# Appendix 2 – Model parameters and output

Table 1. Sensitivity parameters, adjusted hazard ratios and corresponding confidence intervals after applying the Huang et al. (2020) method under the scenario with good knowledge of the unmeasured confounder where Ω is the marginal probability of the unmeasured confounder, is the coefficient of the unmeasured confounder in the treatment model and is the coefficient of the unmeasured confounder in the outcome model

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Ω** | **η** |  | | | | |
| 0.55 | 0.6 | 0.65 | 0.7 | 0.75 |
| 0.4 | 0.8 | 0.57 (0.28 - 0.86) | 0.56 (0.27 - 0.85) | 0.55 (0.26 - 0.85) | 0.54 (0.25 - 0.83) | 0.54 (0.24 - 0.83) |
| 1 | 0.54 (0.23 - 0.84) | 0.53 (0.23 - 0.82) | 0.52 (0.21 - 0.83) | 0.51 (0.2 - 0.82) | 0.5 (0.19 - 0.8) |
| 1.2 | 0.5 (0.19 - 0.82) | 0.49 (0.17 - 0.82) | 0.48 (0.17 - 0.79) | 0.47 (0.16 - 0.79) | 0.46 (0.15 - 0.78) |
| 1.4 | 0.47 (0.14 - 0.8) | 0.46 (0.15 - 0.78) | 0.45 (0.12 - 0.78) | 0.44 (0.11 - 0.77) | 0.43 (0.1 - 0.75) |
| 1.6 | 0.44 (0.1 - 0.78) | 0.43 (0.08 - 0.77) | 0.42 (0.09 - 0.75) | 0.41 (0.06 - 0.75) | 0.4 (0.06 - 0.73) |
| 0.45 | 0.8 | 0.57 (0.27 - 0.86) | 0.56 (0.26 - 0.85) | 0.55 (0.26 - 0.84) | 0.54 (0.25 - 0.83) | 0.53 (0.24 - 0.82) |
| 1 | 0.53 (0.22 - 0.84) | 0.52 (0.22 - 0.82) | 0.51 (0.2 - 0.82) | 0.5 (0.19 - 0.81) | 0.49 (0.19 - 0.8) |
| 1.2 | 0.5 (0.19 - 0.81) | 0.49 (0.16 - 0.81) | 0.48 (0.16 - 0.79) | 0.47 (0.14 - 0.79) | 0.46 (0.13 - 0.78) |
| 1.4 | 0.47 (0.13 - 0.8) | 0.45 (0.12 - 0.79) | 0.44 (0.1 - 0.79) | 0.43 (0.1 - 0.76) | 0.42 (0.09 - 0.75) |
| 1.6 | 0.43 (0.08 - 0.79) | 0.42 (0.06 - 0.78) | 0.41 (0.07 - 0.75) | 0.4 (0.06 - 0.75) | 0.39 (0.05 - 0.73) |
| 0.5 | 0.8 | 0.56 (0.27 - 0.86) | 0.56 (0.26 - 0.85) | 0.55 (0.25 - 0.84) | 0.54 (0.25 - 0.83) | 0.53 (0.23 - 0.83) |
| 1 | 0.53 (0.22 - 0.84) | 0.52 (0.21 - 0.83) | 0.51 (0.2 - 0.82) | 0.5 (0.19 - 0.81) | 0.49 (0.19 - 0.79) |
| 1.2 | 0.5 (0.17 - 0.82) | 0.49 (0.17 - 0.8) | 0.47 (0.15 - 0.8) | 0.46 (0.15 - 0.78) | 0.45 (0.14 - 0.77) |
| 1.4 | 0.47 (0.13 - 0.8) | 0.45 (0.09 - 0.82) | 0.44 (0.12 - 0.77) | 0.43 (0.09 - 0.77) | 0.42 (0.09 - 0.75) |
| 1.6 | 0.43 (0.08 - 0.79) | 0.42 (0.05 - 0.8) | 0.41 (0.05 - 0.78) | 0.4 (0.06 - 0.74) | 0.39 (0.04 - 0.74) |
| 0.55 | 0.8 | 0.57 (0.27 - 0.86) | 0.56 (0.26 - 0.85) | 0.55 (0.26 - 0.84) | 0.54 (0.25 - 0.83) | 0.53 (0.24 - 0.82) |
| 1 | 0.53 (0.22 - 0.85) | 0.52 (0.22 - 0.83) | 0.51 (0.21 - 0.82) | 0.5 (0.19 - 0.81) | 0.49 (0.18 - 0.8) |
| 1.2 | 0.5 (0.17 - 0.83) | 0.49 (0.15 - 0.83) | 0.48 (0.16 - 0.8) | 0.47 (0.15 - 0.78) | 0.46 (0.14 - 0.77) |
| 1.4 | 0.47 (0.13 - 0.81) | 0.46 (0.09 - 0.82) | 0.44 (0.12 - 0.77) | 0.43 (0.08 - 0.78) | 0.42 (0.07 - 0.77) |
| 1.6 | 0.44 (0.06 - 0.82) | 0.43 (0.05 - 0.8) | 0.42 (0.07 - 0.76) | 0.4 (0.02 - 0.79) | 0.39 (0.04 - 0.74) |
| 0.6 | 0.8 | 0.57 (0.27 - 0.87) | 0.56 (0.27 - 0.86) | 0.55 (0.26 - 0.84) | 0.55 (0.25 - 0.84) | 0.54 (0.25 - 0.83) |
| 1 | 0.54 (0.22 - 0.86) | 0.53 (0.22 - 0.84) | 0.52 (0.21 - 0.83) | 0.51 (0.18 - 0.84) | 0.5 (0.19 - 0.81) |
| 1.2 | 0.51 (0.18 - 0.84) | 0.5 (0.18 - 0.81) | 0.48 (0.17 - 0.8) | 0.47 (0.15 - 0.79) | 0.46 (0.14 - 0.78) |
| 1.4 | 0.48 (0.14 - 0.81) | 0.46 (0.12 - 0.81) | 0.45 (0.1 - 0.8) | 0.44 (0.09 - 0.79) | 0.43 (0.07 - 0.79) |
| 1.6 | 0.45 (0.08 - 0.82) | 0.44 (0.08 - 0.8) | 0.42 (0.07 - 0.78) | 0.41 (0.04 - 0.78) | 0.4 (0.04 - 0.76) |

Table 2. Sensitivity parameters and adjusted hazard ratios and corresponding confidence intervals after applying the Ding et al. (2016) method under the scenario with good knowledge of the unmeasured confounder where is the relative risk between the exposure and unmeasured confounder and is the hazard ratio between the unmeasured confounder and outcome

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | | | | |
|  | 1.6 | 1.8 | 2 | 2.2 | 2.4 |
|  |  |  |  |  |  |
| 3.2 | 0.55 (0.42 - 0.72) | 0.52 (0.4 - 0.68) | 0.5 (0.38 - 0.66) | 0.48 (0.37 - 0.63) | 0.47 (0.36 - 0.61) |
| 3.3 | 0.55 (0.42 - 0.72) | 0.52 (0.4 - 0.68) | 0.5 (0.38 - 0.65) | 0.48 (0.37 - 0.63) | 0.47 (0.36 - 0.61) |
| 3.4 | 0.54 (0.42 - 0.71) | 0.52 (0.4 - 0.68) | 0.5 (0.38 - 0.65) | 0.48 (0.36 - 0.62) | 0.46 (0.35 - 0.61) |
| 3.5 | 0.54 (0.41 - 0.71) | 0.51 (0.39 - 0.67) | 0.49 (0.38 - 0.64) | 0.47 (0.36 - 0.62) | 0.46 (0.35 - 0.6) |
| 3.6 | 0.54 (0.41 - 0.71) | 0.51 (0.39 - 0.67) | 0.49 (0.37 - 0.64) | 0.47 (0.36 - 0.62) | 0.46 (0.35 - 0.6) |
| 3.7 | 0.54 (0.41 - 0.7) | 0.51 (0.39 - 0.67) | 0.49 (0.37 - 0.64) | 0.47 (0.36 - 0.61) | 0.45 (0.35 - 0.59) |

Table 3. Sensitivity parameters, adjusted hazard ratios and corresponding confidence intervals after applying the Huang et al. (2020) method under the scenario with poor knowledge of the unmeasured confounder where Ω is the marginal probability of the unmeasured confounder, is the coefficient of the unmeasured confounder in the treatment model and is the coefficient of the unmeasured confounder in the outcome model

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Ω | η |  | | | | |
| 0.25 | 0.3 | 0.35 | 0.4 | 0.45 |
| 0.45 | 0.7 | 0.63 (0.34 - 0.93) | 0.62 (0.33 - 0.91) | 0.62 (0.33 - 0.9) | 0.61 (0.32 - 0.9) | 0.6 (0.31 - 0.88) |
| 0.8 | 0.62 (0.33 - 0.92) | 0.61 (0.31 - 0.91) | 0.6 (0.3 - 0.9) | 0.59 (0.29 - 0.89) | 0.58 (0.29 - 0.88) |
| 0.9 | 0.61 (0.31 - 0.91) | 0.6 (0.3 - 0.9) | 0.59 (0.29 - 0.89) | 0.58 (0.28 - 0.88) | 0.57 (0.27 - 0.87) |
| 1 | 0.6 (0.29 - 0.91) | 0.59 (0.28 - 0.89) | 0.58 (0.26 - 0.89) | 0.56 (0.26 - 0.87) | 0.55 (0.24 - 0.86) |
| 1.1 | 0.59 (0.28 - 0.9) | 0.57 (0.24 - 0.9) | 0.56 (0.25 - 0.87) | 0.55 (0.24 - 0.85) | 0.54 (0.22 - 0.86) |
| 0.5 | 0.7 | 0.63 (0.34 - 0.92) | 0.62 (0.33 - 0.91) | 0.61 (0.32 - 0.91) | 0.61 (0.32 - 0.89) | 0.6 (0.31 - 0.88) |
| 0.8 | 0.62 (0.33 - 0.92) | 0.61 (0.32 - 0.91) | 0.6 (0.31 - 0.9) | 0.59 (0.3 - 0.89) | 0.58 (0.28 - 0.88) |
| 0.9 | 0.61 (0.31 - 0.91) | 0.6 (0.3 - 0.9) | 0.59 (0.28 - 0.9) | 0.58 (0.28 - 0.87) | 0.57 (0.27 - 0.87) |
| 1 | 0.6 (0.29 - 0.91) | 0.59 (0.27 - 0.9) | 0.58 (0.26 - 0.89) | 0.56 (0.26 - 0.87) | 0.55 (0.25 - 0.86) |
| 1.1 | 0.59 (0.27 - 0.9) | 0.57 (0.25 - 0.9) | 0.56 (0.24 - 0.88) | 0.55 (0.22 - 0.88) | 0.54 (0.23 - 0.85) |
| 0.55 | 0.7 | 0.63 (0.34 - 0.93) | 0.63 (0.34 - 0.91) | 0.62 (0.33 - 0.9) | 0.61 (0.32 - 0.89) | 0.6 (0.31 - 0.89) |
| 0.8 | 0.62 (0.33 - 0.92) | 0.61 (0.31 - 0.91) | 0.6 (0.31 - 0.9) | 0.59 (0.3 - 0.89) | 0.58 (0.29 - 0.88) |
| 0.9 | 0.61 (0.31 - 0.91) | 0.6 (0.29 - 0.91) | 0.59 (0.29 - 0.9) | 0.58 (0.28 - 0.88) | 0.57 (0.27 - 0.87) |
| 1 | 0.6 (0.29 - 0.91) | 0.59 (0.28 - 0.9) | 0.58 (0.27 - 0.89) | 0.57 (0.26 - 0.87) | 0.56 (0.24 - 0.87) |
| 1.1 | 0.59 (0.28 - 0.91) | 0.58 (0.26 - 0.9) | 0.57 (0.25 - 0.88) | 0.55 (0.25 - 0.86) | 0.54 (0.22 - 0.86) |
| 0.6 | 0.7 | 0.64 (0.34 - 0.93) | 0.63 (0.34 - 0.92) | 0.62 (0.33 - 0.91) | 0.61 (0.33 - 0.9) | 0.6 (0.32 - 0.89) |
| 0.8 | 0.63 (0.33 - 0.93) | 0.62 (0.33 - 0.91) | 0.61 (0.31 - 0.9) | 0.6 (0.31 - 0.89) | 0.59 (0.29 - 0.89) |
| 0.9 | 0.62 (0.32 - 0.92) | 0.61 (0.3 - 0.91) | 0.6 (0.29 - 0.9) | 0.59 (0.28 - 0.89) | 0.58 (0.27 - 0.88) |
| 1 | 0.61 (0.29 - 0.93) | 0.6 (0.29 - 0.9) | 0.58 (0.28 - 0.89) | 0.57 (0.26 - 0.88) | 0.56 (0.25 - 0.87) |
| 1.1 | 0.6 (0.27 - 0.92) | 0.59 (0.27 - 0.9) | 0.57 (0.26 - 0.89) | 0.56 (0.25 - 0.87) | 0.55 (0.24 - 0.86) |
| 0.65 | 0.7 | 0.64 (0.35 - 0.93) | 0.63 (0.34 - 0.92) | 0.62 (0.34 - 0.91) | 0.62 (0.33 - 0.91) | 0.61 (0.32 - 0.9) |
| 0.8 | 0.63 (0.34 - 0.93) | 0.62 (0.33 - 0.92) | 0.61 (0.32 - 0.91) | 0.6 (0.31 - 0.9) | 0.6 (0.3 - 0.89) |
| 0.9 | 0.62 (0.32 - 0.93) | 0.61 (0.31 - 0.91) | 0.6 (0.3 - 0.9) | 0.59 (0.3 - 0.89) | 0.58 (0.28 - 0.88) |
| 1 | 0.62 (0.31 - 0.93) | 0.6 (0.29 - 0.92) | 0.59 (0.28 - 0.91) | 0.58 (0.27 - 0.89) | 0.57 (0.26 - 0.88) |
| 1.1 | 0.61 (0.3 - 0.92) | 0.6 (0.26 - 0.93) | 0.58 (0.26 - 0.91) | 0.57 (0.25 - 0.89) | 0.56 (0.25 - 0.87) |

Table 4. Sensitivity parameters and adjusted hazard ratios and corresponding confidence intervals after applying the Ding et al. (2016) method under the scenario with poor knowledge of the unmeasured confounder where is the relative risk between the exposure and unmeasured confounder and is the hazard ratio between the unmeasured confounder and outcome

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | | | | |
|  | 1.4 | 1.45 | 1.5 | 1.55 | 1.6 |
|  |  |  |  |  |  |
| 1.5 | 0.64 (0.49 - 0.84) | 0.64 (0.49 - 0.84) | 0.63 (0.48 - 0.83) | 0.63 (0.48 - 0.83) | 0.63 (0.48 - 0.82) |
| 1.6 | 0.64 (0.49 - 0.83) | 0.63 (0.48 - 0.83) | 0.63 (0.48 - 0.82) | 0.62 (0.48 - 0.81) | 0.62 (0.47 - 0.81) |
| 1.7 | 0.63 (0.48 - 0.82) | 0.62 (0.48 - 0.82) | 0.62 (0.47 - 0.81) | 0.62 (0.47 - 0.81) | 0.61 (0.47 - 0.8) |
| 1.8 | 0.62 (0.48 - 0.82) | 0.62 (0.47 - 0.81) | 0.61 (0.47 - 0.8) | 0.61 (0.47 - 0.8) | 0.6 (0.46 - 0.79) |
| 1.9 | 0.62 (0.47 - 0.81) | 0.61 (0.47 - 0.8) | 0.61 (0.46 - 0.8) | 0.6 (0.46 - 0.79) | 0.6 (0.46 - 0.78) |
| 2.0 | 0.62 (0.47 - 0.81) | 0.61 (0.47 - 0.8) | 0.6 (0.46 - 0.79) | 0.6 (0.46 - 0.78) | 0.59 (0.45 - 0.78) |

Table 5. Sensitivity parameters and adjusted hazard ratios and corresponding confidence intervals after applying the Huang et al. (2020) method under the scenario with incorrect knowledge of the unmeasured confounder where Ω is the marginal probability of the unmeasured confounder, is the coefficient of the unmeasured confounder in the treatment model and is the coefficient of the unmeasured confounder in the outcome model

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Ω** | **η** |  | | | | |
| -0.35 | -0.3 | -0.25 | -0.2 | -0.15 |
| 0.2 | 0.2 | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) |
| 0.4 | 0.71 (0.44 - 0.99) | 0.71 (0.43 - 0.98) | 0.7 (0.43 - 0.98) | 0.7 (0.43 - 0.98) | 0.7 (0.42 - 0.97) |
| 0.6 | 0.72 (0.44 - 1) | 0.71 (0.44 - 0.99) | 0.71 (0.43 - 0.98) | 0.7 (0.43 - 0.98) | 0.7 (0.42 - 0.98) |
| 0.8 | 0.72 (0.44 - 1) | 0.71 (0.43 - 1) | 0.71 (0.43 - 0.99) | 0.7 (0.42 - 0.98) | 0.7 (0.41 - 0.98) |
| 1 | 0.72 (0.43 - 1.01) | 0.71 (0.42 - 1) | 0.7 (0.41 - 0.99) | 0.7 (0.4 - 0.99) | 0.69 (0.4 - 0.98) |
| 0.25 | 0.2 | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) |
| 0.4 | 0.72 (0.44 - 0.99) | 0.71 (0.44 - 0.99) | 0.71 (0.43 - 0.98) | 0.7 (0.43 - 0.98) | 0.7 (0.43 - 0.97) |
| 0.6 | 0.72 (0.45 - 1) | 0.72 (0.44 - 1) | 0.71 (0.43 - 0.99) | 0.71 (0.43 - 0.99) | 0.7 (0.42 - 0.98) |
| 0.8 | 0.73 (0.44 - 1.02) | 0.72 (0.43 - 1.01) | 0.71 (0.43 - 1) | 0.71 (0.42 - 0.99) | 0.7 (0.41 - 0.99) |
| 1 | 0.73 (0.43 - 1.02) | 0.72 (0.42 - 1.01) | 0.71 (0.42 - 1) | 0.7 (0.41 - 0.99) | 0.69 (0.4 - 0.98) |
| 0.3 | 0.2 | 0.71 (0.44 - 0.98) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) |
| 0.4 | 0.72 (0.44 - 0.99) | 0.71 (0.44 - 0.99) | 0.71 (0.44 - 0.98) | 0.71 (0.43 - 0.98) | 0.7 (0.43 - 0.98) |
| 0.6 | 0.73 (0.45 - 1.01) | 0.72 (0.44 - 1) | 0.72 (0.43 - 1) | 0.71 (0.43 - 0.99) | 0.7 (0.42 - 0.98) |
| 0.8 | 0.74 (0.45 - 1.03) | 0.73 (0.44 - 1.02) | 0.72 (0.43 - 1.01) | 0.71 (0.42 - 1) | 0.7 (0.41 - 0.99) |
| 1 | 0.74 (0.44 - 1.03) | 0.72 (0.42 - 1.02) | 0.71 (0.42 - 1.01) | 0.7 (0.41 - 1) | 0.69 (0.4 - 0.99) |
| 0.35 | 0.2 | 0.71 (0.44 - 0.98) | 0.71 (0.43 - 0.98) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) |
| 0.4 | 0.72 (0.45 - 1) | 0.72 (0.44 - 0.99) | 0.71 (0.44 - 0.99) | 0.71 (0.43 - 0.98) | 0.7 (0.43 - 0.98) |
| 0.6 | 0.73 (0.45 - 1.02) | 0.73 (0.45 - 1.01) | 0.72 (0.44 - 1) | 0.71 (0.43 - 0.99) | 0.7 (0.42 - 0.99) |
| 0.8 | 0.74 (0.45 - 1.04) | 0.73 (0.43 - 1.03) | 0.72 (0.43 - 1.01) | 0.71 (0.42 - 1.01) | 0.7 (0.41 - 0.99) |
| 1 | 0.74 (0.44 - 1.05) | 0.73 (0.43 - 1.04) | 0.72 (0.41 - 1.02) | 0.71 (0.4 - 1.02) | 0.69 (0.39 - 1) |
| 0.4 | 0.2 | 0.71 (0.44 - 0.98) | 0.71 (0.44 - 0.98) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) | 0.7 (0.43 - 0.97) |
| 0.4 | 0.73 (0.45 - 1) | 0.72 (0.45 - 0.99) | 0.71 (0.44 - 0.99) | 0.71 (0.43 - 0.98) | 0.7 (0.43 - 0.98) |
| 0.6 | 0.74 (0.46 - 1.02) | 0.73 (0.45 - 1.01) | 0.72 (0.44 - 1) | 0.71 (0.43 - 1) | 0.71 (0.42 - 0.99) |
| 0.8 | 0.75 (0.46 - 1.04) | 0.74 (0.44 - 1.03) | 0.73 (0.44 - 1.02) | 0.72 (0.42 - 1.01) | 0.71 (0.41 - 1) |
| 1 | 0.75 (0.45 - 1.05) | 0.74 (0.43 - 1.05) | 0.73 (0.42 - 1.03) | 0.71 (0.4 - 1.02) | 0.7 (0.39 - 1.01) |

Table 6. Sensitivity parameters and adjusted hazard ratios and corresponding confidence intervals after applying the Ding et al. (2016) method under the scenario with incorrect knowledge of the unmeasured confounder where is the relative risk between the exposure and unmeasured confounder and is the hazard ratio between the unmeasured confounder and outcome

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | | | | |
|  | 0.8 | 0.7 | 0.6 | 0.5 | 0.4 |
|  |  |  |  |  |  |
| 1 | 0.69 (0.53 - 0.9) | 0.69 (0.53 - 0.9) | 0.69 (0.53 - 0.9) | 0.69 (0.53 - 0.9) | 0.69 (0.53 - 0.9) |
| 1.05 | 0.7 (0.53 - 0.91) | 0.7 (0.54 - 0.92) | 0.71 (0.54 - 0.92) | 0.71 (0.55 - 0.93) | 0.73 (0.55 - 0.95) |
| 1.1 | 0.7 (0.54 - 0.92) | 0.71 (0.54 - 0.93) | 0.72 (0.55 - 0.94) | 0.73 (0.56 - 0.96) | 0.76 (0.58 - 0.99) |
| 1.15 | 0.71 (0.54 - 0.92) | 0.72 (0.55 - 0.94) | 0.73 (0.56 - 0.96) | 0.75 (0.58 - 0.99) | 0.79 (0.6 - 1.03) |
| 1.2 | 0.71 (0.54 - 0.93) | 0.73 (0.55 - 0.95) | 0.75 (0.57 - 0.98) | 0.77 (0.59 - 1.01) | 0.81 (0.62 - 1.06) |
| 1.25 | 0.72 (0.55 - 0.94) | 0.73 (0.56 - 0.96) | 0.76 (0.58 - 0.99) | 0.79 (0.6 - 1.03) | 0.84 (0.64 - 1.1) |