

# **A Graphical Approach to the Roy Model**

## **Applied Microeconomics**

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# Setup

- Roy model with

$$S = \mathbb{I}[P[S = 1|Z = 1] \leq U]$$

- Marginal treatment responses:

$$E[Y(S = 0, \omega)|U = u] = \alpha_0 + \gamma_0 \cdot (J(u) - E[J(U)])$$

$$E[Y(S = 1, \omega)|U = u] = \alpha_1 + \gamma_1 \cdot (J(u) - E[J(U)])$$

# Binary instrument

- For observed  $Z, S, Y$ , the above implies:

$$E[Y(\omega)|S = 0, Z] = \alpha_0 + \gamma_0 \cdot E[(J(u) - E[J(U)] | U > P(S = 1|Z))]$$

$$E[Y(\omega)|S = 1, Z] = \alpha_1 + \gamma_1 \cdot E[(J(u) - E[J(U)] | U \leq P(S = 1|Z))]$$

- Can do this for two values of  $Z$ .
- Assume two-sided non-compliance, s.t.

$$0 < P[S = 1|Z = 0] < P[S = 1|Z = 1] < 1$$