

Case Nomis A and B

Everyone should purchase the case at <https://hbsp.harvard.edu/import/1194584>[Links to an external site.](#).

We continue our exploration of how analytical approaches can be used to improve pricing. We consider the case of customized pricing – the most common modality in business-to-business markets – and show how profitability can be improved using data from an on-line lender. **You should have bought Nomis A and B. You will analyze the following dataset. It's an important group assignment.**

For Nomis B case, consider two e-Car loan applications with the characteristics shown below.

Tier	Date Approved	Term (Mos.)	Amount (\$)	Car Type	Comp. APR(aka Competition Rate)	Prime Rate (aka Cost of Funds)	Partner Bin	FICO
1	11/19/2004	60	18,000	U	4.85	2.13	1	705
2	11/20/2004	60	25,000	U	4.85	2.13	1	705

1. What is the probability that each of these loans applicants will convert if they are quoted an APR(aka Rate) of 6.00%?
2. How would this probability change if we changed the APRs(aka Rates) to 5.00%? To 7.00%?
3. How should e-Car set the APRs(aka Rates) for these applications in order to maximize expected profit?
4. How should e-Car set the APRs(aka Rates) for all loan applicants in order to maximize expected profit?

Once you download the Nomis case excel file, you will find multiple columns of variables. The most important column I (i.e., dependent variable) indicates whether a customer has accepted the loan or not. Other columns contain key information about the customer and the loan (i.e., independent variables). **Your first task should be identifying the relationship between the loan acceptance and other variables.** Some variables may have significant impact on the loan acceptance, while others' impact may be limited. It is common to use a regression model to analyze this relationship. Given that the dependent variable (i.e., the loan acceptance) is a binary variable (i.e., 1 = accept and 0 = otherwise), a classic linear regression model may not capture the relationship properly. A special type of regression model, known as logistic regression, generally works well here. You should have learned logistic regression in ITM 6400. If not, I suggest you checking [this YouTube video listLinks to an external site.](#). Specifically, video part 1 will teach you the basics of logistic regression and video part 3 second half will teach you how to identify significant dependent variables. You may use either R or Python for the logistic regression analysis. If you are more comfortable with Excel, [this free Excel add-inLinks to an external site.](#) is easy to use. xlstat logistic regression step-by-step tutorial: <https://help.xlstat.com/6432-binary-logit-model-excell>[Links to an external site.](#)

Your second task is to quantify the impact of APR (i.e., the rate column) on the profit. It is easy to see that a higher APR generally leads a lower loan acceptance probability but a higher loan profit if accepted.

I suggest your reading the book chapter of Customized Pricing by Dr. Phillips (digital copy free via SLU library). Equation 13.1 on page 343 is especially crucial. This book chapter also contains many other interesting and important concepts such as endogeneity and customized pricing in action.