

# A Fully Identified Model

## Structural Form

$$\begin{aligned} \text{Demand :} & \quad q_t = \alpha_1 p_t + \alpha_2 x_t + \epsilon_{dt} \\ \text{Supply:} & \quad q_t = \beta_1 p_t + \beta_2 w_t + \epsilon_{st} \end{aligned}$$

## Reduced Form

$$p_t = \frac{\alpha_2 x_t}{\beta_1 - \alpha_1} + \frac{\beta_2 w_t}{\beta_1 - \alpha_1} + \frac{\epsilon_{dt} - \epsilon_{st}}{\beta_1 - \alpha_1} = \pi_1 x_t + \pi_3 w_t + v_{1t}$$

$$q_t = \frac{\beta_1 \alpha_2 x_t}{\beta_1 - \alpha_1} + \frac{\alpha_1 \beta_2 w_t}{\beta_1 - \alpha_1} + \frac{\beta_1 \epsilon_{dt} - \alpha_1 \epsilon_{st}}{\beta_1 - \alpha_1} = \pi_2 x_t + \pi_4 w_t + v_{2t}$$

$$\beta_1 = \frac{\pi_2}{\pi_1} \quad \alpha_1 = \frac{\pi_4}{\pi_3} \quad \alpha_2 = \pi_1(\beta_1 - \alpha_1) \quad \beta_2 = \pi_3(\beta_1 - \alpha_1)$$

# A Partially Identified Model

## Structural Form

$$\text{Demand : } q_t = \alpha_1 p_t + \alpha_2 x_t + \epsilon_{dt}$$

$$\text{Supply: } q_t = \beta_1 p_t + \epsilon_{st}$$

## Reduced Form

$$p_t = \frac{\alpha_2 x_t}{\beta_1 - \alpha_1} + \frac{\epsilon_{dt} - \epsilon_{st}}{\beta_1 - \alpha_1} = \pi_1 x_t + v_{1t}$$

$$q_t = \frac{\beta_1 \alpha_2 x_t}{\beta_1 - \alpha_1} + \frac{\beta_1 \epsilon_{dt} - \alpha_1 \epsilon_{st}}{\beta_1 - \alpha_1} = \pi_2 x_t + v_{2t}$$

$$\beta_1 = \frac{\pi_2}{\pi_1} \quad \alpha_1 = ? \quad \alpha_2 = ?$$

# An Unidentified Model

## Structural Form

$$\text{Demand : } q_t = \alpha_1 p_t + \alpha_2 x_t + \epsilon_{dt}$$

$$\text{Supply: } q_t = \beta_1 p_t + \beta_2 x_t + \epsilon_{st}$$

## Reduced Form

$$p_t = \frac{\alpha_2 x_t}{\beta_1 - \alpha_1} + \frac{\beta_2 x_t}{\beta_1 - \alpha_1} + \frac{\epsilon_{dt} - \epsilon_{st}}{\beta_1 - \alpha_1} = \pi_1 x_t + v_{1t}$$

$$q_t = \frac{\beta_1 \alpha_2 x_t}{\beta_1 - \alpha_1} + \frac{\alpha_1 \beta_2 x_t}{\beta_1 - \alpha_1} + \frac{\beta_1 \epsilon_{dt} - \alpha_1 \epsilon_{st}}{\beta_1 - \alpha_1} = \pi_2 x_t + v_{2t}$$

$$\beta_1 = ? \quad \alpha_1 = ? \quad \alpha_2 = ? \quad \beta_2 = ?$$

# Another Unidentified Model

## Structural Form

Demand :  $q_t = \alpha_1 p_t + \epsilon_{dt}$

Supply:  $q_t = \beta_1 p_t + \epsilon_{st}$

## Reduced Form

$$p_t = \frac{\epsilon_{dt} - \epsilon_{st}}{\beta_1 - \alpha_1} = v_{1t}$$

$$q_t = \frac{\beta_1 \epsilon_{dt} - \alpha_1 \epsilon_{st}}{\beta_1 - \alpha_1} = v_{2t}$$

$$\beta_1 = ? \quad \alpha_1 = ? \quad \alpha_2 = ? \quad \beta_2 = ?$$

# An Overidentified Equation

## Structural Form

$$\begin{aligned} \text{Demand :} & \quad q_t = \alpha_1 p_t + \alpha_2 x_t + \alpha_3 p'_t + \epsilon_{dt} \\ \text{Supply:} & \quad q_t = \beta_1 p_t + \epsilon_{st} \end{aligned}$$

## Reduced Form

$$p_t = \frac{\alpha_2 x_t}{\beta_1 - \alpha_1} + \frac{\alpha_3 p'_t}{\beta_1 - \alpha_1} + \frac{\epsilon_{dt} - \epsilon_{st}}{\beta_1 - \alpha_1} = \pi_1 x_t + \pi_3 p'_t + v_{1t}$$

$$q_t = \frac{\beta_1 \alpha_2 x_t}{\beta_1 - \alpha_1} + \frac{\beta_1 \alpha_3 p'_t}{\beta_1 - \alpha_1} + \frac{\beta_1 \epsilon_{dt} - \alpha_1 \epsilon_{st}}{\beta_1 - \alpha_1} = \pi_2 x_t + \pi_4 p'_t + v_{2t}$$

$$\beta_1 = \frac{\pi_2}{\pi_1} \quad \beta_1 = \frac{\pi_4}{\pi_3} \quad \alpha_1 = ? \quad \alpha_2 = ? \quad \alpha_3 = ?$$