經濟學原理一課堂實驗(六)：污染排放權市場(Tradable Permit Market)
Principles of Economics I - Classroom Experiment (6): Tradable Permit Market

我們將選出六十位同學參與實驗，三人一組，每組同學代表一家工廠。每組同學會拿到一張有數字的撲克牌(J=11，，Q=12，K=13，但 A=1)，牌面數字**乘以十再加上一**代表您防治污染一單位所需花費的減廢成本(元)。請收好這張牌使得別人都沒辦法看到牌上的花色數字。Sixty students will form 20 groups, each representing one factory. Each group will receive a card (J=11, Q=12, K=13, A=1). The number of your card **multiplied by 10 and plus 1** is your pollution reduction cost. For example, if your card is 9, the pollution reduction cost is 9×10+1 = 91. Please store your card properly so no one can peek.

實驗者扮演政府的角色，發放污染排放權執照。發放方式有隨機發放、通通有獎、政府拍賣等等，請仔細聽每回合的說明。在發放過程取得執照的廠商會附贈工研院開發的特殊減廢技術，使得您的防治污染成本**減去二**，因此，獲得發放的廠商，其減廢成本為牌面數字**乘以十再減去一**。
The experimenter represents the government and issues permits to pollute. Permits are distributed either randomly, evenly (everyone gets one), or through an auction. The experimenter will announce the distribution rule at the beginning of each round. Firms who receive permits will also receive special technology that will **lower your pollution reduction cost by $2**. Hence, the total pollution reduction cost for those who receive permits directly from the government is the number of your card **multiplied by 10 and minus 1**. For example, if your card is 9, your pollution reduction cost is 9×10-1 = 89.

發放完成後，實驗者會開放污染權市場讓各工廠有機會買賣污染排放權執照。交易方式如下：After distributing the permits, the experimenter will allow firms to trade their permits using the following rules:

一般交易規則：實驗者充當交易員，聽取買賣雙方舉手喊價：「X 元買進」或「Y 元賣出」，並紀錄在黑板上。如果有買家或賣家願意接受另一方的喊價，則喊「成交」。成交雙方則帶著紀錄表到前面來向實驗者申報繳交撲克牌。每次成交後再重新開始下一單位的喊價。The experimenter acts as the specialist taking orders from both sides ("buy $X" or "sell $Y") and recording them on the blackboard. If you want to accept the other side's standing offer, simply shout "take" and come to the front (with your record sheet) to report your trade and return your card.

交易結束後，最後擁有執照的工廠可以排放一單位的廢水，其他工廠則必須付出防治一單位廢水的減廢成本(牌面數字**乘以十再加上或減去一**)。因此，在發放過程中得到執照的工廠可以選擇把執照留下來自己使用(不負擔減廢成本)，或者是把執照出售牟利，自己另外付出減廢成本。其他廠商則必須在買下執照與付出減廢成本之間抉擇。After the market closes, factories with permits are allowed to emit pollution (no cost), other factories pay the pollution reduction cost (**your number multiplied by 10 and plus/minus 1**). Hence, factories with permits can keep their permits (and save the reduction cost), or sell their permits for profit (and pay the reduction cost). Other firms choose to buy permits or pay the cost.

利潤記錄與結算：每回合結束後，請在記錄表上填入牌面數字、減廢成本和買賣價格(如果有成交)，並計算該回合的付出。您的付出加上實驗者致贈的 130 元，就是您該回合的利潤。算好後請至前面由實驗者核對並繳回撲克牌。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: After each round, please record your number, reduction cost and transaction price. Your profit for this round is 130 minus your pollution reduction cost. Total profit divided by 100 will be your grade for this experiment.

特別規則：當工廠合併為一家公司時，同一家公司的同學必須組成董事會做出共同決定，但該公司轄下每間工廠的減廢成本仍如每位同學牌面數字所述。董事會必須決定哪些工廠使用排放執照，哪些工廠付出減廢成本，但是公司的總或付出由每位同學平均分攤。
Special rule: When several factories form a large firm, students from all factories jointly form the Board of Directors to make decisions collectively. Each factory has the same pollution reduction cost as before, and the Board decides which factory should use the permits and which pay the reduction cost. However, total profit of the firm is evenly shared by all factories.

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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：_____		
姓名：_____		系級：_____		學號：_____		
姓名：_____		系級：_____		學號：_____		

回合 Round	執照發放方式 Distribution of Permits	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 Random Distribution					實驗者致贈 130 元 $130 is given
2	隨機發放 Random Distribution					實驗者致贈 130 元 $130 is given
3	通通有獎：工廠有排放廢水的權利 Factories Have Pollution Rights					實驗者致贈 130 元 $130 is given
4	政府拍賣：人民有不受污染的權利 Auction - Residents have Pollution Rights					實驗者致贈 130 元 $130 is given
5	政府拍賣：所有工廠併為兩家公司 Auction – Factories form two large firms					實驗者致贈 130 元 $130 is given
6	政府拍賣：所有工廠併為一家公司 Auction - Factories form one large firm					實驗者致贈 130 元 $130 is given

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污染排放權市場實驗觀察紀錄表 Observation Record Sheet for "Tradable Permit Market"

| | Name | | | | Student ID |
| | Major/Year | | | | |

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

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

回合 Round	交易規則 Trading Rule	初始價格 Initial Price	中間價格 Intermediate Prices	收盤價格 Final Price	雙方喊價情形 Bidding Observations
1	隨機發放 Random Distribution				
2	隨機發放 Random Distribution				
3	通通有獎：工廠有排放廢水的權利 Factories Have Pollution Rights				
4	政府拍賣：人民有不受污染的權利 Auction - Residents have Pollution Rights				
5	政府拍賣：所有工廠併為兩家公司 Auction – Factories form two large firms				
6	政府拍賣：所有工廠併為一家公司 Auction - Factories form one large firm				

Answer the following questions 回答下列問題：

1. How does allocation of property rights affect bidding and equilibrium prices? 產權歸屬如何影響喊價情形與價格？

2. How does mergers affect bidding and equilibrium prices? What about mergers? 廠商合併如何影響喊價情形與價格？