1 Simple Half-page Example

Algebraically, you have the estimated structural equations

\[ Y = .24X + ... \]
\[ Z = .1X + .022Y + ... \]

Without knowing more about the structure, it’s not possible to tell whether the 2SLS coefficient estimates above consistently estimate the effects postulated. The choice between OLS and 2SLS is crucially dependent on that structure and is not a matter of indifference.

But suppose 2SLS is the appropriate estimator. Then the coefficient estimates are estimates of the ceteris paribus direct effects of the corresponding variables. Assuming that the only indirect channel for \( X \) to affect \( Z \) is through \( Y \), an estimate of the full (direct plus indirect) effect of \( X \) on \( Z \) (your effect of interest) can be read off the equation that economists call the "reduced form," obtained by substitution. The reduced form estimate implied by the 2SLS estimates is

\[ Z = .1X + .022Y + ... \]
\[ = .1X + .022(.24X + ...) + ... \]
\[ = (.1 + .022 \cdot .24)X + ... \]
\[ = .10528X + ... \]

A one unit change in \( X \) causes an estimated .10528 unit change in \( Z \), accounting for both direct and indirect effects.

The only relevant conditional expectation here is \( E(Z \mid X) \), assuming now that there are no other relevant variables and that \( E(Z \mid X) \) is linear in \( X \). Then

\[ E(Z \mid X) = a^*X, \]

where \( a^* \) is the regression coefficient. In this case, the conditional expectation encodes the full structural effect. The other conditional expectations you mentioned are not germane. The estimate of \( a^* \) implied by 2SLS is .10528.

I hope this is helpful.