q25	100%	42.17	21.74	40.25	48.54	48.65	62.58	230
Oak	q25	100%	57.14	8.01	20.53	46.94	48.65	62.58	287
Spruce	q25	100%	52.16	54.17	56.05	62.68	48.65	62.58	648
Scots pine	q25	100%	60.34	20.67	22.69	60.66	48.65	62.58	179
Mixed	q25	100%	50.29	87.64	64.05	64.06	48.65	62.58	3132
Beech	q50	0%	50.75	73.17	67.31	59.42	52.89	58.36	1931
Douglas Fir	q50	0%	54.98	47.01	42.02	56.08	52.89	58.36	402

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class	support	threshold	prod.acc	<i>prod.acc_{cal}</i>	use.acc	<i>use.acc_{cal}</i>	oaa	<i>oaa_{cal}</i>	n.ref
Oak	q50	0%	67.44	43.49	41.76	52.31	52.89	58.36	860
Spruce	q50	0%	59.83	68.38	64.95	63.21	52.89	58.36	1053
Scots pine	q50	0%	70.25	62.86	45.39	59.37	52.89	58.36	595
Mixed	q50	0%	2.80	12.69	13.04	38.20	52.89	58.36	536
Beech	q50	50%	51.28	73.39	65.60	57.96	50.85	55.81	1796
Douglas Fir	q50	50%	55.17	47.48	42.80	53.92	50.85	55.81	377
Oak	q50	50%	67.36	44.83	40.85	52.53	50.85	55.81	812
Spruce	q50	50%	60.12	69.15	64.81	62.12	50.85	55.81	1008
Scots pine	q50	50%	70.44	58.58	44.99	57.42	50.85	55.81	548
Mixed	q50	50%	7.89	14.59	18.59	30.73	50.85	55.81	836
Beech	q50	60%	48.47	69.84	64.63	55.79	48.58	53.45	1704
Douglas Fir	q50	60%	51.91	44.26	45.56	51.59	48.58	53.45	366
Oak	q50	60%	64.31	45.75	40.13	50.58	48.58	53.45	765
Spruce	q50	60%	58.18	69.33	66.32	63.25	48.58	53.45	978
Scots pine	q50	60%	67.48	55.89	43.12	56.47	48.58	53.45	492
Mixed	q50	60%	18.94	20.43	24.52	32.25	48.58	53.45	1072
Beech	q50	80%	40.91	43.69	53.00	52.11	46.48	54.34	1188
Douglas Fir	q50	80%	45.21	39.27	48.07	60.10	46.48	54.34	303
Oak	q50	80%	60.67	24.04	29.61	39.78	46.48	54.34	445
Spruce	q50	80%	52.18	62.39	63.20	63.66	46.48	54.34	803
Scots pine	q50	80%	62.95	41.37	31.59	62.50	46.48	54.34	278
Mixed	q50	80%	42.88	66.14	49.46	53.04	46.48	54.34	2360
Beech	q50	100%	30.39	20.75	45.58	46.10	53.58	61.82	882
Douglas Fir	q50	100%	35.22	21.74	46.29	44.25	53.58	61.82	230
Oak	q50	100%	49.65	11.46	23.25	44.00	53.58	61.82	288
Spruce	q50	100%	43.47	53.61	58.11	60.70	53.58	61.82	651
Scots pine	q50	100%	58.10	26.26	28.42	52.22	53.58	61.82	179
Mixed	q50	100%	63.62	84.59	63.64	64.50	53.58	61.82	3147
Beech	q80	0%	51.16	73.41	67.05	59.67	53.33	58.52	1937
Douglas Fir	q80	0%	55.45	47.52	42.83	56.80	53.33	58.52	404
Oak	q80	0%	67.82	43.75	41.74	52.07	53.33	58.52	864
Spruce	q80	0%	60.95	68.63	65.75	63.34	53.33	58.52	1055
Scots pine	q80	0%	71.19	60.97	45.95	58.43	53.33	58.52	597
Mixed	q80	0%	2.03	14.73	11.96	42.78	53.33	58.52	543
Beech	q80	50%	51.17	72.42	66.05	57.90	51.70	56.06	1802
Douglas Fir	q80	50%	55.94	46.44	45.11	53.99	51.70	56.06	379
Oak	q80	50%	67.52	45.10	41.43	51.90	51.70	56.06	816
Spruce	q80	50%	60.99	69.50	66.17	62.46	51.70	56.06	1010
Scots pine	q80	50%	70.67	59.20	46.75	59.74	51.70	56.06	549
Mixed	q80	50%	12.20	17.89	23.25	34.09	51.70	56.06	844
Beech	q80	60%	47.25	70.23	65.69	56.78	48.76	54.59	1710
Douglas Fir	q80	60%	51.90	46.47	49.61	52.29	48.76	54.59	368
Oak	q80	60%	63.98	47.33	41.80	49.66	48.76	54.59	769
Spruce	q80	60%	56.94	69.59	67.55	63.44	48.76	54.59	980
Scots pine	q80	60%	66.53	55.58	44.99	60.22	48.76	54.59	493
Mixed	q80	60%	23.70	23.70	24.31	36.83	48.76	54.59	1080
Beech	q80	80%	37.80	39.90	55.68	51.63	47.91	53.67	1193
Douglas Fir	q80	80%	40.33	37.70	51.46	60.21	47.91	53.67	305
Oak	q80	80%	57.49	25.73	30.85	41.52	47.91	53.67	447
Spruce	q80	80%	49.00	60.57	64.27	63.99	47.91	53.67	804
Scots pine	q80	80%	62.01	40.86	35.97	66.28	47.91	53.67	279
Mixed	q80	80%	50.13	67.07	49.05	51.71	47.91	53.67	2372
Beech	q80	100%	25.54	22.94	50.45	49.88	57.41	62.61	885
Douglas Fir	q80	100%	29.13	23.91	53.17	52.88	57.41	62.61	230
Oak	q80	100%	40.83	13.49	25.76	52.70	57.41	62.61	289
Spruce	q80	100%	36.96	48.16	61.95	60.15	57.41	62.61	652
Scots pine	q80	100%	51.67	30.00	34.19	60.00	57.41	62.61	180
Mixed	q80	100%	74.43	85.84	63.53	64.62	57.41	62.61	3164
Beech	q100	0%	53.73	72.96	67.46	59.55	55.24	58.53	1945
Douglas Fir	q100	0%	55.88	47.30	45.97	54.21	55.24	58.53	408
Oak	q100	0%	71.35	47.18	43.27	53.25	55.24	58.53	869
Spruce	q100	0%	62.70	66.29	66.14	63.02	55.24	58.53	1059
Scots pine	q100	0%	73.83	65.67	46.98	63.14	55.24	58.53	600
Mixed	q100	0%	0.18	11.23	12.50	33.33	55.24	58.53	552
Beech	q100	50%	48.45	71.66	68.95	57.49	51.87	56.27	1810
Douglas Fir	q100	50%	49.74	48.69	55.39	56.02	51.87	56.27	382
Oak	q100	50%	68.21	49.45	46.40	53.63	51.87	56.27	821
Spruce	q100	50%	57.69	67.85	68.74	62.77	51.87	56.27	1014
Scots pine	q100	50%	68.78	63.70	54.85	61.69	51.87	56.27	551
Mixed	q100	50%	26.55	15.09	21.23	30.50	51.87	56.27	855
Beech	q100	60%	40.98	68.45	69.02	55.84	48.56	52.81	1718

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class	support	threshold	prod.acc	<i>prod.acc_{cal}</i>	use.acc	<i>use.acc_{cal}</i>	oaa	<i>oaa_{cal}</i>	n.ref
Douglas Fir	q100	60%	40.70	42.86	57.85	51.79	48.56	52.81	371
Oak	q100	60%	61.24	46.64	48.12	50.35	48.56	52.81	774
Spruce	q100	60%	51.12	67.78	70.75	61.93	48.56	52.81	984
Scots pine	q100	60%	63.03	58.18	57.78	60.00	48.56	52.81	495
Mixed	q100	60%	45.28	19.98	25.78	29.22	48.56	52.81	1091
Beech	q100	80%	27.55	40.15	63.22	51.06	51.15	53.49	1198
Douglas Fir	q100	80%	26.30	28.57	63.78	58.67	51.15	53.49	308
Oak	q100	80%	47.12	26.55	36.47	44.12	51.15	53.49	452
Spruce	q100	80%	36.80	60.35	69.72	62.92	51.15	53.49	807
Scots pine	q100	80%	57.35	44.09	52.29	64.06	51.15	53.49	279
Mixed	q100	80%	71.08	67.27	48.96	51.79	51.15	53.49	2389
Beech	q100	100%	5.29	19.69	55.29	40.98	59.36	59.51	889
Douglas Fir	q100	100%	7.79	10.39	69.23	40.68	59.36	59.51	231
Oak	q100	100%	11.26	7.85	27.73	30.26	59.36	59.51	293
Spruce	q100	100%	11.81	43.87	77.78	52.87	59.36	59.51	652
Scots pine	q100	100%	20.56	25.00	50.68	52.94	59.36	59.51	180
Mixed	q100	100%	94.51	84.07	59.89	63.13	59.36	59.51	3188

4: Model accuracies

Table 2: Model accuracies realized under various support choices for the CHM- and **uncalibrated** *treespecies* explanatory variables

$support_{chm}$	$support_{tspec}$	$threshold$	R^2_{adj}	$rmse_{cv}$	$RMSE_{cv}[\%]$	AIC	$R^2_{adj,ref}$	$RMSE_{cv,ref}$	$RMSE_{cv,ref}[\%]$	AIC_{ref}
ind	ind	0%	0.44	142.03	44.20	64408.57	0.45	139.71	43.48	64256.93
ind	ind	50%	0.44	141.74	44.11	64401.58	0.45	139.85	43.52	64268.78
ind	ind	60%	0.44	141.95	44.18	64405.91	0.45	139.48	43.41	64255.23
ind	ind	80%	0.44	141.68	44.09	64384.81	0.46	138.92	43.23	64225.80
ind	ind	100%	0.44	141.97	44.18	64385.38	0.46	138.85	43.21	64204.65
ind	q25	0%	0.44	140.67	44.21	64927.75	0.46	139.25	43.77	64780.23
ind	q25	50%	0.44	140.56	44.18	64912.21	0.46	139.37	43.81	64795.25
ind	q25	60%	0.44	140.63	44.20	64914.25	0.46	139.23	43.76	64783.04
ind	q25	80%	0.45	140.77	44.25	64906.60	0.46	138.57	43.56	64749.77
ind	q25	100%	0.44	140.72	44.23	64909.56	0.46	138.14	43.42	64725.81
ind	q50	0%	0.44	141.62	44.71	65195.36	0.46	139.36	44.00	65057.03
ind	q50	50%	0.44	141.58	44.70	65186.32	0.46	139.60	44.07	65072.06
ind	q50	60%	0.45	141.55	44.69	65184.31	0.46	139.53	44.05	65060.08
ind	q50	80%	0.44	141.61	44.70	65197.21	0.46	138.90	43.85	65026.35
ind	q50	100%	0.44	142.05	44.85	65230.07	0.46	138.60	43.75	65002.79
ind	q80	0%	0.45	140.73	44.58	65392.45	0.46	139.43	44.16	65282.95
ind	q80	50%	0.45	140.75	44.58	65391.12	0.46	139.71	44.25	65297.81
ind	q80	60%	0.44	141.25	44.74	65414.38	0.46	139.58	44.21	65286.72
ind	q80	80%	0.45	141.20	44.72	65397.48	0.46	138.97	44.02	65252.00
ind	q80	100%	0.44	142.03	44.98	65482.59	0.46	138.84	43.98	65227.79
ind	q100	0%	0.45	140.81	44.34	65701.65	0.46	138.83	43.72	65570.10
ind	q100	50%	0.45	140.58	44.27	65688.26	0.46	139.13	43.81	65585.38
ind	q100	60%	0.44	140.87	44.36	65708.90	0.46	139.14	43.81	65575.20
ind	q100	80%	0.44	141.69	44.62	65772.71	0.46	138.39	43.58	65541.28
ind	q100	100%	0.42	143.37	45.14	65885.80	0.46	138.25	43.53	65513.09
q25	ind	0%	0.44	142.57	44.60	64938.10	0.46	140.09	43.82	64776.64
q25	ind	50%	0.44	142.53	44.59	64935.55	0.46	140.28	43.88	64790.59
q25	ind	60%	0.44	142.64	44.62	64936.98	0.46	139.96	43.78	64778.10
q25	ind	80%	0.44	142.39	44.54	64908.14	0.46	139.43	43.62	64756.67
q25	ind	100%	0.44	142.06	44.44	64895.64	0.46	138.92	43.46	64729.99
q25	q25	0%	0.45	141.99	45.44	65965.52	0.47	139.91	44.78	65808.37
q25	q25	50%	0.45	141.87	45.40	65955.14	0.47	140.07	44.82	65822.64
q25	q25	60%	0.45	141.89	45.41	65957.07	0.47	139.77	44.73	65809.39
q25	q25	80%	0.45	141.91	45.42	65944.31	0.47	139.33	44.59	65783.19
q25	q25	100%	0.45	142.05	45.46	65955.03	0.48	138.53	44.33	65747.03
q25	q50	0%	0.45	139.70	44.82	66237.98	0.47	138.15	44.33	66087.78
q25	q50	50%	0.45	139.61	44.80	66229.45	0.47	138.31	44.38	66101.77
q25	q50	60%	0.45	139.71	44.83	66226.29	0.47	138.09	44.31	66088.89
q25	q50	80%	0.45	139.87	44.88	66241.23	0.47	137.55	44.13	66062.63
q25	q50	100%	0.45	140.32	45.02	66280.18	0.47	136.83	43.90	66026.09
q25	q80	0%	0.46	140.42	45.24	66429.54	0.47	139.34	44.89	66311.89
q25	q80	50%	0.46	140.36	45.22	66432.75	0.47	139.72	45.02	66325.46
q25	q80	60%	0.45	140.78	45.36	66453.60	0.47	139.52	44.95	66313.60
q25	q80	80%	0.46	140.53	45.27	66439.86	0.47	139.07	44.80	66286.42
q25	q80	100%	0.45	142.02	45.75	66532.00	0.48	138.48	44.61	66249.45
q25	q100	0%	0.45	142.36	45.55	66767.76	0.47	140.09	44.83	66626.46
q25	q100	50%	0.46	141.92	45.41	66755.71	0.47	140.32	44.90	66640.38
q25	q100	60%	0.45	142.18	45.49	66783.49	0.47	140.42	44.93	66629.48
q25	q100	80%	0.45	143.32	45.86	66854.10	0.47	140.16	44.85	66602.55
q25	q100	100%	0.43	145.09	46.43	66974.26	0.48	139.97	44.79	66563.15
q50	ind	0%	0.45	141.43	44.24	64854.59	0.47	138.82	43.42	64686.53
q50	ind	50%	0.45	141.41	44.24	64850.86	0.47	138.93	43.46	64698.27
q50	ind	60%	0.45	141.50	44.27	64853.84	0.47	138.70	43.39	64689.17
q50	ind	80%	0.45	141.33	44.21	64827.37	0.47	138.27	43.25	64672.63
q50	ind	100%	0.45	141.16	44.16	64827.16	0.47	137.91	43.14	64652.47
q50	q25	0%	0.46	140.61	45.00	65874.22	0.48	138.36	44.28	65710.42
q50	q25	50%	0.46	140.45	44.95	65862.51	0.48	138.43	44.30	65722.03
q50	q25	60%	0.46	140.49	44.96	65864.18	0.48	138.19	44.22	65711.95
q50	q25	80%	0.46	140.59	44.99	65854.77	0.48	137.97	44.15	65691.89
q50	q25	100%	0.46	140.58	44.99	65860.14	0.48	137.41	43.98	65664.81
q50	q50	0%	0.46	138.57	44.46	66145.64	0.48	136.89	43.92	65989.18
q50	q50	50%	0.46	138.52	44.44	66138.78	0.48	137.05	43.97	66001.00
q50	q50	60%	0.46	138.62	44.48	66134.47	0.48	136.89	43.92	65991.20
q50	q50	80%	0.46	138.78	44.53	66146.85	0.48	136.48	43.79	65971.13
q50	q50	100%	0.46	139.30	44.70	66189.99	0.48	135.98	43.63	65943.10
q50	q80	0%	0.47	138.34	44.57	66333.05	0.48	137.22	44.21	66211.70
q50	q80	50%	0.47	138.35	44.57	66341.81	0.48	137.60	44.33	66223.75
q50	q80	60%	0.46	138.77	44.71	66361.90	0.48	137.43	44.28	66214.72
q50	q80	80%	0.46	138.54	44.63	66347.78	0.48	137.11	44.17	66193.69
q50	q80	100%	0.45	140.08	45.13	66444.51	0.48	136.63	44.02	66165.28
q50	q100	0%	0.46	141.39	45.24	66681.45	0.48	138.94	44.46	66528.70
q50	q100	50%	0.47	140.88	45.08	66665.99	0.48	139.14	44.52	66540.96
q50	q100	60%	0.46	141.14	45.16	66693.59	0.48	139.27	44.56	66532.93
q50	q100	80%	0.45	142.17	45.49	66764.60	0.48	139.15	44.52	66511.93
q50	q100	100%	0.44	143.86	46.03	66879.02	0.48	138.81	44.42	66480.34
q80	ind	0%	0.45	141.92	44.40	64868.26	0.47	139.22	43.55	64695.13
q80	ind	50%	0.45	141.87	44.38	64862.40	0.47	139.41	43.61	64711.20
q80	ind	60%	0.45	142.00	44.42	64866.26	0.47	139.20	43.54	64701.77
q80	ind	80%	0.45	141.89	44.39	64847.05	0.47	138.77	43.41	64681.35
q80	ind	100%	0.45	141.79	44.35	64851.41	0.47	138.41	43.30	64658.70

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$support_{chm}$	$support_{tspec}$	$threshold$	R^2_{adj}	$RMSE_{cv}$	$RMSE_{cv}[\%]$	AIC	$R^2_{adj,ref}$	$RMSE_{cv,ref}$	$RMSE_{cv,ref}[\%]$	AIC_{ref}
q80	q25	0%	0.46	140.65	45.01	65888.64	0.48	138.44	44.30	65720.92
q80	q25	50%	0.46	140.50	44.96	65877.65	0.48	138.60	44.35	65737.10
q80	q25	60%	0.46	140.54	44.98	65878.63	0.48	138.46	44.31	65726.72
q80	q25	80%	0.46	140.65	45.01	65869.87	0.48	138.20	44.23	65703.95
q80	q25	100%	0.46	140.70	45.03	65878.28	0.48	137.46	43.99	65674.03
q80	q50	0%	0.46	138.78	44.53	66159.84	0.48	137.07	43.98	66000.20
q80	q50	50%	0.46	138.74	44.51	66154.54	0.48	137.26	44.04	66016.68
q80	q50	60%	0.46	138.88	44.56	66151.52	0.48	136.96	43.94	66005.75
q80	q50	80%	0.46	139.03	44.61	66162.48	0.48	136.59	43.82	65982.82
q80	q50	100%	0.46	139.62	44.80	66209.86	0.48	136.14	43.68	65952.40
q80	q80	0%	0.46	138.03	44.47	66348.58	0.48	136.86	44.09	66222.79
q80	q80	50%	0.46	138.08	44.48	66357.36	0.48	137.28	44.23	66239.71
q80	q80	60%	0.46	138.50	44.62	66378.68	0.48	137.06	44.16	66229.36
q80	q80	80%	0.46	138.41	44.59	66367.72	0.48	136.71	44.04	66205.47
q80	q80	100%	0.45	139.94	45.09	66461.68	0.48	136.34	43.93	66174.95
q80	q100	0%	0.46	141.52	45.28	66698.65	0.48	138.91	44.45	66542.06
q80	q100	50%	0.46	140.95	45.10	66684.27	0.48	139.16	44.53	66558.80
q80	q100	60%	0.46	141.31	45.22	66715.73	0.48	139.20	44.54	66550.13
q80	q100	80%	0.45	142.29	45.53	66783.55	0.48	139.01	44.48	66527.02
q80	q100	100%	0.44	143.91	46.05	66895.38	0.48	138.74	44.39	66492.22
q100	ind	0%	0.39	149.44	46.75	65391.23	0.41	147.18	46.04	65241.42
q100	ind	50%	0.39	149.34	46.72	65379.90	0.40	147.32	46.08	65260.46
q100	ind	60%	0.39	149.43	46.75	65382.54	0.41	147.10	46.01	65249.02
q100	ind	80%	0.39	149.50	46.77	65377.00	0.41	146.57	45.85	65224.48
q100	ind	100%	0.39	149.15	46.65	65366.75	0.41	146.01	45.67	65194.50
q100	q25	0%	0.40	147.61	47.24	66442.67	0.42	145.59	46.59	66291.14
q100	q25	50%	0.40	147.46	47.19	66430.07	0.41	145.73	46.63	66310.71
q100	q25	60%	0.40	147.36	47.16	66428.18	0.42	145.51	46.56	66299.12
q100	q25	80%	0.40	147.39	47.17	66416.52	0.42	145.21	46.47	66271.49
q100	q25	100%	0.40	147.60	47.23	66426.82	0.42	144.46	46.23	66233.99
q100	q50	0%	0.40	146.76	47.09	66720.28	0.42	145.07	46.54	66572.83
q100	q50	50%	0.40	146.63	47.05	66712.95	0.41	145.32	46.62	66592.86
q100	q50	60%	0.40	146.85	47.11	66708.05	0.41	145.14	46.57	66581.36
q100	q50	80%	0.40	147.27	47.25	66722.92	0.42	144.59	46.39	66553.52
q100	q50	100%	0.39	147.64	47.37	66759.50	0.42	144.08	46.23	66516.11
q100	q80	0%	0.40	145.20	46.78	66917.50	0.42	144.07	46.42	66796.64
q100	q80	50%	0.40	145.12	46.76	66917.72	0.41	144.47	46.55	66816.62
q100	q80	60%	0.40	145.58	46.90	66935.84	0.42	144.29	46.49	66805.78
q100	q80	80%	0.40	145.62	46.92	66932.29	0.42	143.97	46.39	66776.81
q100	q80	100%	0.39	147.12	47.40	67015.72	0.42	143.54	46.25	66739.98
q100	q100	0%	0.40	148.90	47.65	67272.02	0.42	146.01	46.72	67121.18
q100	q100	50%	0.40	148.28	47.45	67258.42	0.41	146.33	46.82	67140.71
q100	q100	60%	0.40	148.59	47.55	67283.11	0.42	146.45	46.86	67130.60
q100	q100	80%	0.39	149.75	47.92	67353.11	0.42	146.13	46.76	67102.80
q100	q100	100%	0.38	151.55	48.49	67469.16	0.42	145.80	46.66	67062.13

Table 3: Model accuracies realized under various support choices for the CHM- and **calibrated** *treespecies* explanatory variables

$support_{chm}$	$support_{tspec}$	$threshold$	R^2_{adj}	$RMSE_{cv}$	$RMSE_{cv}[\%]$	AIC	$R^2_{adj,ref}$	$RMSE_{cv,ref}$	$RMSE_{cv,ref}[\%]$	AIC_{ref}
ind	ind	0%	0.45	140.12	43.61	64291.15	0.45	139.71	43.48	64256.93
ind	ind	50%	0.45	140.60	43.75	64317.74	0.45	139.85	43.52	64268.78
ind	ind	60%	0.45	140.13	43.61	64294.65	0.45	139.48	43.41	64255.23
ind	ind	80%	0.46	139.10	43.29	64236.04	0.46	138.92	43.23	64225.80
ind	ind	100%	0.45	139.92	43.54	64280.23	0.46	138.85	43.21	64204.65
ind	q25	0%	0.45	139.90	43.97	64835.11	0.46	139.25	43.77	64780.23
ind	q25	50%	0.45	140.06	44.02	64852.35	0.46	139.37	43.81	64795.25
ind	q25	60%	0.45	139.97	43.99	64846.98	0.46	139.23	43.76	64783.04
ind	q25	80%	0.46	139.17	43.74	64792.34	0.46	138.57	43.56	64749.77
ind	q25	100%	0.46	139.16	43.74	64792.06	0.46	138.14	43.42	64725.81
ind	q50	0%	0.45	139.91	44.17	65093.04	0.46	139.36	44.00	65057.03
ind	q50	50%	0.45	140.25	44.28	65113.44	0.46	139.60	44.07	65072.06
ind	q50	60%	0.45	139.89	44.16	65094.92	0.46	139.53	44.05	65060.08
ind	q50	80%	0.46	139.02	43.89	65033.71	0.46	138.90	43.85	65026.35
ind	q50	100%	0.46	139.19	43.94	65040.22	0.46	138.60	43.75	65002.79
ind	q80	0%	0.46	139.68	44.24	65309.58	0.46	139.43	44.16	65282.95
ind	q80	50%	0.45	139.97	44.33	65336.21	0.46	139.71	44.25	65297.81
ind	q80	60%	0.46	139.97	44.33	65319.59	0.46	139.58	44.21	65286.72
ind	q80	80%	0.46	139.25	44.11	65283.08	0.46	138.97	44.02	65252.00
ind	q80	100%	0.46	139.09	44.05	65251.61	0.46	138.84	43.98	65227.79
ind	q100	0%	0.46	138.89	43.73	65577.54	0.46	138.83	43.72	65570.10
ind	q100	50%	0.46	139.18	43.82	65589.23	0.46	139.13	43.81	65585.38
ind	q100	60%	0.46	139.21	43.83	65580.00	0.46	139.14	43.81	65575.20
ind	q100	80%	0.46	138.43	43.59	65543.72	0.46	138.39	43.58	65541.28
ind	q100	100%	0.46	138.34	43.56	65521.67	0.46	138.25	43.53	65513.09
q25	ind	0%	0.45	140.80	44.04	64815.81	0.46	140.09	43.82	64776.64
q25	ind	50%	0.45	140.79	44.04	64815.82	0.46	140.28	43.88	64790.59
q25	ind	60%	0.45	140.73	44.02	64812.34	0.46	139.96	43.78	64778.10
q25	ind	80%	0.46	139.93	43.77	64780.19	0.46	139.43	43.62	64756.67
q25	ind	100%	0.45	140.61	43.99	64846.27	0.46	138.92	43.46	64729.99
q25	q25	0%	0.46	141.17	45.18	65882.42	0.47	139.91	44.78	65808.37
q25	q25	50%	0.46	140.96	45.11	65878.58	0.47	140.07	44.82	65822.64
q25	q25	60%	0.46	140.82	45.07	65871.86	0.47	139.77	44.73	65809.39
q25	q25	80%	0.47	139.69	44.70	65814.08	0.47	139.33	44.59	65783.19
q25	q25	100%	0.47	139.64	44.69	65826.77	0.48	138.53	44.33	65747.03
q25	q50	0%	0.46	138.51	44.44	66122.18	0.47	138.15	44.33	66087.78
q25	q50	50%	0.46	138.65	44.49	66132.92	0.47	138.31	44.38	66101.77
q25	q50	60%	0.46	138.51	44.44	66140.26	0.47	138.09	44.31	66088.89
q25	q50	80%	0.47	137.57	44.14	66087.41	0.47	137.55	44.13	66062.63
q25	q50	100%	0.47	137.32	44.06	66076.87	0.47	136.83	43.90	66026.09
q25	q80	0%	0.46	139.64	44.99	66345.17	0.47	139.34	44.89	66311.89
q25	q80	50%	0.46	139.99	45.10	66355.29	0.47	139.72	45.02	66325.46
q25	q80	60%	0.46	139.57	44.97	66349.49	0.47	139.52	44.95	66313.60
q25	q80	80%	0.47	139.47	44.93	66318.88	0.47	139.07	44.80	66286.42
q25	q80	100%	0.47	139.12	44.82	66310.46	0.48	138.48	44.61	66249.45
q25	q100	0%	0.47	140.12	44.83	66631.70	0.47	140.09	44.83	66626.46
q25	q100	50%	0.47	140.34	44.90	66642.41	0.47	140.32	44.90	66640.38
q25	q100	60%	0.47	140.46	44.94	66633.43	0.47	140.42	44.93	66629.48
q25	q100	80%	0.47	140.20	44.86	66606.19	0.47	140.16	44.85	66602.55
q25	q100	100%	0.47	140.13	44.84	66576.55	0.48	139.97	44.79	66563.15
q50	ind	0%	0.46	140.05	43.81	64745.65	0.47	138.82	43.42	64686.53
q50	ind	50%	0.46	139.97	43.79	64748.33	0.47	138.93	43.46	64698.27
q50	ind	60%	0.46	139.64	43.68	64731.81	0.47	138.70	43.39	64689.17
q50	ind	80%	0.47	139.05	43.50	64712.28	0.47	138.27	43.25	64672.63
q50	ind	100%	0.46	139.66	43.69	64771.24	0.47	137.91	43.14	64652.47
q50	q25	0%	0.47	139.57	44.67	65788.59	0.48	138.36	44.28	65710.42
q50	q25	50%	0.47	139.75	44.72	65802.74	0.48	138.43	44.30	65722.03
q50	q25	60%	0.47	139.60	44.68	65789.21	0.48	138.19	44.22	65711.95
q50	q25	80%	0.48	138.54	44.34	65728.34	0.48	137.97	44.15	65691.89
q50	q25	100%	0.48	138.42	44.30	65735.17	0.48	137.41	43.98	65664.81
q50	q50	0%	0.47	137.47	44.11	66034.28	0.48	136.89	43.92	65989.18
q50	q50	50%	0.47	137.59	44.15	66037.77	0.48	137.05	43.97	66001.00
q50	q50	60%	0.47	137.33	44.06	66033.77	0.48	136.89	43.92	65991.20
q50	q50	80%	0.48	136.78	43.89	66003.35	0.48	136.48	43.79	65971.13
q50	q50	100%	0.48	136.62	43.84	66002.02	0.48	135.98	43.63	65943.10
q50	q80	0%	0.48	137.80	44.39	66248.74	0.48	137.22	44.21	66211.70
q50	q80	50%	0.47	137.94	44.44	66261.63	0.48	137.60	44.33	66223.75
q50	q80	60%	0.47	137.77	44.39	66256.59	0.48	137.43	44.28	66214.72
q50	q80	80%	0.47	137.69	44.36	66250.53	0.48	137.11	44.17	66193.69
q50	q80	100%	0.48	137.13	44.18	66202.85	0.48	136.63	44.02	66165.28
q50	q100	0%	0.48	138.91	44.45	66527.59	0.48	138.94	44.46	66528.70
q50	q100	50%	0.48	139.18	44.53	66542.04	0.48	139.14	44.52	66540.96
q50	q100	60%	0.48	139.30	44.57	66535.91	0.48	139.27	44.56	66532.93
q50	q100	80%	0.48	139.17	44.53	66513.80	0.48	139.15	44.52	66511.93
q50	q100	100%	0.48	138.82	44.42	66479.85	0.48	138.81	44.42	66480.34
q80	ind	0%	0.46	140.31	43.89	64746.39	0.47	139.22	43.55	64695.13
q80	ind	50%	0.46	140.23	43.87	64748.57	0.47	139.41	43.61	64711.20
q80	ind	60%	0.46	140.00	43.80	64737.02	0.47	139.20	43.54	64701.77
q80	ind	80%	0.47	139.16	43.53	64702.03	0.47	138.77	43.41	64681.35
q80	ind	100%	0.46	140.13	43.84	64782.06	0.47	138.41	43.30	64658.70
q80	q25	0%	0.47	139.67	44.70	65812.79	0.48	138.44	44.30	65720.92
q80	q25	50%	0.47	139.78	44.73	65816.46	0.48	138.60	44.35	65737.10
q80	q25	60%	0.47	139.63	44.68	65803.87	0.48	138.46	44.31	65726.72
q80	q25	80%	0.48	138.66	44.37	65740.91	0.48	138.20	44.23	65703.95

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$support_{chm}$	$support_{tspec}$	$threshold$	R^2_{adj}	$RMSE_{cv}$	$RMSE_{cv}[\%]$	AIC	$R^2_{adj,ref}$	$RMSE_{cv,ref}$	$RMSE_{cv,ref}[\%]$	AIC_{ref}
q80	q25	100%	0.48	138.48	44.32	65747.54	0.48	137.46	43.99	65674.03
q80	q50	0%	0.47	137.55	44.13	66041.96	0.48	137.07	43.98	66000.20
q80	q50	50%	0.47	137.67	44.17	66057.53	0.48	137.26	44.04	66016.68
q80	q50	60%	0.47	137.33	44.06	66042.83	0.48	136.96	43.94	66005.75
q80	q50	80%	0.48	136.92	43.93	66016.64	0.48	136.59	43.82	65982.82
q80	q50	100%	0.48	136.83	43.90	66016.69	0.48	136.14	43.68	65952.40
q80	q80	0%	0.47	137.32	44.24	66254.83	0.48	136.86	44.09	66222.79
q80	q80	50%	0.47	137.49	44.30	66267.03	0.48	137.28	44.23	66239.71
q80	q80	60%	0.47	137.41	44.27	66262.63	0.48	137.06	44.16	66229.36
q80	q80	80%	0.47	137.17	44.19	66247.32	0.48	136.71	44.04	66205.47
q80	q80	100%	0.48	137.14	44.18	66237.84	0.48	136.34	43.93	66174.95
q80	q100	0%	0.48	139.02	44.48	66548.99	0.48	138.91	44.45	66542.06
q80	q100	50%	0.48	139.28	44.56	66566.73	0.48	139.16	44.53	66558.80
q80	q100	60%	0.48	139.23	44.55	66553.30	0.48	139.20	44.54	66550.13
q80	q100	80%	0.48	139.00	44.48	66526.64	0.48	139.01	44.48	66527.02
q80	q100	100%	0.48	138.84	44.43	66501.70	0.48	138.74	44.39	66492.22
q100	ind	0%	0.40	147.90	46.26	65284.59	0.41	147.18	46.04	65241.42
q100	ind	50%	0.40	147.96	46.28	65287.17	0.40	147.32	46.08	65260.46
q100	ind	60%	0.40	147.88	46.26	65290.73	0.41	147.10	46.01	65249.02
q100	ind	80%	0.40	147.33	46.09	65256.46	0.41	146.57	45.85	65224.48
q100	ind	100%	0.40	147.94	46.28	65310.65	0.41	146.01	45.67	65194.50
q100	q25	0%	0.41	146.40	46.85	66352.97	0.42	145.59	46.59	66291.14
q100	q25	50%	0.41	146.37	46.84	66364.04	0.41	145.73	46.63	66310.71
q100	q25	60%	0.41	146.44	46.86	66359.76	0.42	145.51	46.56	66299.12
q100	q25	80%	0.41	145.80	46.66	66319.25	0.42	145.21	46.47	66271.49
q100	q25	100%	0.41	145.44	46.54	66311.30	0.42	144.46	46.23	66233.99
q100	q50	0%	0.41	145.73	46.76	66629.70	0.42	145.07	46.54	66572.83
q100	q50	50%	0.41	145.90	46.81	66641.20	0.41	145.32	46.62	66592.86
q100	q50	60%	0.41	145.50	46.68	66621.92	0.41	145.14	46.57	66581.36
q100	q50	80%	0.41	145.08	46.55	66597.85	0.42	144.59	46.39	66553.52
q100	q50	100%	0.42	144.76	46.45	66570.46	0.42	144.08	46.23	66516.11
q100	q80	0%	0.41	144.43	46.53	66840.17	0.42	144.07	46.42	66796.64
q100	q80	50%	0.41	144.61	46.59	66852.78	0.41	144.47	46.55	66816.62
q100	q80	60%	0.41	144.50	46.56	66831.91	0.42	144.29	46.49	66805.78
q100	q80	80%	0.41	144.40	46.52	66819.43	0.42	143.97	46.39	66776.81
q100	q80	100%	0.42	144.23	46.47	66799.38	0.42	143.54	46.25	66739.98
q100	q100	0%	0.42	146.18	46.78	67128.38	0.42	146.01	46.72	67121.18
q100	q100	50%	0.41	146.48	46.87	67147.05	0.41	146.33	46.82	67140.71
q100	q100	60%	0.42	146.49	46.88	67131.35	0.42	146.45	46.86	67130.60
q100	q100	80%	0.42	146.17	46.77	67105.03	0.42	146.13	46.76	67102.80
q100	q100	100%	0.42	145.81	46.66	67064.03	0.42	145.80	46.66	67062.13