Instructions

AIRBUS A3XX: Developing the World’s Largest Commercial Aircraft

In this case, you will be analyzing the strategic interaction between Airbus and Boeing, the two leading producers of large commercial aircraft. Specifically, you will consider Airbus’ proposed launch of the A3XX, their entry into the very large aircraft (VLA) segment of the market, and Boeing’s potential response to this entry. You will attempt to answer the following questions: should Airbus enter the VLA segment? And what, if anything, should Boeing do about it?

Class groups will analyze the case from the perspective of one of these companies. Some groups will be making recommendations regarding Airbus’ strategy, while other groups will be making recommendations regarding Boeing’s strategy. Regardless of your groups’ perspective, however, each group will have to conduct the same analysis.

As always, the only information you may use in your analysis is the information provided in the case. Don’t bother researching the case, since your mark will be based entirely on your ability to justify your decision using information provided in the case. The only outside source of information you may consider is the information found on each companies’ website; both firms publish market forecasts for their products and you may use this information in your analysis.

The written report is due no later than 2:30 PM Thursday, May 3 (end of lecture). No late reports will be accepted! The length of the report is not to exceed 7 double-spaced pages with 1” margins and a minimum of 12 point font. Any exhibits such as graphs, tables, etc. must be included as an appendix and will not count as part of the length of the report itself (nor will the title page, which will identify each group member and their set). Finally, each report is to be submitted with a disk containing the Excel spreadsheet used in the analysis as well as a peer review evaluation. Note: we will not ask for another disk should the disk you submit be corrupted. So make sure it works and is free of viruses.

Step 1: Assemble a Cash flow Model for each Scenario

To help you get started, use the spreadsheet template to put your cash flow analysis together. Included in this template is a model of both market demand and market share in the VLA market segment. The market share model is “interactive” in the sense that a change in the price of either company’s product will lead to corresponding changes in market share. Further, the market share model is tied to the cash flow model, so any change in market share will lead to corresponding changes in cash flows. Remember, whether your group is handling Airbus or Boeing, you need to put together cash flows models for both companies under each scenario.

Note: in putting together the cash flow models, most of the work has already been done for you. The cash flow template is already linked to both the market share model as well as the overview worksheet, where most of the assumptions are listed and tied to the other
worksheets. All you have to do is simply copy the cash flow worksheet to create cash flow models for each of the other scenarios. This way, the cash flow models you create will be tied to the market share model as well as the overview worksheet. If you do this correctly, you can then modify each cash flow worksheet to capture the essence of each of the scenarios under consideration.

The strategy profiles you need to consider in your analysis are driven by the decisions each company might potential take. For example, Airbus can choose to launch the A3XX or not. Boeing can choose to either launch a modified version of the 747 or continue with the status-quo (i.e., producing and selling the current version of the 747). Evaluating each strategy profile in this market involves understanding what happens when different pairs of strategies are used by the two competitors. Note also that, because of the lead time required to develop a large aircraft, neither company will be in a position to observe what their rival does before making their own decision. From a strategic standpoint, therefore, Airbus and Boeing are essentially playing a simultaneous one-shot game, rather than a sequential game.

**Step 2: Determine the Optimal Pricing Strategies for Airbus and Boeing Under Each Scenario**

To figure out the performance implications of each scenario, you need to figure out the optimal pricing strategy in each situation (one of the BIG problems in marketing). You can figure out each firm's optimal pricing strategy (after you have put together the cash flow models) by first considering your firm's optimal response to a series of prices used by the competitor. For example, if you were Airbus, you might consider what you would do if Boeing priced the 747 at $50 M, $100 M, $150 M, $200 M, and $250 M. At each of these price points, you can figure out what your optimal pricing response would be by entering the Boeing price in the appropriate yellow square on the spreadsheet. Then, in Excel, go up to the "Tools" menu. Within "Tools," you should see an option for "Solver;" select "Solver". Now, you want to figure out your optimal response to Boeing’s price; that is, given Boeing's price, you want to find the price for Airbus that maximizes Airbus' (NPV) payoff. In "Solver," you can do this by telling “Solver” to maximize Airbus' NPV (the target cell) by changing Airbus' price. In addition, you will want to add a constraint that keeps Airbus' price greater than zero. (Below you can see a "screenshot" of the "Solver" window with the appropriate settings.) After you have set the conditions, tell "Solver" to solve the problem by clicking solve. The NPV and price that are obtained are Airbus's optimal pricing strategy and payoff given Boeing's price.
Make a note of both the price and payoff. By iteratively changing Boeing's price and obtaining Airbus' optimal prices and payoffs, you can get a feel for Airbus' pricing strategy under the given scenario. After you have obtained Airbus' optimal response given several of Boeing's potential pricing strategies, follow the same steps for Boeing. After you have the optimal pricing strategy for both Airbus and Boeing, plot out the result for both firms. You should get a picture similar to the chart below. You can now determine the optimal pricing strategies for each firm by noting where the two lines "cross." (This point is a "Nash equilibrium," a concept we'll introduce shortly.) To determine the payoffs to each firm, take these prices, plug them back into the cash flow spreadsheet, and note the payoffs to both Airbus and Boeing. These payoffs are your forecast of what you think will happen to Airbus and Boeing under that scenario.

![Chart](chart.png)

You then need to find a similar pricing equilibrium for the scenario where "Airbus Launches & Boeing Doesn't." However, if you think about it, you don't have to go through this procedure where Airbus doesn't launch. Under those scenarios, you should be able to figure out intuitively what Airbus' payoff is. Boeing's payoff can be determined simply by finding the price for Boeing that maximizes NPV.

**Step 3: Assemble the Payoff Matrix and Determine the Outcome of the Game**

Once you have the payoffs for both Airbus and Boeing under each scenario, you can put those payoffs into a matrix similar to the one that appears below (the payoffs here are arbitrary). Using the same principles described in class, you can then determine the likely outcome of this strategic interaction between Airbus and Boeing.

### Boeing

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<thead>
<tr>
<th>Airbus</th>
<th>No Launch</th>
<th>Launch</th>
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<tbody>
<tr>
<td>No Launch</td>
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<td>Launch</td>
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Game Theoretic Principles in this Analysis

A key insight from game theory that can be applied to strategic reasoning in business situations is the principle, "Look forward, and reason back." This principle refers to the idea that when attempting to determine what your course of action should be in a given situation, it is important that you consider the potential responses a competitor may use. If you can anticipate how a competitor is likely to react in a situation, you can pick your actions contingent on those potential responses, thus, improving your performance.

Throughout this quantitative analysis of Airbus vs. Boeing, you have been applying the principle, "Look forward, reason back." When you account for the pricing strategy used by Boeing when determining Airbus' pricing strategy, you are applying this principle. When you consider the outcomes of the pricing competition between Airbus and Boeing while deciding whether to launch a new jumbo jet, you are once again making use of this important principle. When you attempt to figure out whether Airbus should launch the A3XX based on Boeing's potential responses to Airbus' strategy, once again you are "looking forward (to Boeing's response), and reasoning back (to figure out what Airbus should do)." Thus, this fundamental principle is nested throughout the analysis.

Exercising Judgement in the Use of Quantitative Analysis

The exercise of constructing a quantitative model of a business situation is valuable for a number of reasons. First, the act of formulating a model imposes discipline on your thought process. To get a model to "work," you have to be explicit about your assumptions, how those assumptions interact with one another, and how they affect the outcomes in which you are interested. Second, a model is useful in predicting what the outcomes of a situation will actually be. If you are making an investment in launching a new product or business, you should be interested in determining what the payoff to the company will be. Having an answer to this question is critical to understanding whether the new product is a good investment or not. Finally, a quantitative model of a business situation is important to assessing the risks associated with the investment as well as the sensitivity of the investment to the assumptions underlying your decision-making process. Assessing the risks associated with an investment decision is where analysis and judgement meet, and this is your final task in formulating a recommendation for Airbus and Boeing.

No model is perfect, and a model should not be judged on the basis of whether or not it captures every single detail in the "real world." The important issue is whether or not the model captures the factors that are most relevant in determining outcomes. However, you need to learn how to balance the imperfections of the model against your own personal experience and judgement. Ultimately, this is what managerial decision-making is all about.
Caveats and Risks

So, how do you bring judgement to bear upon these issues? Here, you need to take into account the caveats and risks associated with the model. How reasonable are our projections of total industry demand? What are the risks if that demand does not materialize? What if there are cost over-runs in launching the product? What difference does it make whether or not Airbus is subsidized by various European governments. Such factors could influence the decision-making process, and the importance and likelihood of such events should figure into your recommendations. Incorporating such factors into your thinking is about exercising judgement.

Therefore, after you have run through the analysis, try and think about how the assumptions affect the outcomes you forecast. Would changes in any of these assumptions dramatically affect your decision? What other strategic concerns might Airbus and Boeing have that could override the strategy recommended by the quantitative analysis?

One aspect of the model that you need to consider in forming your recommendations is the model of demand and market share imbedded in the analysis. So, let's go over that a little bit. Basically, the demand and market share for commercial aircraft and is driven by two factors: the demand for airline transportation (freight and people) and the operational efficiency of new aircraft versus old. Both of these factors are either directly or indirectly reflected in the spreadsheet model. The total level of demand is a function of the average price levels of the firm. So, as the price for aircraft goes up, the expected level of demand goes down. Second, airlines decide whose aircraft they will buy based on who provides the best efficiency advantage. In this model, your market share is equal to the efficiency advantage you provide relative to your competitors. Having this factor included in the model means that Airbus has slightly more pricing flexibility relative to Boeing because the A3XX is more efficient than the Boeing according to the information we have. However, we can assume that such an advantage disappears if Boeing launches a new plane. This leads to another point. The model explicitly assumes that operational efficiency is the only form of differentiation advantage available to Airbus and Boeing, but there are others. For example, we might expect the design of the passenger cabin, etc. would be important to Airbus' and Boeing's customers, the airlines. In addition, Boeing probably has more brand name and reputation capital than Airbus. After all, the 747 has been flying for 30 years with one of the lowest accident records of any aircraft. These are just a few examples of the types of issues you can think about. Obviously, given the constraint that your paper should not exceed 7 pages in length, you can't write about everything, and you need to prioritize your analysis. But, it is good practice to think in pretty broad terms about these issues.

Conclusion

So, there you go; that should get you started! Your written analysis should briefly state the issue confronting Airbus or Boeing (depending on which group you are in), undertake an analysis of that issue (your written analysis should in some sense build off of your
quantitative analysis of the case), and finally, make recommendations on what Airbus or Boeing should do. In addition, please make sure you submit a copy of your spreadsheet file. The name of the file should be of the form, "Airbus Team ?.xls" or "Boeing Team ?.xls".

This is a complex assignment. Due to the number of assumptions that must be made, and the background analysis required to make those assumptions, there is no reason to believe that any two papers will be the same. As is usually the case, there’s no one correct answer to the case. Good papers are well written and have conclusions that can be justified and defended. This leads us to two final points. First, if you have good results but cannot convey them using the written word, your results will matter less. In the real world, how you say it matters just as much as what you are trying to say. So, spend some time writing up your case. Second, please make sure that everyone is involved. Don't just hand the financial analysis off to one person, the writing duties off to another person and so on. Remember, you are required to submit a peer review for the written case as well. These evaluations will be collected in lab the week following the due date.