Strategy Simulation: Competitive Dynamics and Wintel

Instructions and FAQs

Play of the Wintel Game follows a sequence of decisions by two complementary companies: Intel Corporation and Microsoft Corporation. The game concerns only the market for “Wintel” PCs, which are comprised of one Intel CPU and one Microsoft OS. In each round of the game, Intel must decide (1) whether to release a new version of its microprocessor, and (2) where to price it. Similarly, Microsoft must decide (1) whether to release a new version of its operating system, and (2) where to price it. At the beginning of the game, both companies have released version one of their products. Subsequent releases increase versions to two, three, etc.

You will be assigned to be either Intel or Microsoft. During class, multiple, independent games are played at the same time. The identity of your competitor will remain secret until the end of the game.

How is the game won?

The object for each company is to maximize its cumulative profit, which is displayed in the Values section on the top right corner of the screen. Companies compete against their opponents, but they also compete against other players representing the same company. At the end of the session, the instructor will be able to determine which of the Microsoft players and which of the Intel players earned the highest cumulative profits.

How is cumulative profit calculated?

Cumulative profit is the sum of profits earned in each round, discounted by the rate displayed at the upper right of the screen in the Values area. So, for example, if the discount rate is 2.0%, and 12 rounds have been played, the cumulative profit would be:

$$\pi_{\text{cum}} = \sum_{i=1}^{12} \frac{\pi_i}{(1.0125)^{12-i}}$$

where $\pi_{\text{cum}}$ is the cumulative profit and $\pi_i$ is the profit in round $i$.

Students can set the price of their company’s products. What information do we have about costs?

Marginal costs for Microsoft are $0. Intel’s marginal cost per microprocessor appears at the upper right of the screen in the Values area (note that these values may differ from the values in your simulation depending on the configuration chosen by your instructor).
Are any costs incurred by releasing a new product?
Yes. The cost incurred by releasing a new product is displayed at the upper right of the screen in the Values area. Initially, release costs are the same for both companies. Release costs increase for each team by the same predetermined percentage each time a new version is released. So, for example, if the increase in release costs are 10% and Microsoft has released three new versions of its operating system—they are currently selling version four—and Intel has released two new versions of its microprocessor—currently selling version three, the cost of releasing the next version is 10% higher for Microsoft than for Intel.

Are release costs depreciated?
No. They are incurred entirely in the same round as the release.

In each round, how is profit calculated?

Intel’s Profit
If Intel does not release a new version of its microprocessor, its profit for the round is calculated as follows:

$$\pi_{\text{Intel}} = q \left( p_{\text{Intel}} - m_{\text{Intel}} \right)$$

where $\pi_{\text{Intel}}$ is Intel’s profit for this round, $q$ is the number of PCs sold in this round, $p_{\text{Intel}}$ is Intel’s price this round, and $m_{\text{Intel}}$ is Intel’s marginal cost.

If Intel does release a new version of its microprocessor, its profit for the round is:

$$\pi_{\text{Intel}} = q \left( p_{\text{Intel}} - m_{\text{Intel}} \right) - r_{\text{C Intel}}$$

where $r_{\text{C Intel}}$ is Intel’s current release cost.

Microsoft’s Profit
Calculation of Microsoft’s profit is different because in addition to revenues for PCs sold in the current round, it also earns revenues from its installed base of PCs; that is, PCs sold in previous rounds.

The number of PCs in Microsoft’s installed base is the sum of PCs sold during the previous years. The size of the installed base in round one is zero. The table below shows sample calculations, assuming the size of Microsoft’s install base is set to equal the 5 previous years:

<table>
<thead>
<tr>
<th>Year</th>
<th>PCs Sold</th>
<th>Inst. Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>41</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>44</td>
</tr>
</tbody>
</table>
Microsoft’s revenue per PC in its installed base depends on whether the PC is running the current version of Microsoft’s OS or an older version. Revenues for each new PC and for each old PC are displayed at the upper right of the screen in the Values section.

If Microsoft does not release a new version of its operating system, its profit for the round is calculated as follows:

$$\pi_{\text{MS}} = q p_{\text{MS}} + q_{\text{newPC}} r_{\text{newPC}} + q_{\text{oldPC}} r_{\text{oldPC}}$$

where $\pi_{\text{MS}}$ is Microsoft’s profit for this round, $q$ is the number of PCs sold in this round, $p_{\text{MS}}$ is Microsoft’s price this round, $q_{\text{newPC}}$ is the total number of PCs sold in the five previous rounds that are running the current version of Microsoft’s OS, $q_{\text{oldPC}}$ is the total number of PCs sold in the five previous rounds that are running an older version of Microsoft’s OS, $r_{\text{newPC}}$ is revenue per PC running the current OS, and $r_{\text{oldPC}}$ is revenue per PC running an older version of its OS.

If Microsoft does release a new version of its operating system, its profit for the round is calculated as follows:

$$\pi_{\text{MS}} = q p_{\text{MS}} + q_{\text{newPC}} r_{\text{newPC}} + q_{\text{oldPC}} r_{\text{oldPC}} - r c_{\text{MS}}$$

where $r c_{\text{MS}}$ is Microsoft’s current release cost.

**How is the number of PCs sold calculated?**

The number of PCs sold each round is determined by the demand curve, which is the straight black line that appears in the Scratch Pad on the lower right corner of the screen. As new versions of microprocessors and operating systems are released, the demand curve shifts right and becomes steeper. This will effectively increase the number of PCs sold for a given price. However, as more rounds go by without releasing a new version of your product, the demand curve moves down to the left as technological obsolescence becomes greater.

**When does the game end?**

The end point of the game is unknown to the players and is determined by the professor during class. All games will end at the same clock time. Depending on how quickly they play, different games will get through more or fewer rounds than others. The maximum number of rounds available for play is 60, and most games will average between 20 and 60 rounds of play.

**How much time do we have in each round to decide on new releases and prices?**

Each round of play is timed, and each team has more time available in the rounds at the beginning of the game to make decisions than they have near the final rounds of play. The beginning and end round times are set by the professor and the time for each round decreases exponentially. The duration of rounds that succeed a release from either team are automatically 45 seconds longer than they would be otherwise.

What happens if the round ends before we submit our decisions?
If you time out before submitting your decisions, the following default values are submitted for you:

<table>
<thead>
<tr>
<th>Release new version?</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your New Price ($)</td>
<td>Last round’s price</td>
</tr>
</tbody>
</table>

**How does the SCRATCH PAD work?**

The **Scratch Pad** is intended for you to experiment with different product prices and release decisions. You can use the **Scratch Pad** to determine hypothetical profits, depending on whether you and/or your opponent release new versions of your products and depending on the prices you and your opponent set for your products. The default price for your opponent is its price from the previous round, but you can change it using the sliders on the y-axis to test scenarios.

When you change values on the **Scratch Pad**, the game is not affected. You must separately submit values from the **Scratch Pad** in the **Input Panel** at the upper left of the screen.

**Does either team have hidden information?**

No. All information displayed on your screen appears on your opponent’s screen, too. **Scratch Pads** differ in that each team can only view their own hypothetical information regarding prices and releases.

**In the ROUNDS PLAYED area, what do the check marks signify?**

The check marks indicate previous and future releases of new versions of Intel’s and Microsoft’s products. They are shown identically on Intel’s and Microsoft’s screens.

A greyed out check mark next to a previous round indicates a previous release period for Microsoft or Intel.

A player may also signal a future release to the opposing company by placing a check mark next to the period they wish to release in before selecting the submit button for the current decision period.

For example, if game play is in round three and Intel wants to signal that it plans to release a new version of its microprocessor in round 8, the Intel player clicks the box in the **Intel Rel** column corresponding to round 8, and a check mark appears on both company’s screens. When game play reaches round 8, Intel must decide whether to release or not. Planned releases are non-binding.