

Signaling Model

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1 Education as a Signal

2 Correlation and Causality

Education as a Signal

- Michael Spence (1973), “Job Market Signaling,” Quarterly Journal of Economics, 87:3, 355-74.
- Two types of workers, one with productivity 1, the other with productivity 2.
- Employers **can not** distinguish the types.
- Schooling **does not** change productivity.

Figure 9.7: The Benefits to Workers of Educational Signaling

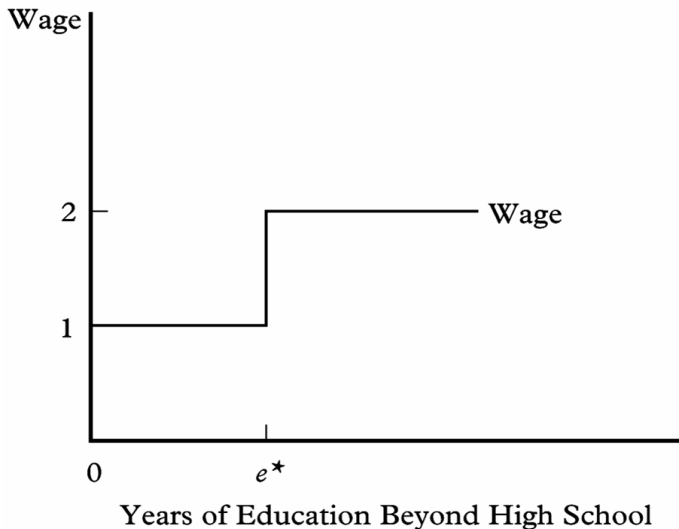


Figure 9.8: The Lifetime Benefits and Costs of Educational Signaling

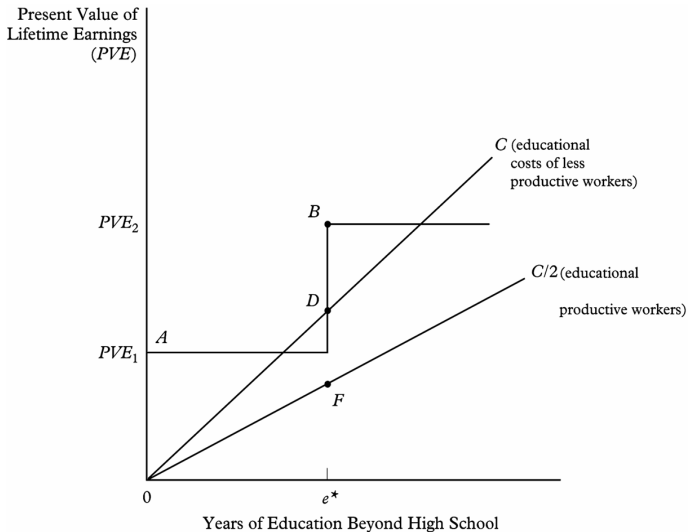
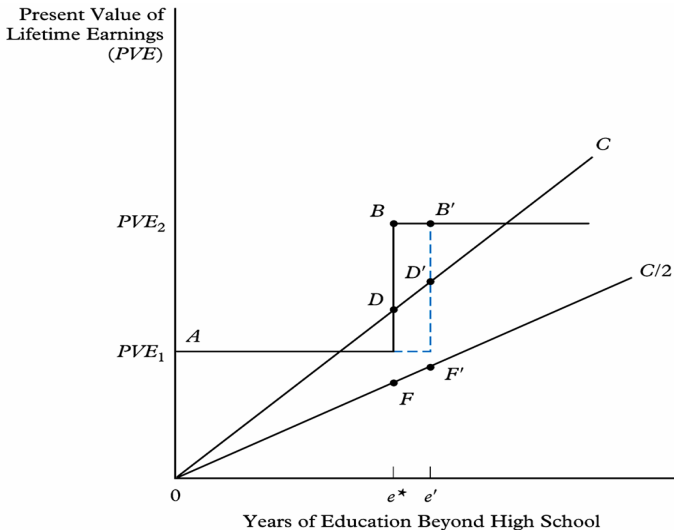


Figure 9.9: Requiring a Greater Signal May Have Costs Without Benefits



Human Capital or Signal?

- If education is only a signal, why do employers in the competitive market not notice?
- If education increases human capital, but not a signal, then why does “sheepskin effect” (the effect of a diploma) exist?

Empirical Issues

- Returns to education and **endogeneity**.
- How to control for unobserved characteristics such as ability?
 - Panel data.
 - Twins.
 - IVs: birth quarter, compulsory education (Indonesia, Taiwan).

Correlation and Causality

Correlation (相關性) does not necessarily imply causality (因果關係).

- How to correctly estimate the effect of college education on earnings?
- 理論上, 我們要測量同一個人大學畢業之後和沒有念大學(即只有高中畢業)時的薪資差異。
- 問題是, 一個人只會屬於 (1) 讀了大學或 (2) 沒有讀大學, 這兩種狀態的其中一種。

- 資料上, 我們只能得到 (1) 讀了大學的一群人和 (2) 沒有讀大學的一群人的薪資資料, 只能比較這兩群人平均薪資的差異。
- 由於能否讀大學和個人能力正相關, 這兩群人平均薪資的差異高估了讀大學的效果。
- 理想上, 如果讀大學與否是個隨機決定的結果, 那麼這兩群人平均薪資的差異就是讀大學的效果。

相關性不表示因果關係的例子。

- 怡君比較會考試?
- 教育程度較高者, 身體較健康, 壽命較長。
- 2004年總統選舉廢票率和陳水扁得票率成正相關, 是作票的結果?
- 考前一天越用功, 考試成績越差。
- 警力和治安成負相關, 警察越多的地方, 治安越差。
- 研究發現: 養貓舒緩壓力, 可降低中風心臟病機率。
- 高相關性很容易存在, 因果關係的證明較困難。

以迴歸分析的語彙來說,

$$Y_i = \beta_0 + \beta_1 X_i + u_i$$

上述問題的 X_i 都是內生的, 都和誤差項 u_i 相關, 即 $\text{Cov}(X_i, u_i) \neq 0$.