

A simple market game (to illustrate the relevance of strategic actions)

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There are 7 firms in a potential pollution permit market. Only the firm itself knows its own marginal abatement cost function, $MAC_i(m_i)$. Each firm's initial emission level is m_i^o , and each firm is freely given pollution permits that is half of its initial emission level, i.e., $m_i = \frac{1}{2}m_i^o$. Before the tradable permit market was introduced, total emissions, $M^o = \sum_i m_i^o = 608$. The benefits from emissions reductions are not known, but the politicians have firmly decided to cut emissions to half of the initial amount. The initial marginal abatement cost functions are all of the format $MAC(m_i) = (m_i^o - m_i) / \sqrt{m_i^o}$.

Purpose of exercise: Show that because (at least some of) the firms have different marginal abatement cost functions, there are potential gains to be made from trade. This will be manifested by trade starting despite no starting price from the regulator.

Extra: By making an investment of $m_i^o \sqrt{m_i^o}$ firms can get the new marginal abatement cost function $MAC_{new}(m_i) = \frac{1}{2} (m_i^o - m_i) / \sqrt{m_i^o}$. Firms can borrow at the market interest rate r' . Is this investment profitable? Explain why it is more profitable for some firms than others. [this is not part is not to be done in the standard class room exercise]