ECON 60303
Local Average Treatment Effect
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Spring 2013

Equation of interest

(1) $y_i = \alpha + x_i\beta + \varepsilon_i$

In this case, let y be earnings and x be a dummy that indicates Vietnam era service in the military. We anticipate at the start that $E[x_i\varepsilon_i] \neq 0$ but we have an instrument z_i such that $E[z_i\varepsilon_i] = 0$. Let z_i be a dummy variable that equals 1 or 0. In this instance, let z_i be 1 if the person was drafted and 0 otherwise.

Since z is dichotomous and we have a bivariate model, we know the IV estimate can be described by the Wald estimate

(2) $\hat{\beta} = \dfrac{\overline{y} \mid z_i = 1 \quad - \quad \overline{y} \mid z_i = 0}{\overline{x} \mid z_i = 1 \quad - \quad \overline{x} \mid z_i = 0} = \dfrac{\overline{y}_1 - \overline{y}_0}{\overline{x}_1 - \overline{x}_0}$

Terms:

$y_i(z_i, x_i) =$ the value of y given z and x

$x_i(z_i) =$ the value of x given z

Key assumption: Monotonicity $x_i(1) \geq x_i(0)$

		Z_i=0	
		X_i=0	X_i=1
Z_i=1	X_i=0	Never takers $x_i(1) - x_i(0) = 0$ $y_i(1,0) - y_i(0,0) = 0$	Empty cell – given monotonicity, no one will enter military because they were not drafted
	X_i=1	Compliers $x_i(1) - x_i(0) > 0$ $y_i(1,1) - y_i(0,0) = \Delta$	Never takers $x_i(1) - x_i(0) = 0$ $y_i(1,1) - y_i(0,1) = 0$

The value of the denominator in the Wald estimate is generated by a regression of x on z. In this case ,the value is determined by how many people change their behavior *because* they received a low draft lottery number – the compliers. Some people will always volunteer – other will never go to the military – for these groups, their behavior has not changed.

Therefore, since only the compliers are altering their behavior, this group can only have different outcomes as a result of receiving treatment. 2SLS estimates are local average treatment effects. They represent the impact of x on y for people whose behavior is altered by the receipt of instrument z.