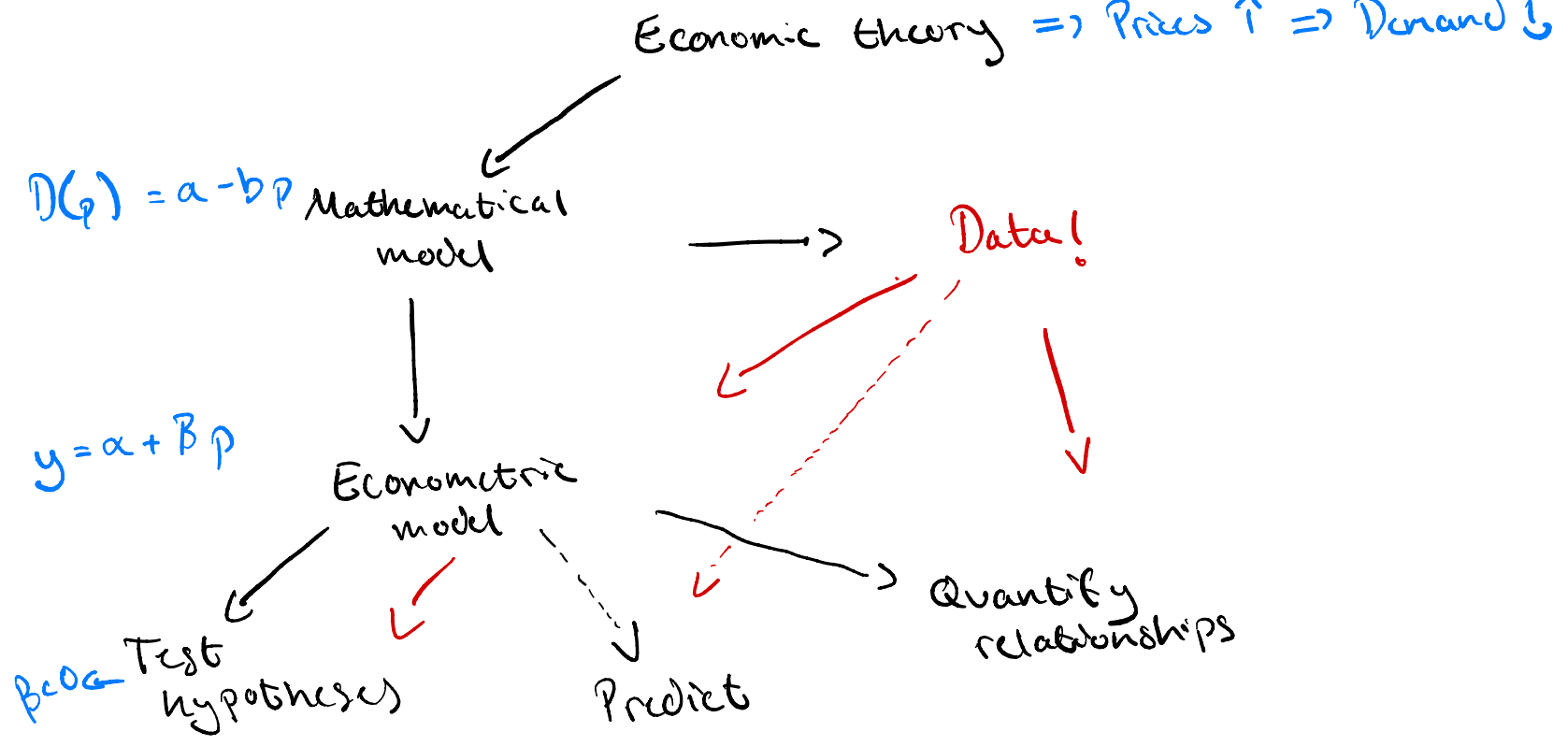
Why econometrics?
(What is)

Law of demand:



Causality:

$x \rightarrow y$:

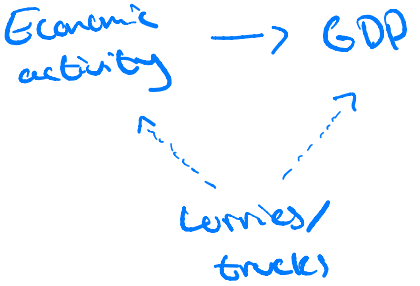
- Assuming a direction
- Assuming temporality

$\Rightarrow$ x affects y, but not the other way around.

↳ Ceteris paribus

$\Rightarrow$ Everything else equal.

GDP Prediction:



Randomized Controlled Trials (RCT's): Gold standard

- Test whether a treatment (x) affects health (y)

The process:

- Draw a random sample from the population (T)
  - Split into two groups: t_0 and t_1
  - t_1 is treated ($x=1$), t_0 is a control ($x=0$)

Causal effect of x:

$$\delta = E[y \mid x=1] - E[y \mid x=0]$$

The aim of (most) econometrics is to correctly identify the causal effect δ.

In practice:

$$y = \alpha + \delta x + u$$

Randomization ensures:

$$E[u|x] = 0$$

Example: Returns to education on wages.

1. What is the causal relationship of interest?

- How does a marginal change in education (x) affect wages (w)?

2. What is the ideal experiment that would capture the effect of x on w?

- Randomly assign education and measure the difference in wages.
  ⟹ We can measure the difference in average wages.

3. What is the relevant identification strategy?

We need randomization: $E[u|x] = 0$

↳ Not feasible in practice!

- We cannot ensure randomization because things like experience also affect your expected wages!