

個體經濟學原理——課堂實驗(六)：污染排放權市場(Tradable Permit Market)  
Principles of Microeconomics I - Classroom Experiment (6): Tradable Permit Market

三人一組參與交易實驗，每組代表一家工廠，每個市場有三十家工廠。每回合各組會拿到一張有數字的撲克牌(J=11, Q=12, K=13, 但 A=1, 而大鬼=15, 小鬼=14), 牌面數字乘以十代表您減少一噸碳排放所需花費的減碳成本(元)。因此如果你拿到黑桃九, 你的減碳成本就是 90 元。請將牌面花色數字保密。Form groups of 3 to act as factories in markets of 30 groups. In each round, each group will receive a card (A=1, J=11, Q=12, K=13, but Small Joker = 14, Big Joker = 15). The number of your card **multiplied by 10** is your cost for reducing one ton of carbon emission: If your card is 9, your cost is 90. Please keep your card as a secret.

實驗者扮演政府的角色分配碳排放的污染排放權執照。分配方式有：(請仔細聽每回合說明)

- (1) 隨機發放，並開放碳排放市場讓大家自由談判買賣污染排放權，
- (2) 通通有獎，但由政府用密封拍賣買回半數執照，或
- (3) 拍賣執照，以荷蘭式拍賣進行。

The experimenter acts as the government and distributes tradable permits for carbon emission. Permits are distributed either: (announced at the beginning of each round)

- (1) randomly with a tradable permit market where you can trade via free-form bargaining,
- (2) to all with a sealed-bid auction to buy back half of them, or
- (3) through a Dutch auction.

自由談判(Free-Form Bargaining)：你們有三分鐘的時間自由個別談判，談判時不能強迫、不能給對方看你的牌面數字，申報之後亦不能反悔。如果兩組達成協議，請一起到前面來跟實驗者申報交易。You have three minutes to bargain. Bargaining is voluntary, but you cannot (1) Coerce, (2) Show your card, or (3) Reverse a trade once reported. If you reach a deal, please come to the front together to report the trade.

密封投標(Sealed Bid Auction)：政府決定採用密封式投標的方式買回半數(N/2)執照——每組寫下組別及願意出售的金額，統一交出後，政府會以第 16 (N/2+1)低的金額向前 15 (N/2)低的工廠買入執照。The gov't buys back half (N/2) of the licenses through a sealed bid auction where groups submit sealed bids of willingness-to-accept (+group #) and the highest 15 (N/2) bids win getting paid the 16<sup>th</sup> (N/2+1) bid.

荷蘭式拍賣(Dutch Auction)：政府決定採用荷蘭式拍賣的方式拍賣半數(N/2)執照——價格將由 130 元向下減，每 0.5 秒減 1 元。各組認為價格可接受的話請派代表起立，當有 15 (N/2)組表達購買意願時計數停止，並以計數停止時之數值作為拍賣價格。The gov't sells half (N/2) of the licenses through a Dutch auction where the price clock starts at \$130 and drops by \$1 every 0.5 second. Each group should as a representative to rise if price is acceptable; the clock stops when 15 (N/2) people rise and you buy at that price.

成交雙方請帶著撲克牌和紀錄表到前面來申報交易；實驗者會在黑板上記錄交易價格。Please **come to the front with your record sheet and card** to report the trade; transactions are recorded on the blackboard.

碳排放市場休市後，沒有持有執照的工廠必須負擔減少一噸碳排放的減碳成本(牌面數字乘以十)，擁有執照的工廠則不必付出減碳成本。因此，獲政府發放執照的工廠可以選擇把執照留下來自己使用(不負擔減碳成本)，或把執照出售牟利、自己另外付出減碳成本。其他廠商則必須在購買執照與負擔減碳成本之間抉擇。After the market closes, factories with permits can emit one ton of carbon at no cost, the other factories pay the pollution reduction cost (**your number multiplied by 10**). Hence, factories starting with permits can either keep them (pay no reduction cost), or sell their permits for a profit (pay the cost). The other firms choose to buy permits or pay the cost.

利潤記錄與結算：如果您最後沒有成交或放棄交易，請到前面繳回撲克牌。請在記錄表上填入牌面數字，並計算減碳成本。您該回合的利潤是起始資金 150 元減去減碳成本(如果未持有執照)，有成交的話，要再減去購買執照所付出的價格(或加上賣出執照所獲得的價金)。最後的總利潤除以 100 則是您所獲得的分數。分數越高，成績越高。Profit Calculation: If you eventually did not trade (or want to give up), please come to the front and return your card. Please record your number and calculate the reduction cost. Your profit is your endowment (=150) minus pollution reduction cost (if hold no permit), and, if trade, minus/add the price you paid/earned. Total profit divided by 100 will be your grade for this experiment.

污染排放權市場實驗紀錄表 Record Sheet for “Tradable Permit Market”  
 Name Major/Year Student ID

姓名：\_\_\_\_\_ 系級：\_\_\_\_\_ 學號：\_\_\_\_\_

回合 Round	執照發放方式 Distribution of Permits	起始 資金 Endow- ment	牌面 數字 Number on Card	我的減廢 成本 Reduction Cost	買賣執照 的價格 Price of Permit	本回合 利潤 Profit of Round	備註 Memo
1	隨機發放(自由談判) Random Distribution	150					
2	通通有獎：工廠有 碳排放的權利 Buy-back: Factories Have Pollution Rights	150					
3	政府拍賣：人民有不 受污染的權利 Auction - Residents Have Pollution Rights	150					
4	政府拍賣：所有工廠 併為兩家公司 Auction - Factories form two large firms	150					(有時間才進行) (Optional)
5	政府拍賣：所有工廠 併為一家公司 Auction - Factories form one large firm	150					(有時間才進行) (Optional)

**特別規則：**當不同工廠合併為一家公司時，對應的各組將一起組成董事會做決定，但公司轄下每間工廠的減碳成本仍取決於各組牌面數字。如果執照不敷使用，董事會必須決定哪些工廠使用排放執照，哪些工廠負擔減碳成本，但是公司獲利/成本由各組平均分攤。**Special rule:** When factories merge into a large firm, corresponding groups merge to form the Board of Directors and make decisions collectively. Each factory has a pollution reduction cost as before, and the Board decides which factory should use the permits and which pay the reduction cost. Total profit is evenly shared across all groups.

Answer the following questions 回答下列問題：

- How does property rights allocation affect bidding and prices? 產權歸屬如何影響喊價情形與價格？
- How does mergers affect bidding and equilibrium price? 廠商合併如何影響喊價情形與價格？