MICROECONOMICS FORECAST: LEARNING BY DOING. A TEN YEARS GRADUATE LEVEL EXPERIENCE

Jean-Hugues Chauchat
Université Lumière Lyon2, France
jean-hugues.chauchat@univ-lyon2.fr

For the past twenty years, we have been using an original technique to teach statistics and Microeconomics Forecast Methods to postgraduates studying economics, computer sciences and statistics. After the usual lectures and practical exercises in the lab, students, by groups of two, have to find a shop, a company, a community organization, etc., which provide them time series of sales or activities in order to modelize them and calculate forecast for the next days, weeks or months. They find their "client" by themselves. The professor works with them as a consultant. More than 100 different times series forecasts have already been carried out by students on this program over the last 20 years. This year 2005-2006, we use the same teaching method in our double diploma program with the National Economics University in Kharkov, Ukrainia.

MAKE A LINK BETWEEN THEORETICAL MODELS AND REAL WORD SITUATIONS

A difficult part of the statistics activity is to make the link between theoretical models and real word situations we have to modelize. A large part of our efforts, at post-graduate level statistical education, is to put the students in the following situation: they have to understand what a non-statistician client is asking for, and to give a realistic solution to the client's need. The best situation is when students find themselves their client. In this situation, students are motivated to work a lot, and the teacher becomes the student's "statistical consultant."

For the past twenty years, we have been using an original technique to teach Microeconomics Forecast Methods to postgraduates studying statistics, computer sciences and economics at University Lumière, Lyon, France (http://dis.univ-lyon2.fr/).

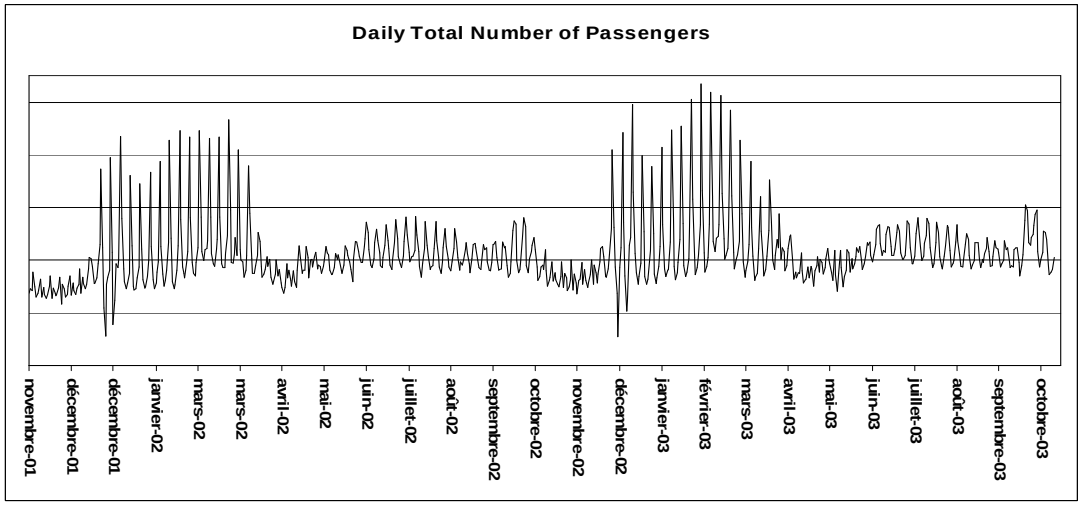
After the usual lectures and practical exercises in the lab, the students put their knowledge into practice by carrying out a forecast for a client that they will have find themselves. We use the same teaching method in Kharkov National University of Economics, Ukrainia (http://www.hdeu.edu.ua/en/university/) in our double diploma master program.

Students, by groups of two, have to find a shop, a company, a community organization, etc., that provides them time series of sales or activities in order to modelize them and calculate forecast for the next days, weeks or months. The computations and graphics are done by the students with *Excel*: they must go through all the steps of the process. More than 100 different times series forecasts have already been carried out by students on this program over the last 20 years. These applied studies enable the students to get hands-on experience in the world of work.

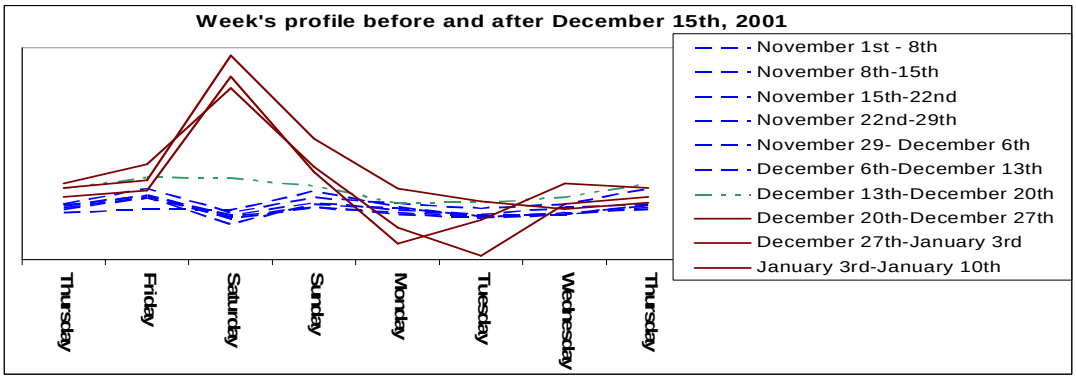
I will present different case studies, the students' difficulties and what they learn when making forecast for real non academic clients.

FIRST EXAMPLE: THE DAILY PASSENGER TRAFIC IN AN AIRPORT

The first example is the daily number of passengers in an International Airport, near the French Alps. A student using to have a summer job at this airport has processed the number of passengers arriving at the airport everyday from November 2001 to October 2003. The goal was the traffic forecast for the next 12 months (for confidentiality reasons, the values are hidden on the plot). We can see the seasonal variations 1) during the year, 2) during the week. But no classical methods give good forecasts because of the seasonal effects due to the skiing period (15th December-15th march).



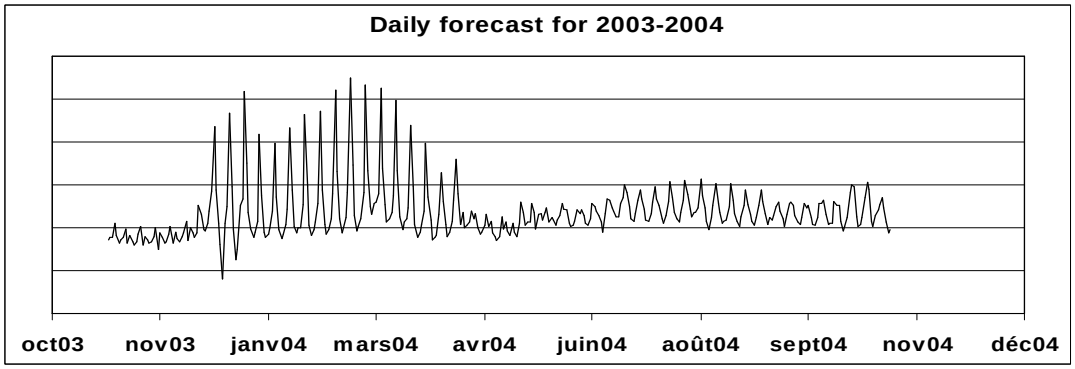
The students split the series in two components:
Normal : during the 3 following time intervals,1st November 2001-14th December 2001 + 16th march 2002-14th December 2003 + 16th march 2003-31st October 2003
Ski: 15th December 2001-15th march 2002 + 15th December 2003-15th march 2003.



The boundaries of the two parts, *normal* and *skiing*, have been chosen to be between a Friday and a Saturday. In the Alps, the accommodation renting is always from Saturday to Saturday. That means that the Saturday is a rush day for the airport during winter.

The week from December, 13th to 20th shows an intermediate profile: Saturday is no more an off-peak day, but not yet a peak one.

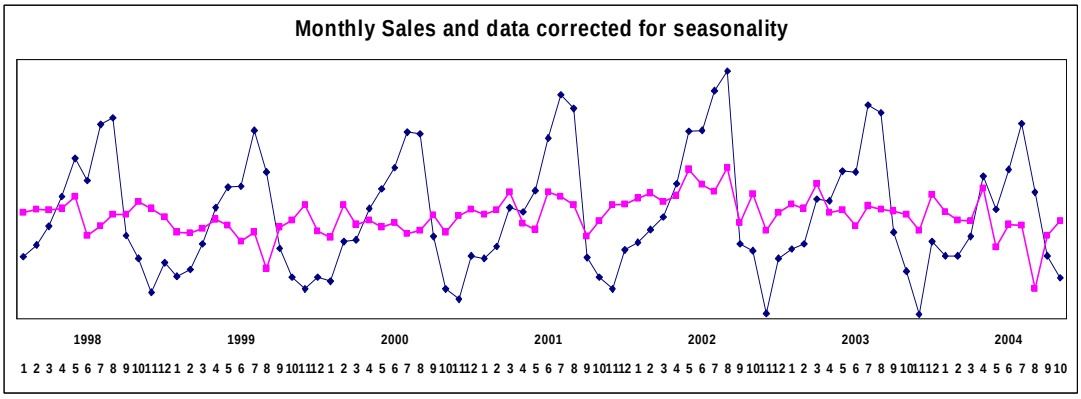
For each time period, the students have estimated the seasonal effects of the months of the year, then of the days of the week and they combined the previous components with the linear trend to get the daily forecasts on 12 months: November 2003 to October 2004.



These analyses, decompositions and reconstructions are possible if one has enough time, and with many exchanges backward and forwards between the teacher and the students. The use of a spreadsheet provides the flexibility needed for the computations and graphics.

SECOND EXEMPLE: THE MONTHLY SALES OF A VEGETABLE GROCERY

The second example is about the monthly sales of a vegetable grocery. The length of the series is 6 years and 10 months, from January 1998 to October 2004. The grocer is the father of one of the students involved in the study, which means that the discussion between the "client" and the students is easier. The grocer works on the markets of a touristic area of the French Alps. There are 5 markets each week in different places; the customers are faithful and use to buy their fruit and vegetables to the same stall on the same market each week.

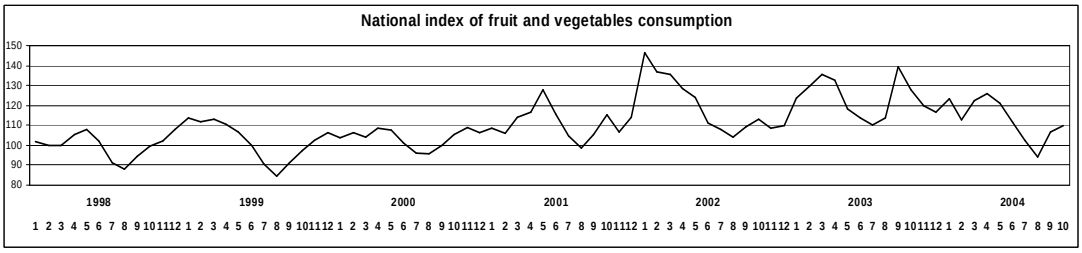


A first figure shows the seasonality and regularity of the time series. The seasonal patterns of the 12 months are easily estimated from the deviations to moving average, the same for the series when removing the seasonal dependencies. The seasonal pattern is strong due to the production fluctuations and the product prices on one hand, and to the fluctuation of the touristic activity of this area.

The deviations to moving average and the plot of the series with the seasonality removed show that in 2002 and 2003, the results in November became lower than before. The grocer explained that from 2002, he started taking a week of vacation each year in November. Therefore, the students have computed two series of seasonal patterns, one from 1998 to 2001, the second from 2002 to 2004.

On the plot of the series with seasonality removed, we can see a decrease from September 2002. The students had to ask the grocer what happened in his management: change of politics of prices, quality of the products, diversity, marketplaces, competition with other grocers… For the client, nothing had changed even if he had felt a sales decrease.

The students got in touch with the national union of fruit and vegetables grocers and they discovered a national index of fruit and vegetables consumption. After obtaining the monthly index, they observed a correlation (0.41) between the national index and the sales of the grocer.



At the end, the students have built a complete linear model explaining the grocery monthly sales by this monthly national index of fruit and vegetables consumption, the indicator of months and the indicator of holidays. This model fits quite well the past seven year's sales and it managed to predict the following sales.

Method	*Forecast*		*Actual values*	
	November 04	*December 04*	*November 04*	*December 04*
Holt-Winter's Seasonal Exponential Smoothing	7 309	11 301	8 705	13 295
6 years linear trend, plus monthly and seasonal effects	10 160	13 803		
2 years linear trend, plus monthly and seasonal effects	7 937	11 435		
Complete Linear model	*8 656*	*13 772*		

BENEFITS FOR STUDENTS

These applied studies enable the students to get hands-on experience in the world of work.

Actually, post-graduate students learn how to

- Understand the client's needs, asking for the time series' history, its particularities (grocer's holidays periods, business and tourism activity…),
- propose a tailored study, and to adapt classical methods,
- visualize and translate the results into non-specialist's language for the client.

Each student is evaluated by the average of his (her) individual exam grade and the group's forecast study grade.