Simulation Result 1: C~Exp(0.2)

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These are the results without removing the non-converged estimates.

"Suc" indicates the percentage of getting estimates (both converged and non-converged) successfully among 1000 repeat.

Table 1: Summary of the estimated SAUC for Biomarker1 when the true censoring is distributed as $Exp(0.2)$.

			$p = 0.7$		$p = 0.5$		$p = 0.3$	
Patients	N	Method	Median (Q1, Q3)	Suc	Median (Q1, Q3)	Suc	Median (Q1, Q3)	Suc
50-150	20	HZ_P	75.01 (73.32, 76.39)	99.6	74.82 (73.57, 75.97)	99.1	74.66 (73.67, 75.65)	96.6
		HZ_O	76.12 (74.27, 78.11)	99.6	76.52 (74.53, 78.27)	99.1	78.38 (75.47, 80.57)	96.6
		Prop	75.63 (73.35, 77.91)	99.6	74.69 (72.35, 76.97)	99.1	73.12 (70.04, 76.82)	96.6
	30	HZ_P	74.82 (73.56, 75.96)	100.0	74.78 (73.60, 75.73)	99.8	74.56 (73.84, 75.42)	98.6
		HZ_O	75.96 (74.40, 77.38)	100.0	76.50 (74.84, 77.92)	99.8	77.62 (75.42, 79.64)	98.6
		Prop	75.19 (73.56, 77.10)	100.0	74.81 (72.77, 76.60)	99.8	72.95 (70.38, 75.78)	98.6
	50	HZ_P	74.61 (73.66, 75.57)	99.9	74.59 (73.74, 75.33)	100.0	74.46 (73.86, 75.17)	99.1
		HZ_O	75.71 (74.52, 76.90)	99.9	76.10 (74.89, 77.23)	100.0	77.56 (75.97, 78.95)	99.1
		Prop	75.06 (73.55, 76.48)	99.9	74.40 (72.87, 76.06)	100.0	73.27 (71.29, 75.60)	99.1
	100	HZ_P	74.54 (73.81, 75.23)	100.0	74.50 (73.94, 75.02)	99.9	74.40 (73.99, 74.81)	100.0
		HZ_O	75.57 (74.74, 76.43)	100.0	76.08 (75.33, 76.96)	99.9	77.27 (76.19, 78.22)	100.0
		Prop	75.04 (73.95, 76.19)	100.0	74.59 (73.40, 75.80)	99.9	73.54 (71.66, 75.08)	100.0
50-300	20	HZ_P	75.87 (74.78, 77.07)	99.5	75.96 (74.91, 76.94)	99.2	75.82 (75.04, 76.59)	58.5
		HZ_O	76.79 (75.30, 78.29)	99.5	77.51 (75.76, 78.97)	99.2	78.98 (77.01, 80.92)	58.5
		Prop	76.05 (73.65, 78.14)	99.5	75.50 (72.87, 77.73)	99.2	73.73 (69.96, 76.58)	58.5
	30	HZ_P	75.97 (75.01, 76.87)	99.8	75.81 (75.00, 76.59)	99.3	75.64 (75.07, 76.28)	56.6
		HZ_O	76.71 (75.58, 78.00)	99.8	77.12 (75.79, 78.46)	99.3	78.51 (76.73, 80.25)	56.6
		Prop	76.05 (74.36, 77.60)	99.8	75.69 (73.71, 77.36)	99.3	73.57 (70.00, 76.12)	56.6
	50	HZ_P	75.67 (74.93, 76.40)	100.0	75.59 (74.98, 76.19)	99.9	75.65 (75.15, 76.18)	54.8
		HZ_O	76.45 (75.52, 77.38)	100.0	76.73 (75.76, 77.79)	99.9	78.25 (76.82, 79.75)	54.8
		Prop	76.05 (74.82, 77.28)	100.0	75.61 (74.24, 76.86)	99.9	74.29 (71.77, 76.43)	54.8
	100	HZ_P	75.58 (75.07, 76.14)	100.0	75.52 (75.10, 76.00)	100.0	75.51 (75.13, 75.88)	51.3
		HZ_O	76.28 (75.59, 76.94)	100.0	76.64 (75.92, 77.29)	100.0	77.74 (76.71, 78.77)	51.3
		Prop	75.90 (75.11, 76.74)	100.0	75.66 (74.77, 76.58)	100.0	74.65 (72.66, 76.23)	51.3

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Prop denotes the proposed sensitivity analysis method; HZ_P denotes the HZ model using the population (published and unpublished) studies; HZ_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of successfully convergenced estimates among 1000 repetition. All the entries are multiplied by 100.

Table 2: Summary of the estimated SAUC for Biomarker2 when the true censoring is distributed as $Exp(0.2)$.

			$p = 0.7$		$p = 0.5$		$p = 0.3$	
Patients	N	Method	Median (Q1, Q3)	Suc	Median (Q1, Q3)	Suc	Median (Q1, Q3)	Suc
50-150	20	HZ_P	57.65 (56.68, 58.72)	99.8	57.74 (56.85, 58.57)	99.8	57.75 (57.08, 58.37)	98.9
		HZ_O	58.26 (57.05, 59.51)	99.8	59.27 (57.88, 60.58)	99.8	61.32 (59.27, 62.95)	98.9
		Prop	57.50 (55.95, 58.91)	99.8	56.73 (55.02, 58.45)	99.8	56.45 (54.27, 60.13)	98.9
	30	HZ_P	57.67 (56.93, 58.46)	99.8	57.72 (57.07, 58.44)	100.0	57.73 (57.19, 58.24)	100.0
		HZ_O	58.32 (57.28, 59.32)	99.8	59.23 (58.24, 60.22)	100.0	61.43 (59.81, 62.91)	100.0
		Prop	57.38 (56.21, 58.53)	99.8	56.39 (55.09, 57.86)	100.0	55.74 (54.00, 58.77)	100.0
	50	HZ_P	57.75 (57.12, 58.36)	100.0	57.71 (57.16, 58.24)	100.0	57.75 (57.34, 58.14)	99.9
		HZ_O	58.48 (57.65, 59.17)	100.0	59.19 (58.35, 59.94)	100.0	61.21 (60.09, 62.34)	99.9
		Prop	57.43 (56.48, 58.28)	100.0	56.12 (55.19, 57.03)	100.0	55.10 (53.94, 56.40)	99.9
	100	HZ_P	57.73 (57.25, 58.18)	99.9	57.73 (57.36, 58.09)	100.0	57.75 (57.46, 58.03)	99.9
		HZ_O	58.40 (57.89, 58.93)	99.9	59.10 (58.57, 59.67)	100.0	61.26 (60.45, 62.05)	99.9
		Prop	57.22 (56.57, 57.88)	99.9	56.01 (55.42, 56.64)	100.0	54.79 (54.01, 55.65)	99.9
50-300	20	HZ_P	57.89 (57.15, 58.63)	99.3	57.92 (57.29, 58.56)	99.5	57.88 (57.44, 58.43)	98.0
		HZ_O	58.68 (57.71, 59.59)	99.3	59.46 (58.38, 60.38)	99.5	61.22 (59.87, 62.56)	98.0
		Prop	57.74 (56.76, 58.76)	99.3	57.33 (55.90, 58.75)	99.5	57.86 (55.35, 61.22)	98.0
	30	HZ_P	57.90 (57.30, 58.55)	98.9	57.89 (57.38, 58.45)	99.5	57.87 (57.49, 58.27)	97.8
		HZ_O	58.67 (57.92, 59.43)	98.9	59.39 (58.59, 60.15)	99.5	61.09 (59.94, 62.16)	97.8
		Prop	57.67 (56.78, 58.51)	98.9	57.10 (55.93, 58.20)	99.5	56.75 (55.09, 60.62)	97.8
	50	HZ_P	57.84 (57.38, 58.37)	99.2	57.93 (57.51, 58.33)	99.4	57.93 (57.60, 58.21)	98.4
		HZ_O	58.58 (58.00, 59.13)	99.2	59.42 (58.83, 60.01)	99.4	61.16 (60.30, 61.93)	98.4
		Prop	57.49 (56.80, 58.18)	99.2	56.94 (56.16, 57.76)	99.4	56.15 (54.82, 58.83)	98.4
	100	HZ_P	57.93 (57.60, 58.28)	99.6	57.92 (57.61, 58.20)	99.9	57.89 (57.69, 58.11)	98.2
		HZ_O	58.64 (58.23, 59.08)	99.6	59.35 (58.93, 59.77)	99.9	61.06 (60.51, 61.65)	98.2
		Prop	57.45 (57.00, 57.95)	99.6	56.79 (56.28, 57.30)	99.9	55.55 (54.58, 56.84)	98.2

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Prop denotes the proposed sensitivity analysis method; HZ_P denotes the HZ model using the population (published and unpublished) studies; HZ_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of successfully convergenced estimates among 1000 repetition. All the entries are multiplied by 100.

Table 3: Summary of the estimated SAUC for Biomarker1 when the true censoring is distributed as $U(1,4)$, but a misspecified exponential distribution is fitted.

			$p = 0.7$		$p = 0.5$		$p = 0.3$	
Patients	N	Method	Median (Q1, Q3)	Suc	Median (Q1, Q3)	Suc	Median (Q1, Q3)	Suc
50-150	20	HZ_P	75.34 (73.89, 76.74)	100.0	75.06 (73.80, 76.42)	99.1	74.97 (73.99, 75.85)	98.4
		HZ_O	76.35 (74.44, 78.03)	100.0	76.82 (74.98, 78.94)	99.1	78.52 (76.12, 80.89)	98.4
		Prop	76.25 (74.04, 78.41)	100.0	75.50 (73.05, 77.97)	99.1	73.36 (70.22, 76.79)	98.4
	30	HZ_P	75.04 (73.86, 76.22)	100.0	74.92 (73.95, 75.90)	99.3	74.83 (74.13, 75.57)	99.1
		HZ_O	76.28 (74.75, 77.70)	100.0	76.65 (75.20, 78.06)	99.3	78.08 (76.14, 80.12)	99.1
		Prop	76.15 (74.37, 78.31)	100.0	75.00 (73.04, 77.31)	99.3	73.07 (70.41, 76.01)	99.1
	50	HZ_P	75.00 (73.99, 75.83)	99.9	74.84 (74.08, 75.52)	99.7	74.77 (74.15, 75.29)	99.6
		HZ_O	75.98 (74.90, 77.10)	99.9	76.39 (75.33, 77.50)	99.7	77.61 (76.20, 79.14)	99.6
		Prop	75.91 (74.43, 77.49)	99.9	75.03 (73.37, 76.86)	99.7	72.94 (70.76, 75.07)	99.6
	100	HZ_P	74.75 (74.16, 75.42)	100.0	74.77 (74.24, 75.26)	100.0	74.76 (74.34, 75.14)	99.8
		HZ_O	75.76 (75.01, 76.61)	100.0	76.32 (75.47, 77.11)	100.0	77.52 (76.42, 78.50)	99.8
		Prop	75.74 (74.64, 76.92)	100.0	75.06 (73.78, 76.40)	100.0	73.09 (71.53, 74.93)	99.8
50-300	20	HZ_P	76.22 (75.03, 77.25)	99.8	76.14 (75.15, 77.16)	98.0	76.03 (75.20, 76.68)	54.2
		HZ_O	77.07 (75.59, 78.53)	99.8	77.72 (76.01, 79.29)	98.0	79.01 (77.06, 80.85)	54.2
		Prop	76.98 (74.10, 79.77)	99.8	76.71 (73.32, 79.56)	98.0	73.92 (70.47, 75.98)	54.2
	30	HZ_P	76.08 (75.07, 77.03)	100.0	75.98 (75.18, 76.74)	98.3	75.84 (75.21, 76.42)	55.1
		HZ_O	76.93 (75.77, 78.13)	100.0	77.42 (76.05, 78.70)	98.3	78.96 (77.29, 80.30)	55.1
		Prop	76.82 (74.41, 79.30)	100.0	76.28 (73.67, 78.43)	98.3	73.79 (70.18, 75.64)	55.1
	50	HZ_P	75.84 (75.17, 76.62)	100.0	75.86 (75.27, 76.49)	99.5	75.79 (75.34, 76.26)	51.0
		HZ_O	76.63 (75.74, 77.66)	100.0	77.14 (76.16, 78.07)	99.5	78.49 (77.04, 79.91)	51.0
		Prop	76.56 (74.97, 78.46)	100.0	75.68 (73.84, 77.53)	99.5	73.33 (70.14, 75.32)	51.0
	100	HZ_P	75.85 (75.32, 76.33)	100.0	75.77 (75.36, 76.23)	99.4	75.74 (75.42, 76.08)	44.9
		HZ_O	76.53 (75.86, 77.13)	100.0	76.90 (76.18, 77.62)	99.4	78.16 (76.91, 79.35)	44.9
		Prop	76.27 (75.25, 77.33)	100.0	75.77 (74.60, 76.87)	99.4	72.52 (70.61, 74.75)	44.9

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Prop denotes the proposed sensitivity analysis method; HZ_P denotes the HZ model using the population (published and unpublished) studies; HZ_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of successfully convergenced estimates among 1000 repetition. All the entries are multiplied by 100.

Table 4: Summary of the estimated SAUC for Biomarker2 when the true censoring is distributed as $U(1,4)$, but a misspecified exponential distribution is fitted.

			$p=0.7$		$p=0.5$		$p=0.3$	
Patients	N	Method	Median (Q1, Q3)	Suc	Median (Q1, Q3)	Suc	Median (Q1, Q3)	Suc
50-150	20	HZ_P	57.85 (56.84, 58.76)	99.8	57.80 (57.00, 58.60)	100.0	57.93 (57.26, 58.42)	99.6
		HZ_O	58.79 (57.67, 59.93)	99.8	59.67 (58.42, 60.98)	100.0	62.40 (60.50, 64.06)	99.6
		Prop	57.68 (56.23, 59.05)	99.8	56.75 (55.20, 58.49)	100.0	56.96 (54.22, 61.60)	99.6
	30	HZ_P	57.80 (57.02, 58.60)	99.9	57.78 (57.10, 58.34)	99.9	57.78 (57.31, 58.27)	99.9
		HZ_O	58.86 (57.89, 59.72)	99.9	59.79 (58.82, 60.83)	99.9	62.35 (60.86, 63.78)	99.9
		Prop	57.72 (56.40, 58.76)	99.9	56.57 (55.26, 58.01)	99.9	55.82 (54.12, 60.06)	99.9
	50	HZ_P	57.73 (57.19, 58.34)	100.0	57.81 (57.31, 58.33)	100.0	57.79 (57.46, 58.20)	99.9
		HZ_O	58.74 (58.02, 59.48)	100.0	59.79 (59.02, 60.53)	100.0	62.30 (61.26, 63.30)	99.9
		Prop	57.50 (56.57, 58.26)	100.0	56.48 (55.48, 57.43)	100.0	55.17 (53.78, 57.21)	99.9
	100	HZ_P	57.83 (57.40, 58.22)	100.0	57.82 (57.47, 58.14)	100.0	57.80 (57.54, 58.07)	99.7
		HZ_O	58.81 (58.31, 59.32)	100.0	59.83 (59.28, 60.33)	100.0	62.19 (61.42, 62.95)	99.7
		Prop	57.37 (56.78, 57.93)	100.0	56.33 (55.73, 57.01)	100.0	54.70 (53.64, 55.92)	99.7
50-300	20	HZ_P	57.92 (57.15, 58.65)	99.6	57.89 (57.31, 58.51)	99.6	57.94 (57.45, 58.45)	98.3
		HZ_O	58.91 (58.00, 59.81)	99.6	59.83 (58.90, 60.77)	99.6	61.73 (60.47, 62.84)	98.3
		Prop	57.82 (56.79, 59.04)	99.6	57.62 (56.34, 59.10)	99.6	58.35 (56.16, 61.31)	98.3
	30	HZ_P	57.98 (57.39, 58.57)	99.9	58.02 (57.48, 58.45)	99.5	57.98 (57.59, 58.33)	99.5
		HZ_O	58.93 (58.29, 59.67)	99.9	59.90 (59.12, 60.63)	99.5	61.80 (60.82, 62.68)	99.5
		Prop	57.76 (56.97, 58.72)	99.9	57.52 (56.45, 58.64)	99.5	57.70 (55.80, 61.24)	99.5
	50	HZ_P	57.90 (57.48, 58.39)	99.9	57.93 (57.55, 58.30)	99.9	57.94 (57.64, 58.23)	99.3
		HZ_O	58.91 (58.36, 59.51)	99.9	59.86 (59.30, 60.35)	99.9	61.75 (60.98, 62.47)	99.3
		Prop	57.65 (56.96, 58.35)	99.9	57.28 (56.49, 58.09)	99.9	57.14 (55.68, 59.81)	99.3
	100	HZ_P	57.92 (57.61, 58.25)	100.0	57.94 (57.69, 58.21)	99.9	57.94 (57.73, 58.15)	99.7
		HZ_O	58.89 (58.53, 59.28)	100.0	59.87 (59.47, 60.27)	99.9	61.65 (61.17, 62.18)	99.7
		Prop	57.56 (57.13, 58.01)	100.0	57.16 (56.64, 57.72)	99.9	56.56 (55.35, 58.15)	99.7

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