### Supplementary Table 1. Baseline characteristics by the treatment group after IPTW

| Characteristic                      | Overall (n=150) | Regorafenib (n=102) | Nivolumab (n=48) | P-value |
|-------------------------------------|-----------------|---------------------|------------------|---------|
| Age (years)                         | 62 (55–69)      | 62 (54–70)          | 64 (57–68)       | 0.92    |
| Male                                | 122 (81.6)      | 87 (82.0)           | 36 (81.0)        | 0.89    |
| HCC etiology                        |                 |                     |                  | 0.96    |
| HBV                                 | 127 (85.2)      | 90 (85.4)           | 38 (85.1)        |         |
| Others                              | 22 (14.8)       | 15 (14.6)           | 7 (14.9)         |         |
| Child-Pugh score                    |                 |                     |                  | 0.59    |
| 5                                   | 80 (53.5)       | 58 (55.3)           | 21 (47.7)        |         |
| 6                                   | 51 (33.8)       | 33 (31.1)           | 19 (42.1)        |         |
| 7–9                                 | 19 (12.7)       | 14 (13.5)           | 5 (10.2)         |         |
| Vascular invasion                   | 77 (51.4)       | 52 (49.1)           | 25 (55.8)        | 0.53    |
| Biliary invasion                    | 5 (3.4)         | 5 (4.3)             | 1 (3.3)          | 0.75    |
| Intrahepatic tumor burden           |                 |                     |                  | 0.82    |
| None                                | 25 (16.7)       | 16 (15.6)           | 6 (14.3)         |         |
| <50%                                | 93 (62.0)       | 66 (62.4)           | 26 (57.8)        |         |
| ≥50%                                | 32 (21.3)       | 23 (22.0)           | 13 (27.8)        |         |
| Extrahepatic metastases            | 120 (80.0)      | 83 (78.7)           | 33 (73.8)        | 0.63    |
| Lymph node                          | 54 (36.0)       | 37 (34.7)           | 12 (27.7)        |         |
| Lung                                | 77 (51.3)       | 53 (50.6)           | 24 (54.1)        |         |
| Bone                                | 32 (21.3)       | 20 (18.5)           | 8 (18.6)         |         |
| Peritoneum                          | 24 (16.0)       | 15 (13.8)           | 7 (15.2)         |         |
| Others                              | 3 (2.0)         | 1 (0.7)             | 2 (5.4)          |         |
| Portal hypertension                 | 64 (42.7)       | 48 (45.7)           | 19 (43.2)        | 0.82    |
| BCLC stage                          |                 |                     |                  | 0.97    |
| B                                   | 5 (3.3)         | 3 (3.2)             | 1 (3.1)          |         |
| C                                   | 145 (96.7)      | 102 (96.8)          | 44 (96.9)        |         |
| Laboratory data                     |                 |                     |                  |         |
| Albumin (g/dL)                      | 3.7 (3.2–4.0)   | 3.6 (3.3–4.1)       | 3.7 (3.2–3.9)    | 0.48    |
| Total bilirubin (mg/dL)             | 1.0 (0.7–1.4)   | 1.0 (0.7–1.4)       | 1.0 (0.7–1.3)    | 0.73    |
| AST (IU/L)                          | 53 (36–78)      | 45 (34–77)          | 63 (40–79)       | 0.54    |
| ALT (IU/L)                          | 37 (22–55)      | 37 (20–55)          | 42 (25–54)       | 0.62    |
| ALP (IU/L)                          | 148 (89–224)    | 150 (89–224)        | 157 (89–247)     | 0.94    |
| Creatinine (mg/dL)                  | 1.08 (1.02–1.15)| 0.80 (0.64–0.93)    | 0.82 (0.70–0.93) | 0.82    |
| Platelet count (×10^9/L)            | 150 (106–212)   | 148 (106–216)       | 162 (103–207)    | 0.79    |
| INR                                 | 1.08 (1.02–1.15)| 1.09 (1.02–1.15)    | 1.08 (1.03–1.16) | 0.91    |
| AFP (ng/mL)                         | 621.5 (15.5–6,833.0) | 566.2 (18.2–7,386.3) | 878.5 (15.5–7,585.2) | 0.69 |
| PIVKA (mAU/mL)                      | 1,826 (177–9,007)| 1,625 (207–8,790)   | 2,744 (148–13,067) | 0.93   |
| MoRAL                               | 653.6 (211.8–1,573.3)| 689.2 (207.3–1,573.3)| 636.9 (244.6–1,261.1) | 0.93  |

Values are presented as median (interquartile range) or number (%) of patients.

HCC, hepatocellular carcinoma; HBV, hepatitis B virus; BCLC, Barcelona Clinic Liver Cancer; AST, aspartate aminotransferase; ALT, alanine aminotransferase; ALP, alkaline phosphatase; INR, international normalized ratio; AFP, alpha-fetoprotein; PIVKA, protein induced by vitamin K absence or antagonist; MoRAL, model to predict tumor recurrence after living donor liver transplantation.