Preliminary analysis of simultaneous equation model of Health Risk Perceptions for self and family with respect to Chornobyl radiation

Robert A. Yaffee
Silver School of Social Work
New York Univerisity
New York, NY 10003

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1 Chornobyl related health Risk Perception to oneself and one's family

The model considers a reciprocal relationship between the risk perception of Chornobyl related health risk to oneself and that to one's family. There is a linear correlation of 0.832 between these two endogenous variables, suggesting some sort of interaction between them. There is reason to believe that one affects the other, and vice versa. If we add the squared terms to a regression model, the adjusted R^2 increases from 0.69 to 0.97. Because the parameter estimates of the squared terms are about 1/100 the magnitude of the linear term, compared to those of the linear terms, there is evidence of the concavity and convexity of the nonlinear relationship. Both linear and nonlinear terms are significant at the 0.000 level.

Without a controlled experiment, we cannot empirically determine the direction of the relationship. Because of the high intercorrelation between these endogenous variables, we need to guard against simultaneous equation bias and we can do this employing instrumental variables as proxies for the endogenous variables when they are situated on the right-hand side of the equation. The instrumental variables are highly correlated with the variable for which they are substituted as a proxy, whereas they have no appreciable correlation with the error term of the equation if they are to be deemed good or strong instruments. In fact, the correlation with the error is to be so weak that feedback from one equation to the other cannot creep in to generate bias through the residuals over the different waves. If be is indeed the case, then strong exogeneity obtains

between the endogenous variables (radhlw3 and radfmw3) and the variables we use as instruments for them – namely, radhlw2 and radfmw2.

On the right hand side of the radfmw3 equation, whether it be the male equation or the female equation, we have the variables representing a devastating syndrome– depression, anxiety, and PTSD. Depression can undermine the immune system and give rise to somatic effects. In both the male report and the female report, we find that anxiety at wave two, BSI depression at wave three, and PTSD at wave three measured by the Missippi PTSD subscale.

We attempted a validation of these models. We cluster controlled the id for autocorrelation between waves and found that these relationships were supported by the bootstrap resampling with bias correction and acceleration for both male and female models.

Three-stage least-squares regression of male model 70 Equation Obs Parms RMSE "R-sq" chi2 P 70 radhlw3 340 6 20.03441 0.6815 873.16 0.0000 radfmw3 340 7 20.30791 0.6639 817.13 0.0000 70 1364 Coef. Std. Err. z P¿—z— [95% Conf. Interval] 1364 radhlw3 age -.062514 .0950077 -0.66 0.511 -.2487257 .1236977 radfmw2 .8172238 .036333 22.49 0.000 .7460123 .8884352 radchw2 -.0977447 .0370773 -2.64 0.008 -.1704149 -.0250746 radtlw3 .1828247 .0351685 5.20 0.000 .1138957 .2517537 soclifhlthw3 .2142032 .0928286 2.31 0.021 .0322625 .396144 WHPpa .1621446 .0785176 2.07 0.039 .008253 .3160362 $_cons$−2.5338374.691259−0.540.589−11.728546.6608621364$radfmw3radhlw2$.6838665.035107919.480.000.6150563.7526768$carcin$.153353 .27204711.305665$MiPTSD$.2444217.1243061.970.049.0007864.488057$anxagw1$.0022808.03381410.070.946−.0639937.0685553$illw2$6.3828451.8817023.390.0012.69477710.07091$_cons$−10.736195.212721−2.060.039−20.95293−.51944371364$Endogenousvariables$: $radhlw3radfmw3Exogenousvariables$: $ageradfmw2radchw2radtlw3soclifhlthw3WHPparadhlw2carcininjothrBSIdepMiPTSDanxagw1illw2$78