Challenge Case

Competing E-book Standards

Amazon's Kindle was the first successful entrant into the e-book reader market, but it now has a variety of competitors. Not all e-book readers use the same format for books. The current best-selling product, Amazon's Kindle, uses Amazon's proprietary AZW format.
Amazon does not support the open-standard EPUB format,
which is used by the Kindle's competitors such
as Barnes & Noble's NOOK, Sony's Reader, and Apple's iPad. Amazon provides applications that allow consumers to read AZW books on the iPhone (and slightly less successfully on the iPad) as well as on Windows PCs.

If e-book readers' formats differ, e-book publishers must incur additional expenses in producing books for the various formats or sell books that can be read on only some readers, which affects consumers' costs and the practicality of using a given reader. **What role did Amazon's early entry play in determining the standards used? How might the outcome have been different if the firms had chosen standards simultaneously?**

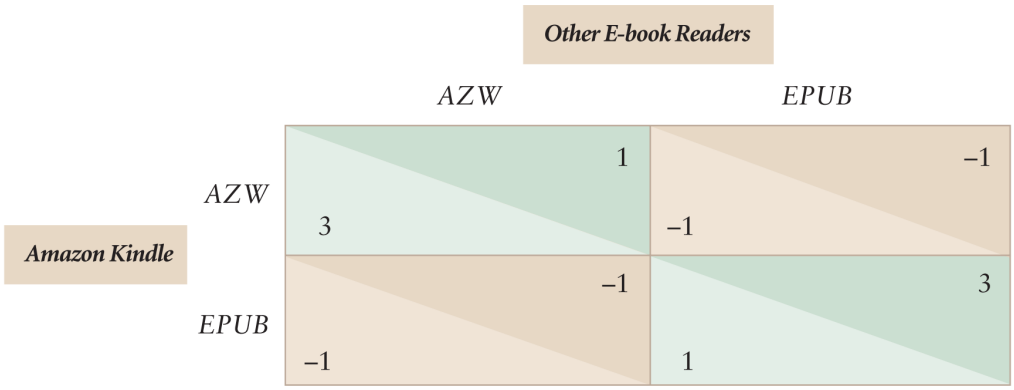
Amazon的Kindle使用AZW系統格式，其他對手則使用EPUB格式。
請問Amazon先進入市場，是否具有優勢而能影響到標準的使用選擇呢？　　假如Amazon和競爭對手同時進入市場，情況是否有變？

Challenge Solutions

We can use all the methods that we've covered in this chapter to analyze the Challenge questions posed at the beginning of the chapter about a game where e-book reader manufacturers choose e-book standards. We'll start by answering the question about the outcome **if firms had engaged in a simultaneous-move game, where firms may use pure or mixed strategies.** We'll then address the question about the outcome given that **Amazon entered the market first so it choose its standard before other firms using a sequential-move game, where we'll solve for the subgame perfect Nash equilibrium.**

- 同時出招的靜態賽局，用NE與混合策略均衡分析之。
- 先後出招的動態賽局，用SPNE分析之。

Consider a simplified simultaneous-move game with two players, Amazon and the group of all other firms (Other group), that choose between two standards, Amazon's AZW and the open-source EPUB. Depending on the payoffs in the normal-form game, it is possible that only one standard and one group of firms survives in the Nash equilibrium. Another possibility is that the firms adopt a single standard (like the universally used MP3 standard for digital music players). Suppose that the payoff matrix is



If the firms move simultaneously and can choose either standard, is a pure-strategy equilibrium possible? In the table, we add light-green triangles for Amazon and dark-green triangles for the Other group to the relevant cells in the payoff matrix to indicate the best responses to its rival's strategy. **The game has two Nash equilibria in which Amazon and the other manufacturers choose the same standard. If both choose the AZW standard, neither Amazon nor the Other group would change its strategy if it knew that its rival was using the AZW standard.**
The Other group's profit falls from 1 to - 1 if it changes its strategy from the AZW to the EPUB standard, whereas Amazon's profit falls from 3 to - 1 if it makes that change. Similarly, no firm would change its strategy from the EPUB standard if it believed that the Other group would use the EPUB standard.

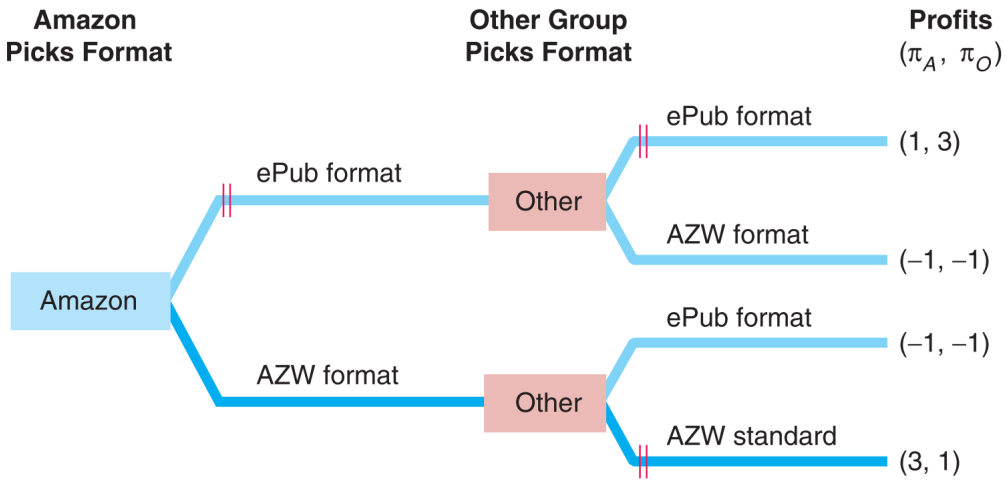
- NE納許均衡為(AZW,AZW)與(EPUB, EPUB)。

What are the mixed-strategy equilibria? If the Other group chooses the AZW standard with a probability of θ_0, Amazon's expected profit is$(3 * \theta_0) + (-1 * [1 - \theta_0]) = 4\theta_0 - 1$ if it chooses the AZW standard and $(-1 * \theta_0) + (1 * [1 - \theta_0]) = 1 - 2\theta_0$ if it chooses the EPUB standard. For Amazon to be indifferent between these two actions, its expected profits must be equal: $4\theta_0 - 1 = 1 - 2\theta_0$. That is, **if $\theta_0 = 1/3$, Amazon is indifferent between choosing either standard.** Similarly, **if Amazon selects the AZW standard with a probability of $\theta_A = 2/3$, the Other group is indifferent between choosing either of the two standards.**

混和策略均衡：

- 對手則以$\theta_0 = 1/3$的機率出AZW，2/3的機率出EPUB。
- Amzon以$\theta_A = 2/3$的機率出AZW、1/3的機率出EPUB。

Finally, we consider what happens if Amazon acts first (which is what actually happened).The figure shows the extensive-form diagram given that Amazon moved first and then the Other group moved.



- Amazon先出招的動態賽局

The figure assumes that the Other group could choose to adopt either the AZW or EPUB format. **If Amazon initially choose the AZW standard, then the Other group would choose the AZW standard** because its profit, π_0, would be higher (1) than if it chose EPUB (-1). Similarly, **if Amazon initially choose the EPUB standard, so would the Other group.** Because Amazon's profit, π_A, would be greater if it chose the AZW standard (3) than if it choose the EPUB standard (1), it prefers the AZW standard. Thus, **with a first-mover advantage, Amazon chose the AZW standard, which the Other group would accept.**

- SPNE子賽局完美均衡：Amazon選AZW，其他選AZW，有先動優勢。

However, this analysis does not fully correspond to reality. We have assumed that other firms could use the AZW standard if they wanted. So far, Amazon has only been willing to let its AZW standard be used on Apple iPhones and iPads. Given its head start, Amazon may hope that it can drive the other e-reader firms out of business by not allowing them to use the AZW standard.