

Table S1 Univariate sensitive analysis of BCSS and OS

Characteristics	BCSS		OS	
	HR (95% CI)	P value	HR (95% CI)	P value
Age (years)				
≤39	1 (ref.)		1 (ref.)	
40–59	0.63 (0.44–0.89)	0.01	0.74 (0.54–1.02)	0.067
60–69	0.51 (0.36–0.74)	<0.001	0.94 (0.68–1.29)	0.699
≥70	0.92 (0.65–1.30)	0.621	2.25 (1.65–3.08)	<0.001
Race				
Black	1 (ref.)		1 (ref.)	
White	0.68 (0.56–0.81)	<0.001	0.75 (0.66–0.85)	<0.001
Others	0.67 (0.50–0.91)	0.01	0.58 (0.46–0.72)	<0.001
Marital status				
Married	1 (ref.)		1 (ref.)	
Separated	1.16 (0.94–1.42)	0.164	1.4 (1.22–1.61)	<0.001
Single	1.39 (1.16–1.66)	<0.001	1.5 (1.32–1.7)	<0.001
Widowed	1.64 (1.39–1.93)	<0.001	2.68 (2.42–2.97)	<0.001
Laterality				
Left	1 (ref.)		1 (ref.)	
Right	1.22 (1.07–1.38)	0.003	1.02 (0.94–1.11)	0.661
Histology				
Favorable	1 (ref.)		1 (ref.)	
ILC	1.64 (0.99–2.70)	0.054	0.82 (0.63–1.06)	0.133
Metaplastic	6.57 (2.93–14.75)	<0.001	2.51 (1.39–4.55)	0.002
NST	1.48 (0.91–2.39)	0.11	0.82 (0.65–1.05)	0.119
Others	1.23 (0.55–2.77)	0.61	1.04 (0.68–1.6)	0.855
Grade				
I	1 (ref.)		1 (ref.)	
II	1.61 (1.31–1.99)	<0.001	1.18 (1.05–1.33)	0.005
III	3.67 (2.99–4.49)	<0.001	1.79 (1.59–2.02)	<0.001
Undifferentiated	1.61 (0.40–6.52)	0.504	1.15 (0.48–2.78)	0.753
Stage				
I	1 (ref.)		1 (ref.)	
IIA	1.77 (1.48–2.13)	<0.001	1.44 (1.29–1.6)	<0.001
IIB	2.49 (2.03–3.06)	<0.001	1.47 (1.28–1.69)	<0.001
IIIA	4.24 (3.47–5.19)	<0.001	2.19 (1.9–2.53)	<0.001
IIIB	7.45 (5.85–9.50)	<0.001	3.64 (3.03–4.38)	<0.001
IIIC	6.89 (5.41–8.78)	<0.001	3.12 (2.58–3.77)	<0.001
Subtype				
HR–/HER2+	1 (ref.)		1 (ref.)	
HR+/HER2–	0.45 (0.35–0.58)	<0.001	0.69 (0.57–0.84)	<0.001
HR+/HER2+	0.56 (0.41–0.76)	<0.001	0.74 (0.58–0.93)	0.015
HR–/HER2–	1.21 (0.91–1.61)	0.181	1.27 (1.02–1.59)	0.035
ER status				
Negative	1 (ref.)		1 (ref.)	
Positive	0.40 (0.34–0.46)	<0.001	0.58 (0.52–0.65)	<0.001
PR status				
Negative	1 (ref.)		1 (ref.)	
Positive	0.42 (0.37–0.48)	<0.001	0.63 (0.57–0.69)	<0.001
HER2status				
Negative	1 (ref.)		1 (ref.)	
Positive	1.33 (1.13–1.58)	<0.001	1.09 (0.97–1.24)	0.148
HR status				
Negative	1 (ref.)		1 (ref.)	
Positive	0.40 (0.35–0.47)	<0.001	0.59 (0.53–0.66)	<0.001
Multicentral				
2	1 (ref.)		1 (ref.)	
3	1.13 (0.96–1.33)	0.149	1.42 (1.28–1.57)	<0.001
≥4	1.38 (1.04–1.83)	0.025	1.50 (1.24–1.81)	<0.001
Chemotherapy				
No	1 (ref.)		1 (ref.)	
Yes	1.63 (1.43–1.85)	<0.001	0.89 (0.81–0.97)	0.01
Radiation				
No	1 (ref.)		1 (ref.)	
Yes	0.96 (0.84–1.10)	0.59	0.83 (0.75–0.91)	<0.001
Breast Conserving				
No	1 (ref.)		1 (ref.)	
Yes	1.07 (0.93–1.22)	0.363	1.33 (1.22–1.45)	<0.001

BCSS, breast cancer-specific survival; ILC, invasive lobar carcinoma; NST, no special type; HR, hormone receptor; HER2, human epidermal growth factor receptor 2; ER, estrogen receptor; PR, progesterone receptor; OS, overall survival; HR, hazard ratio; CI, confidence interval.

**Table S2** Multivariate sensitive analysis of BCSS and OS

Characteristics	BCSS		OS	
	HR (95% CI)	P value	HR (95% CI)	P value
<b>Age (years)</b>				
≤39	1 (ref.)		1 (ref.)	
40–59	0.79 (0.55–1.14)	0.208	0.86 (0.62–1.19)	0.359
60–69	0.67 (0.46–0.97)	0.036	1.05 (0.76–1.45)	0.762
≥70	1.17 (0.81–1.69)	0.413	2.16 (1.56–2.98)	<0.001
<b>Race</b>				
Black	1 (ref.)		1 (ref.)	
White	0.81 (0.67–0.98)	0.032	0.82 (0.72–0.94)	0.003
Others	0.76 (0.56–1.03)	0.078	0.70 (0.56–0.87)	0.001
<b>Marital status</b>				
Married	1 (ref.)		1 (ref.)	
Separated	1.10 (0.90–1.36)	0.35	1.29 (1.12–1.48)	<0.001
Single	1.23 (1.02–1.48)	0.027	1.44 (1.27–1.64)	<0.001
Widowed	1.24 (1.04–1.49)	0.018	1.63 (1.46–1.82)	<0.001
<b>Histology</b>				
Favorable	1 (ref.)		1 (ref.)	
ILC	1.24 (0.74–2.06)	0.412	0.80 (0.61–1.05)	0.109
Metaplastic	1.82 (0.80–4.16)	0.157	1.10 (0.60–2.02)	0.756
NST	0.93 (0.57–1.52)	0.778	0.76 (0.60–0.98)	0.033
Others	0.64 (0.28–1.44)	0.28	0.81 (0.52–1.25)	0.338
<b>Grade</b>				
I	1 (ref.)		1 (ref.)	
II	1.29 (1.04–1.60)	0.019	1.07 (0.95–1.21)	0.277
III	2.14 (1.71–2.69)	<0.001	1.40 (1.22–1.61)	<0.001
Undifferentiated	0.77 (0.19–3.14)	0.711	0.80 (0.33–1.96)	0.631
<b>Stage</b>				
I	1 (ref.)		1 (ref.)	
IIA	1.59 (1.32–1.92)	<0.001	1.44 (1.29–1.62)	<0.001
IIB	2.39 (1.93–2.96)	<0.001	1.72 (1.49–1.99)	<0.001
IIIA	4.73 (3.8–5.89)	<0.001	3.01 (2.57–3.51)	<0.001
IIIB	6.15 (4.78–7.91)	<0.001	3.43 (2.84–4.15)	<0.001
IIIC	8.18 (6.29–10.64)	<0.001	4.70 (3.83–5.76)	<0.001
<b>ER status</b>				
Negative	1 (ref.)		1 (ref.)	
Positive	0.78 (0.63–0.95)	0.016	0.75 (0.64–0.87)	<0.001
<b>PR status</b>				
Negative	1 (ref.)		1 (ref.)	
Positive	0.58 (0.49–0.69)	<0.001	0.77 (0.68–0.87)	<0.001
<b>Multicentral</b>				
2	1 (ref.)		1 (ref.)	
3	1.15 (0.97–1.36)	0.104	1.28 (1.15–1.43)	<0.001
≥4	1.58 (1.19–2.10)	0.002	1.34 (1.11–1.62)	0.002
<b>Chemotherapy</b>				
No	1 (ref.)		1 (ref.)	
Yes	1.03 (0.88–1.20)	0.714	0.90 (0.80–1.00)	0.051
<b>Radiation</b>				
No	1 (ref.)		1 (ref.)	
Yes	0.64 (0.55–0.74)	<0.001	0.66 (0.60–0.74)	<0.001
<b>Breast Conserving</b>				
No	1 (ref.)		1 (ref.)	
Yes	1.55 (1.34–1.79)	<0.001	1.57 (1.43–1.73)	<0.001

BCSS, breast cancer-specific survival; ILC, invasive lobar carcinoma; NST, no special type; HR, hormone receptor; HER2, human epidermal growth factor receptor 2; ER, estrogen receptor; PR, progesterone receptor; OS, overall survival; HR, hazard ratio; CI, confidence interval.

**Table S3** Multivariate Cox regression sensitive analysis the influence of BCS on survival in different subgroups

Subgroups	Patient No.	BCSS		OS	
		HR (95% CI)	P value	HR (95% CI)	P value
<b>Age (years)</b>					
≤39	234	3.51 (1.27–9.69)	0.015	3.08 (1.24–7.67)	0.0156
40–59	3,120	1.74 (1.32–2.29)	<0.001	1.64 (1.30–2.06)	<0.001
60–69	2,704	1.32 (0.95–1.83)	0.093	1.38 (1.10–1.72)	0.0045
≥70	3,528	1.52 (1.23–1.88)	<0.001	1.58 (1.40–1.79)	<0.001
<b>Race</b>					
Black	970	1.93 (1.32–2.82)	<0.001	1.69 (1.30–2.20)	<0.001
White	7,924	1.55 (1.31–1.83)	<0.001	1.57 (1.41–1.75)	<0.001
Others	692	1.19 (0.60–2.37)	0.617	1.38 (0.87–2.19)	0.17
<b>Marital status</b>					
Married	5,254	1.47 (1.18–1.83)	<0.001	1.55 (1.33–1.81)	<0.001
Separated	1,208	1.54 (1.00–2.37)	0.052	1.67 (1.26–2.22)	<0.001
Single	1,456	1.62 (1.13–2.31)	0.00823	1.40 (1.09–1.80)	0.00845
Widowed	1,668	1.6 (1.19–2.15)	0.00177	1.70 (1.44–2.02)	<0.001
<b>Laterality</b>					
Left	4,957	1.66 (1.34–2.06)	<0.001	1.67 (1.46–1.92)	<0.001
Right	4,629	1.46 (1.19–1.78)	<0.001	1.48 (1.29–1.70)	<0.001
<b>Histology</b>					
Favorable	258	2.1 (0.59–7.45)	0.253	1.49 (0.84–2.62)	0.172
ILC	1,456	1.92 (1.27–2.90)	0.00189	1.93 (1.46–2.54)	<0.001
NST	7,726	1.50 (1.28–1.76)	<0.001	1.52 (1.37–1.70)	<0.001
Others	146	0.32 (0.06–1.63)	0.171	1.50 (0.49–4.53)	0.475
<b>Grade</b>					
I	2,308	1.67 (1.08–2.58)	0.0212	1.86 (1.49–2.33)	<0.001
II	4,659	1.59 (1.26–2.01)	<0.001	1.47 (1.27–1.70)	<0.001
III	2,598	1.48 (1.20–1.82)	<0.001	1.54 (1.31–1.81)	<0.001
<b>Stage</b>					
I	4,954	2.09 (1.55–2.81)	<0.001	2.00 (1.70–2.36)	<0.001
IIA	2,216	1.74 (1.28–2.38)	<0.001	1.64 (1.35–2.00)	<0.001
IIB	1,103	1.89 (1.30–2.76)	<0.001	1.58 (1.19–2.09)	0.00137
IIIA	713	0.85 (0.54–1.34)	0.489	0.85 (0.60–1.22)	0.378
IIIB	320	2.02 (1.26–3.26)	0.004	1.91 (1.30–2.81)	<0.001
IIIC	280	0.34 (0.12–0.96)	0.041	0.39 (0.17–0.90)	0.0282
<b>Subtype</b>					
HR–/HER2+	369	1.94 (1.10–3.43)	0.022	2.16 (1.39–3.36)	<0.001
HR+/HER2–	7,541	1.55 (1.30–1.86)	<0.001	1.52 (1.35–1.70)	<0.001
HR+/HER2+	895	1.43 (0.89–2.29)	0.136	1.61 (1.16–2.23)	0.004
HR–/HER2–	781	1.45 (0.99–2.11)	0.054	1.71 (1.28–2.28)	<0.001
<b>ER status</b>					
Negative	1,225	1.58 (1.18–2.13)	0.002	1.82 (1.45–2.27)	<0.001
Positive	8,361	1.55 (1.31–1.84)	<0.001	1.53 (1.37–1.71)	<0.001
<b>PR status</b>					
Negative	2,258	1.57 (1.25–1.97)	<0.001	1.67 (1.41–1.98)	<0.001
Positive	7,328	1.54 (1.27–1.86)	<0.001	1.52 (1.36–1.72)	<0.001
<b>HER2status</b>					
Negative	8,322	1.53 (1.30–1.80)	<0.001	1.55 (1.39–1.72)	<0.001
Positive	1,264	1.55 (1.09–2.22)	0.015	1.69 (1.31–2.19)	<0.001
<b>HR status</b>					
Negative	1,150	1.53 (1.13–2.09)	0.006	1.78 (1.40–2.25)	<0.001
Positive	8,436	1.57 (1.33–1.86)	<0.001	1.54 (1.38–1.71)	<0.001
<b>Multicentral</b>					
2	7,502	1.47 (1.24–1.74)	<0.001	1.53 (1.36–1.71)	<0.001
3	1,673	1.68 (1.20–2.36)	0.002	1.56 (1.26–1.92)	<0.001
≥4	411	4.07 (1.89–8.79)	<0.001	3.60 (2.24–5.79)	<0.001
<b>Chemotherapy</b>					
No	6,274	1.83 (1.50–2.24)	<0.001	1.76 (1.56–1.98)	<0.001
Yes	3,312	1.29 (1.03–1.63)	0.0284	1.38 (1.16–1.65)	<0.001
<b>Radiation</b>					
No	6,523	1.92 (1.62–2.28)	<0.001	1.86 (1.66–2.08)	<0.001
Yes	3,063	0.76 (0.55–1.04)	0.0813	0.88 (0.71–1.09)	0.228
<b>Surgery alone</b>					
No	4,832	1.01 (0.83–1.24)	0.924	1.16 (1.00–1.34)	0.0437
Yes	4,754	2.20 (1.77–2.73)	<0.001	1.96 (1.72–2.22)	<0.001

BCSS, breast cancer-specific survival; ILC, invasive lobar carcinoma; NST, no special type; HR, hormone receptor; HER2, human epidermal growth factor receptor 2; ER, estrogen receptor; PR, progesterone receptor; OS, overall survival; HR, hazard ratio; CI, confidence interval.