

ONLINE SUPPLEMENT

Hazard Versus Linear Probability Difference-In-Differences Estimators for Demographic Processes

This online supplement provides the expression for $dd_{lp(hz)}$ when divorces are governed by the proportional hazard specification in Eq. (3) in the main text. From Eq. (3), $S(u)$ will be given by:

$$\begin{aligned} S(u) = S(t|t_0) &= \exp \left\{ - \int_0^{t-t_0} r_0(s) \exp [b_1 \times g_i + b_2 \times I_i(t) + dd_{hz} \times g_i \times I_i(t)] \right\} ds \\ &= \exp \{-H(t|t_0)\} \end{aligned} \quad (\text{A.1})$$

where

$$H(t|t_0) = \begin{cases} \exp(b_1 \times g_i) H_0(t|t_0) & t < \tau \\ \exp(b_1 \times g_i) H_0(\tau|t_0) + \exp(b_1 \times g_i + b_2 + dd_{hz} \times g_i) H_0(t|\tau) & t \geq \tau \end{cases} \quad (\text{A.2})$$

and

$$H_0(b|a) = \int_a^b r_0(s) ds \quad b \geq a, \quad (\text{A.3})$$

Then plugging Eq. (A.1) into Eq. (12) in the main text yields:

$$\begin{aligned} dd_{lp(hz)} &= \{E[p(g=1, I(t)=1)] - E[p(g=1, I(t)=0)]\} - \\ &\quad \{E[p(g=0, I(t)=1)] - E[p(g=0, I(t)=0)]\} \\ &= \{[S_{g=1}(\tau|t_0) - S_{g=1}(\tau_2|t_0)] - [S_{g=1}(\tau_1|t_0) - S_{g=1}(\tau|t_0)]\} - \\ &\quad \{[S_{g=0}(\tau|t_0) - S_{g=0}(\tau_2|t_0)] - [S_{g=0}(\tau_1|t_0) - S_{g=0}(\tau|t_0)]\} \\ &= \{[2 \times S_{g=1}(\tau|t_0) - S_{g=1}(\tau_1|t_0) - S_{g=1}(\tau_2|t_0)] - \\ &\quad \{[2 \times S_{g=0}(\tau, g=0) - S_{g=0}(\tau_1|t_0) - S_{g=0}(\tau_2|t_0)]\} \\ &= \{2 \times S_{g=1}(\tau|t_0) - 2 \times S_{g=0}(\tau|t_0)\} - \\ &\quad \{S_{g=1}(\tau_1|t_0) - S_{g=0}(\tau_1|t_0)\} - \\ &\quad \{S_{g=1}(\tau_2|t_0) - S_{g=0}(\tau_2|t_0)\} \\ &= \{2 \times \exp[-\exp(b_1) H_0(\tau|t_0)] - 2 \times \exp[-H_0(\tau|t_0)]\} - \\ &\quad \{\exp[-\exp(b_1) H_0(\tau_1|t_0)] - \exp[-H_0(\tau_1|t_0)]\} - \end{aligned}$$

$$\begin{aligned}
& \left\{ \exp[-\exp(b_1)H_0(\tau|t_0) - \exp(b_1 + b_2 + dd_{hz})H_0(\tau_2|\tau)] - \right. \\
& \quad \left. \exp[-H_0(\tau|t_0) - \exp(b_2)H_0(\tau_2|\tau)] \right\} \\
= & \left\{ 2 \times \exp[-\exp(b_1)H_0(\tau|t_0)] - 2 \times \exp[-H_0(\tau|t_0)] \right\} - \\
& \left\{ \exp[-\exp(b_1)H_0(\tau_1|t_0)] - \exp[-H_0(\tau_1|t_0)] \right\} - \\
& \left\{ \exp[-\exp(b_1)H_0(\tau|t_0) - \exp(b_1 + b_2 + dd_{hz})H_0(\tau_2|\tau)] - \right. \\
& \quad \left. \exp[-H_0(\tau|t_0) - \exp(b_2)H_0(\tau_2|\tau)] \right\}. \tag{A.4}
\end{aligned}$$