3 - 2013/2014

Per Vectum

magazine of study association SCOPE | Vectum

Evy's Study Abroad in Milan

Working at Pointlogic

Research Article by Eric Beutner

Interview with the Vectum Babies

SCOPE Maastricht University School of Business and Economics

Word from the President

Dear Econometricians,

Time is flying by and we are approaching the end of this academic year, which also means that my board year is almost over. As such, it is a great moment to look back at what we did this year and what the future will bring us.

We started this year with our semi-annual GMA, where we, as a board, presented what we did during the first half of this academic year. We were pleased to see that so many of our members came to visit this assembly, and that we could welcome back some of our third year bachelor students from their adventures abroad. Just like in the previous editions, you can again enjoy reading an exchange experience later on in this edition of the PerVectum. In the week after the skills block and before block 4, the famous SCOPE | Vectum Business Trip took place. With a group of 25 students we headed off to Eindhoven, Amsterdam and Huizen, to visit four different companies. We made sure that we could offer a well-diversified portfolio of employers to the participants. The participating students managed to get a clear insight in what these possible future employers have to offer. Next to that, it is an ideal way to show to the companies what we as members of SCOPE | Vectum have to offer to them. On the second day of the Business Trip we had our yearly Alumni drink. I was glad to see that it was very well attended, and that I could see some old friends again. From what I have heard and in my opinion, the trip was a great success. For this reason, I would like to thank all the participating companies, my fellow board members and of course my Business Trip committee for making this trip a success. Special thanks go to Celine, who made sure that we were in time at all our appointments. Later on in this PerVectum you can read a more elaborated story about our Business Trip. Two weeks after the Business Trip, the next big career event was planned. The LED 2014, this year organised by VESTING, took place at the 11th

of February in Nieuwegein. At 06:40 a.m. more than thirty of our students set off to the beginning of an exciting day. The LED 2014 was a great success, and I want to thank the board of VESTING and the LED committee for organizing this great day. You can read more about the LED 2014 later on in this magazine.

We started off this period with a research lecture by Tobias Harks. After the lecture, some third year bachelor students shared their exchange experiences. Afterwards we had the block opening drink together with the other SCOPE associations. I was glad that Tobias Harks and a lot of members joined us to the Preuverij. In the third week we had the, already famous, beer tasting. Thanks to the stories of Thijs and the fine selection of special beers, this evening was a great success. After the week of holidays, we had a week with academics related activities. On Tuesday, we had our LaTex workshop together with SCOPE | Economics. Thanks to André Berger and his assistants Sean and Michael, the participating students now know how to work with the text editing software LaTex. On Thursday, we had the master and PhD information evening hosted by Jean-Pierre Urbain and Dries Vermeulen. We ended the block with a completely new and exciting activity. Thanks to the creativity of our activities committee, we could offer our members an adventure tour in the casemates of Maastricht. Assisted by the fourth musketeer, d'Artagnan, we found our way through the casemates. I want to highlight that we have several career events upcoming block. On the 17th of April, we will organise our Case Day. Next to that we will have the Kempen&Co in-house day together with SCOPE | Focus and the Deloitte lunch lecture together with SCOPE | 3MA. On the 1st of May we have a recruitment dinner with MI-company. The subscriptions for the Case Day are already closed, but the others are still open, so do not forget to subscribe if you want to meet some exciting companies. Next to these career events there will also be some more informal activities. In the weekend before block 6 we will have our members' weekend to end the academic year together in style. The end of the academic year brings me to the following. As our board year is almost coming to an end, we have to recruit a new board for next year. In the beginning of the next block we will have an information evening were we will tell you about all the board positions and their duties. If you want to know more already, you can check our website for more information.

I hope to see many of you at our remaining events of this academic year. Next to that, I would like to seize the opportunity to wish you good luck for the upcoming exams!

Jim Bemelen
President SCOPE | Vectum 2013-2014

EXPLORE+ SUCCEED

TALENTS FIND IT AT SABIC

Saudi Basic Industries Corporation (SABIC) ranks among the world's top petrochemical companies and operates in more than 40 countries across the world with over 33,000 employees. At SABIC our focus is to help our customers achieve their ambitions and powering their competitive advantage. We put customers' success at the heart of what we do.

We seek the best and the brightest employees throughout the world to become part of our vision.

You are ambitious and talented. You are looking for a career that will equip you to make the best of your strengths, both personally and professionally. That is why this is the perfect time to build our futures together. Our comprehensive training and development programs are among the best in the petrochemical industry. Our pay and reward packages are always competitive and we offer you career opportunities in a diversity of disciplines and locations worldwide.

Find out more: sabic.com/careers

top EMPLOYERS 2013 NEDERLAND
CERTIFIED BY THE CRF INSTITUTE

CHEMISTRY THAT MATTERS™

PerVectum

Magazine for Econometrics students at Maastricht University

Year 19, issue 3 of 4
April 2014

Editor in Chief
Fabiënne Verwey
Co-editors
Evy Zeptner
Mitchell Boer

SCOPE | Vectum
P.O. Box 616
6200 MD Maastricht
+31 (0)43 388 39 40
NL67ABNA0 441037887

Visiting Address
Tongersestraat 43
Room 1.014
6211 LM Maastricht

info@scope-vectum.nl
www.scope-vectum.nl

Table of contents

2 Word from the President

6 Business Trip

9 Pictures Business Trip

10 Working at Pointlogic

15 Research Article by Eric Beutner

21 LED

23 Pictures LED

24 Article by the Actuarial Institute

28 Pictures Research Lecture and Block Opening Party

29 Pictures Adventure Tour

30 Interview with the Vectum Babies

33 Puzzle

34 Pictures Active Members Dinner

35 Evy's Study Abroad in Milan

39 Upcoming Events

Business Trip

by Merit Geldmacher

I read about the Business Trip Committee of SCOPE | Vectum a few weeks after my first semester started in September and I decided to become a member, even though I did not really know what it was all about. I just knew that I had the opportunity to join the business trip after our skills block in January.

On Monday morning, Jim was waiting for us at the station in Maastricht at 11:10 and was surprised at how punctual econometricians could be, as it did not fit his previous experiences. However, this would be the only time this week that everyone was on time. As I was the only first year student, I only knew a few students who joined the business trip. All third year students have just come back from their exchange semester and they were all really happy to see each other again. The train ride to Eindhoven did not take much time and once we were there, it was time to visit the first company: KPMG. We arrived there a little bit early, so it was time for a group picture. KPMG gave us a warm welcome with a nice lunch to give us enough energy for their program. We started with a short quiz about KPMG and continued with presentations about the company. Our visit ended with drinks, snacks and some very big sausages. Afterwards, we still had to go to Amsterdam which we managed by blocking a whole tram in Amsterdam with our suitcases but finally we arrived at the hotel. Afterwards, we had dinner at a nice Italian restaurant and we finished off with some free (this means paid by SCOPE | Vectum) drinks at the Café de Gieter.

It felt like we met up in the middle of the night at Tuesday, but it was actually 9am when we left to visit Flow Traders in Amsterdam. We started with some really nice cake and they gave us some insight in their company. Apart from an interesting presentation, we could see how the employees at Flow Traders work. They are watching six or seven screens simultaneously and by clicking on another screen they make lots of money! We had yet another break with drinks and snacks before it was our turn to become active; it was time for the trading challenge. After a short introduction, we slipped into the role of a trader and we could

explore the thrill and the speed of the stock market ourselves. Our visit at Flow Traders ended with a meet and greet lunch, which provided us with the opportunity to talk to some of the employees.

After we got back at the hotel in the afternoon, we had time to walk through Amsterdam. Some of us played frisbee in the park and another group went downtown. We lost some of the guys there while the girls seemed to stay in a shoe shop forever. Later on, we found them again and guess where their journey ended up – in the famous red-light district of Amsterdam! After dinner we all met in the Gieter again because a few alumni students joined us for the Alumni Drink. Some people went to bed earlier than others and Florentijn even thought it was a good idea to buy a bike for ten Euros from a random guy on the street late at night.
On Wednesday we visited Shell and we arrived there after a boat ride and a short walk. Some of us already had lunch before and some others just managed to eat breakfast so it was obvious who went to bed late on Tuesday night. One of the first things we learned at Shell were their safety standards; everyone has to hold the handrail while climbing stairs that even three-year-old children would not fall down from. But anyway, after a while we got used to it. They gave us some presentations about their company and after a lab tour and a break we got to solve two different challenges in teams. Our visit ended with drinks and that night we went to the second dinner place we had organized. After we had convinced everyone to take the tram instead of walking through the city, we arrived at "Umami", a Japanese restaurant. We had booked five tables there and all non-Dutch students were sitting at the same table. After our three course menu, we were stuffed with de-

licious food and managed to walk to the Café de Gieter again. At midnight, it was my birthday and they surprised me with horns, cake and spray cream which was simply amazing! When the Gieter closed around three, those who were left went to the Bubbels, but we headed back to the hotel soon after having taken some pictures at the famous IAMSTERDAM sign.

The next day we had a day off and we could explore the city. Several people went to the famous Rijksmuseum, others went shopping and a few people went ice skating or just relaxed for a day.

Time flew by, as it was already Friday. We visited our last company, SAS in Huizen, and started there with a delicious lunch. After some presentations, we worked on a case which consisted of analyzing data for a champagne marketing campaign. The prize for the winning team was – of course – a bottle of champagne. Around six, we went back to the station to take the train back home to Maastricht. On Friday morning, Florentijn's bike was still there, even though it was unlocked! He considered to take it with him but in the end he left it in Amsterdam and he hoped that a nice person will randomly find and take care of it.

I would like to thank everyone for this amazing week and I hope that you all enjoyed it as much as I did! It was so much fun to organise and join this trip and special thanks to Jim and Celine who made the trip go very smoothly. I got to know many fellow econometricians, learned a lot about interesting job opportunities and I really enjoyed our free time in Amsterdam.

Impressions from **Business Trip**

Working at Pointlogic

By Sanne Willems and Sarah de Thier

Could you introduce yourselves?
My name is Sarah. I am 22 years old and I come from the French part of Belgium. I studied Econometrics and Operations Research at Maastricht University, I started my bachelor in 2008 and finished my master in Econometrics last year. I started working at Pointlogic in Rotterdam in September and I live in Rotterdam since I started working. Even though I moved to Rotterdam, I often go back to (beautiful) Maastricht as my boyfriend is still finishing his master in Econometrics.
My name is Sanne Willems and I am 23 years old. I studied Econometrics and Operations Research and did my master in Mathematical Economics. I graduated from Maastricht University in 2012. After that, I moved to Rotterdam and started working for Pointlogic. Besides working there, I also like to do fun stuff, like dancing, playing music and travelling.

Could you tell us something about Pointlogic?
Pointlogic positions itself as a software company working in the field of media and HR. I would say that it is midway between software and consultancy. It is divided in 3 big departments: Intelligence, systems and HR. The intelligence department, where we work, is responsible of "building" the intelligence behind the scenes of the software that are developed by the systems department. HR is a business apart from the rest in the company and they develop software used in HR planning.
In the media world, there are a lot of decisions to be taken. Pointlogic helps brand owners, media agencies or advertising agencies to make better decision by using econometric models or simply dive into media and marketing data.
Although Pointlogic is not a very big company, with 85 employees, it is a worldwide company and we have clients in the US, Asia and Europe. The Rotterdam office is the main office with about 65 employees. Next to this there are a few smaller offices in Londen, New York, Sao Paulo and Singapore.

Why did you choose Pointlogic?
Sarah: I was never a big fan of finance and economics. I have always been more interested in the "softer" side of Business, like management and marketing, but combined with an analytical approach. I really like the idea of using data to explain relationships among variables which might sometimes be really complex, but I like it even more when those variables are real. In marketing, you are dealing

with real people, who fill in questionnaires and you use their answers to make complicated models.
Sanne: In my final year at Maastricht I didn't know at all what I wanted to do after my studies. A lot of the other students already had ideas on where they wanted to go, but I didn't. Then at the LED in 2012, I saw for the first time how econometrics and marketing can be combined to do research on the effectiveness of campaigns and media. This interested me a lot and I decided to try to find a job in this area. What I immediately liked at Pointlogic was the atmosphere and the friendliness of all the people. Furthermore, the case at my second interview was fun to make, so I also thought the work activities would be challenging and interesting. The nice thing about Pointlogic is that it is a small company, so you know all your colleagues pretty well, but it is also an international company with big clients. This combination seems perfect to me.

What does the application process involve?
Sarah: I applied in February last year, after I participated in a case with Pointlogic at the LED in 2013. I applied rather early, at that time, there were no job openings at Pointlogic yet. However, I had a first interview so we could get to know each other and I could get a better feeling of what Pointlogic was doing. After this first interview, I was told that I should apply again in June, as they didn't know at the time whether they would need to hire someone for September. I was really lucky to know Sanne at the company. When she knew that the hiring process had started, she immediately let me know. It was at the end of May. I then did as I was told and applied for the job of "Analytical Consultant". After a while, I was contacted by Elvira, the HR person. She invited me to a second more formal interview. During the second interview, I had a talk with the two managers of the Intelligence department and was given a small case of about one hour. I had to wait quite a while due to uncertainty of closing projects until Elvira let me know that they had picked me to fill the vacancy, but I finally got a call mid-July.
Sanne: I came into contact with Pointlogic via an employment agency. My first interview was with someone from HR, where we talked about Pointlogic in general, the job and my interests and expectations. After this first interview, I was invited for a case, with afterwards a talk with two colleagues from the Intelligence department and the manager. We discussed the results of the case and had a general conversation to get to know each other.

What did your first period at Pointlogic look like?/ How did you experience your first month?
Sarah: My first month at Pointlogic was rather quiet, which gave me the opportunity to learn a lot. Several projects were delayed when I arrived, so I could focus on learning as much

as I could about the media world and improving my programming skills. Moreover, I had to move to Rotterdam, decorate my apartment, get used to this (big) city and to working every day for 8 hours. The first month was a big change for me as I had never worked before.
Sanne: My first month… I remember being overwhelmed by all the new people, the new city and most of all, all the media information that was thrown at me. Talk about different media, reach, frequency, GRPs, impressions, KPIs. That was a lot to take in. Besides this, I just had two months of holiday, so I had to get used to working at the office, every day, 8 hours a day. It was only after a few weeks that I started to get a grip on the complexity of what we do and all the little details that are involved. The learning process hasn't stopped, I am still learning everyday (and that is fun!).

Which skills that you have learned during your studies do you use in practice at Pointlogic? Do you use your "university" knowledge in practice?
Sarah: I have to use what I learned during my studies quite a lot. Econometrics has helped me to understand complex things quickly and have no problems with complicated calculations. I am also really grateful that we learned programming. Back in the second year, I really hated it but right now we use "softer" programming languages and I really enjoy that part of my job.
Sanne: We actually do econometric modelling at Pointlogic, so I do use the skills we learned at university. Besides the real modelling, what is most important is the analytical thinking we learned at university. Analyzing data, drawing conclusions from different information sources etc. Furthermore, I think we learned already a great deal at university on how to work with other people, presenting for other people and writing documentation (it is all part of the game…)

Could you describe a normal day at work?
Sarah: For me, a normal day at work involves a lot of talking to colleagues, asking for help, checking that what I do is right. I am still in the learning process but that doesn't mean that I don't have responsibilities. I was trained to work on a certain type of projects, which usually involve data analysis, data processing, reshaping and very often modelling using all types of regression methods.
Sanne: My day at work always starts around 8.30. I start with checking my emails, looking at my calendar and making a plan of today; what things are most important, which projects will I work on and which people do I need to contact. During the day, you will work on your projects, have meetings with other people and of course have some small talk at the coffee machine. Every day we have a lunch together at 12.30 and after that a nice

lunch walk to enjoy the nice weather and to be out of the office for a small time. Finally, the day ends for me when I have checked off some items from my to-do list and have entered my hours into the system.

What are the possibilities to further develop yourself within Pointlogic, for example working abroad or further education?

Sarah: Every year we set personal and company objectives with our managers. The personal objectives are a mix of what your manager thinks you should achieve and what you personally want to achieve. You can choose almost anything: training outside of the company, change the type of project you are working on, learn a new programming language etc.

Sanne: People at Pointlogic are very open minded, so if you have a good idea about a next step in your education, or you want to do some kind of training, there is always a possibility for this. Working abroad is also a possibility, but for that you need to work at Pointlogic a few years, so that you have enough experience to survive abroad. Besides working abroad, there are also some small trips to be made to our foreign clients.

Could you tell us something about the current project that you are working on?

Sarah: What I am mostly involved in is measuring the effectiveness of a campaign. Brand owners or media agencies, after having run an advertising campaign, come to us to evaluate the effect of those campaigns on indicators such as sales, brand awareness or purchase intention. In order to come to an answer, we develop all kinds of models. Those models are used as inputs for the software which provides an interactive tool to the clients.

Sanne: I am currently working on several different projects. One of the projects I am currently working on is a tool which is called Bizpoint. This tool helps big international companies allocating their media budget over different markets and brands. This is done based on several different measurements that could be of importance when you are thinking of allocating your media budget (f.e. market growth, competition, need to communicate etc.). This tool has recently been updated and is since then back in the children shoes (as we say in Dutch, which means we start kind of from scratch with developing the tool). Therefore, it is really interesting to work on this project, since you can have a say in the setup of the tool at the intelligence behind it.

Do you have any advice to fellow econometricians that will soon enter the labour market, and are interested in your job area?

Sarah: As a general advice, I would recommend to start early. Even though I had to wait a while until I got my employment contract, applying early really paid off for me.

GET ON BOARD?

SCOPE | Vectum

Treasurer & Activities Coordinator

President

Vice-President & External Affairs

Secretary

By sending your CV and motivation letter to info@scope-vectum.nl
you can become next year's board.

Deadline May 5th, 2014

Longevity: Modelling and forecasting

By Eric Beutner

In the last century human mortality rates have shown a persistent trend in many countries leading to an enormous increase in life expectancy. For instance, in the United States the life expectancy rose from 47 to 75 from 1900 to 1988, and in the Netherlands it rose from 48 to 77 in the same period. In the Netherlands, life expectancy at birth was 81.20 as of 2011. This increase welcomed by all of us leads to a considerable number of new issues and challenges at multiple levels. It is of course a challenge for insurance companies and pension funds that pay benefits during an individual's lifetime. For these institutions the investment strategy has always been very important. However, because of the persistent decrease of mortality rates the modelling of these rates has become a major focus of attention for these institutions. The reason is that underestimation of the future decrease of mortality rates could lead to serious financial consequences. Therefore, understanding, modelling and forecasting mortality rates have become of growing importance to many institutions.

The data

For many countries annual age-specific and gender-specific mortality rates are available from the Human Mortality Base (www.mortality.org). For instance, for the Netherlands the available data go back to 1851. Figure 1 shows mortality rates, or more precisely the logarithm of mortality rates, for Dutch females. We can clearly see the decrease over time at all depicted ages. The first raise of the mortality rates for the age groups 20 and 40 is due to the Spanish flu of 1918. The second raise above trend is due to World War II. The main features of the data are the decrease of mortality rates over time for all age groups, the lower mortality rates at younger ages and the fact that the decline of mortality rates is much more dramatic at younger ages than at older ages.

Modelling mortality rates

The data suggest that we should look for a time-dynamic model instead of a static model that assumes that mortality rates at age x are constant over calendar time. Moreover, the data are quite huge. As mentioned above, the data for the Netherlands go back to 1851. If we arrange the data in a matrix where the rows correspond to age and the columns to calendar time and if we restrict the rows to ages 0 to 99, we have in total 16200 mortality rates. Hence, apart from being dynamic every meaningful model must also provide a reduction of the dimensionality of the data matrix. The by now most popular and most used dynamic mortality model is the Lee-Carter model that I will detail in the following. It

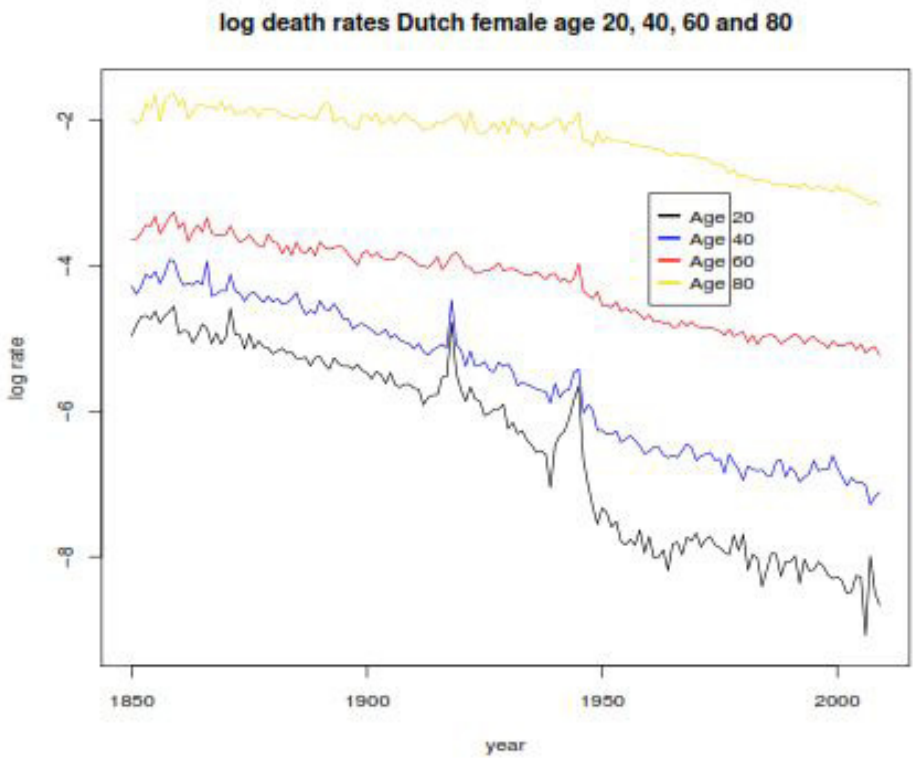

Figure 1: Evolution of Dutch mortality rates

was introduced by Ronald D. Lee and Lawrence R. Carter in an article published 1992 in the Journal of the American Statistical Association. According to Google Scholar there are 1445 articles, conference proceedings etc. citing this article, and according to the more restrictive database Web of Science there are436 articles citing the work by Lee and Carter published in 1992. To get a feel whether 436 is a small number of citations or not, the following will be interesting: Looking atthe period from 1992 to today the most cited article by Elinor Ostram who won the Nobel Memorial Prize in Economic Sciences in 2009 has been cited 479 times according to Web of Science. It might also be interesting to mention that neither Ronald D. Lee nor Lawrence R. Carter is an actuary. Ronald D. Lee is Professor at the Departments of Demography and Economics at the University of California, Berkeley, and Lawrence R. Carter was Professor at the Department of Sociology at the University of Oregon. Lawrence Carter died in 2011. However, nowadays a lot of research on the Lee-Carter model and its extensions is done by actuaries, econometricians and statisticians. Lee and Carter were seeking a parsimonious model to describe and forecast mortality rates. Figure 1 reveals that the observed mortality rates depend on age x and calendar

time t. Moreover, it is clear that every model that neglects either age or calendar time or both will hardly provide a good fit to the data. Lee and Carter proposed the following model:
Here is $m_{x,t}$ the mortality rate of a life

$$\log(m_{x,t}) = a_x + \kappa_t b_x + \epsilon_{xt},$$
$$x = 0, \ldots, X, t = \tilde{t}, \ldots, T. \quad (1)$$

age x in year t. It is quite common to model the log of the mortality rates rather than the rates themselves, and Lee and Carter followed this tradition. X is the maximum age, $\tilde{t}$ is the first year (for the Dutch data mentioned above we have $\tilde{t}$ = 1851) and T is the end of the observation period. The parameters of the model are the vectors $\mathbf{a} = (a_0, \ldots, a_X)$ and $\mathbf{b} = (b_0, \ldots, b_X)$

They are age-specific constants, and (κ_t) is a discrete time stochastic process. Notice that there are only 2(X + 1) parameters + the number of parameters of (κ_t). Thus, even if we let (κ_t) depend on 100 parameters, we only have 300 parameters in the Dutch example whereas the matrix of mortality rates has 16200 entries. One may refer to model (1) as a two factor model with random interaction term.The two factors that explain the observed mortality rates are age and calendar time. Interaction term refers to the fact that the two factors act on each other via the product of b_x and κ_t. This is in contrast to a model of the form

$$\log(m_{x,t}) = \alpha_x + \beta_t + \epsilon_{xt},$$

where the two factors do not act on each other. Finally, we call it a random interaction term, because (κ_t) follows a stochastic process. The ϵ_{xt}'s are assumed to be independent and normally distributed with mean zero and variance σ^2.They capture random fluctuations of the log mortality rates about their means $a_x + \kappa_t b_x$.

The interpretation of the right-hand side of (1) is as follows:

- The vector **a** represents the general shape of the log of the age-specific mortality rates;
- The stochastic process (k_t) represents the underlying trend in log mortality rates; and
- The vector **b** represents the sensitivity of the log mortality rates at ages x to the time trend.

If we now compare the Lee-Carter model to the observed mortality rates in Figure 1, it becomes plausible that it provides a good fit to the data. Firstly, we see that the levels of the mortality rates are different across age which one may hope to capture by the general shape a. Secondly, for fixed age all mortality rates decline which might be captured by the stochastic process (κ_t). Thirdly, as we have seen above mortality rates at younger ages decline more rapidly than at older ages. This effect is taken into account by the vector **b**.

Estimating the Lee-Carter model and forecasting

Before estimating the parameters of the model one has to decide whether, for instance, the mortality rates from

the year 1918 that were raised by the influenza epidemic should be included in the statistical analysis. In their statistical analysis Lee and Carter decided not include the year 1918. A similar question arises for countries that were affected by World War II. How should we treat the death rates during World War II? Most studies exclude these data points from the statistical analysis.

After having decided how to treat what one may consider to be outliers, the next step is to estimate the parameters of the model. This is done in a two-step procedure. The first step is to estimate the parameter vectors **a** and **b**. For this, Lee and Carter use singular value decomposition which is a well known technique in multivariate statistics to reduce the dimensionality of the data. In a second step Lee and Carter fit a time series model to the discrete time stochastic process (κ_t). In their statistical analysis they find that a random walk with drift fits the United States data well.

After having fitted the model to the data, it can be used to generate forecasts of mortality rates. However, point forecasts are not of great use. What is actually needed are prediction intervals for future mortality rates, because they allow to quantify the uncertainty in forecasting mortality rates. This was already noted by Lee and Carter and has been discussed further by many researchers. The importance of quantifying the uncertainty in forecasting mortality rates stems from the fact that insurance companies and pensions institutions need to understand and quantify the risks inherent in any portfolio and find appropriate risk management strategies. However, it is impossible to derive prediction intervals for the Lee-Carter model analytically. The reason is that there are two different sources that contribute to the uncertainty in the forecasts:
errors in the estimation of the parameters **a** and **b**, and errors in the forecasts of the process (κ_t). The suggestion in the literature to overcome the analytical diffculties in deriving prediction intervals is to use simulation based techniques. Different methods have been proposed: Brouhns et al. (2005) analyse parametric bootstrap methods, Koissi et al. (2006) investigate an approach based on resampling residuals, and Heinemann (2013), a former student at SBE, suggests to use the sieve bootstrap and studies its impact on the length of the prediction intervals.

Extensions and recent applications

Various extensions of the Lee-Carter model have been proposed in the literature. It is quite natural to model the number of deaths at age x in year t instead of modelling mortality rates. This is the starting point for the considerations in Brouhns et al. (2002) who propose to model the number of deaths by a Poisson distribution while keeping the two factors of the original Lee-Carter model. Haberman and Renshaw (2008) keep Equation (1), but extend the right-hand side by including more factors.

As said earlier longevity risk is an

important risk factor for insurers and pensions funds and it is therefore not surprising that there has been an increased interest in longevity swaps in recent years. A longevity swap allows insurers and pensions funds to hedge longevity risks in their portfolios. The pricing of these swaps is often done by using inter alia the Lee-Carter model.

References

Brouhns, N., Denuit, M., and Vermunt, J. (2002). A Poisson log-bilinear regression approach to the construction of projected lifetables. Insurance: Mathematics and Economics, 31, 373–393.

Brouhns, N., Denuit, M. and Keilegom, I.V. (2005). Bootstrapping the poisson Logbilinear Regression Approach to the Construction of Projected Lifetables. Scandinavian Actuarial Journal, 3, 212–224.

Dowd, K., Cairns, A., Blake, D., Coughlan, G., Epstein, D. and Khalaf-Allah, M. (2010). Evaluating the goodness of t of stochastic mortality models. Insurance: Mathematics and Economics, 47, 255–265.

Haberman, S., Renshaw, A. (2008). Mortality, longevity and experiments with the Lee Carter model. Lifetime Data Analysis, 14, 286–315.

Heinemann, A. (2013). Sieve Bootstrapping in the Lee-Carter Model. Research Memorandum 13/06, Maastricht University, Graduate School of Business and Economics (GSBE).

Koissi, M., Shapiro, A. and H¨ogn¨as, G. (2006). Evaluating and extending the LeeCartermodel for mortality forecasting: Bootstrap condence interval. Insurance: Mathematics and Economics, 38, 1–20.

Lee, R. D. and Carter, L. R. (1992). Modeling and Forecasting U. S. Mortality. Journal of the American Statistical Association, 87, 659–671.

> Become part of the best profession of 2010, 2011, 2012 and 2013 (Elsevier/SEO 2013)

MANAGING FINANCIAL RISKS: A NEW GENERATION OF ACTUARIES

Risk is the possibility that an undesirable event will occur

The demand for skilled actuarial professionals is still growing. Actuaries are the leading professionals in finding ways to manage risk and managing risk requires knowledge of several disciplines. Understanding how businesses operate, how legislation may impact and how financial economics can affect values are all vital skills for an actuary.

EXECUTIVE MASTER OF ACTUARIAL SCIENCE

E M A S

Distinguish yourself from other risk professionals

- Fast track from bachelor (BSc) to MSc/AAG
- Direct admission after Master Econometrics and Operations Research, track Actuarial Sciences (UM)
- State-of-the-art NVAO accredited programme (MSc) from TiasNimbas Business School (RVE)
- Developed by the Dutch Actuarial Institute (AI) and TiasNimbas
- Start date: January 2014, part-time degree programme in Tilburg and Utrecht, English-language, 24-30 months
- Lectures and tutorials are mixed with case-based learning
- Expert mentors, excellent network
- Directly applicable in your working environment
- Exchange of experience and ideas amongst fellow students
- International recognition
- Information: T +31 (0)30 6866150 E info@ag-ai.nl W www.ag-ai.nl

More information can be obtained from the websites of the two partner organisations, the Dutch Actuarial Institute (www.ag-ai.nl) and TiasNimbas Business School (www.TiasNimbas.edu).

nvao accredited programme

Actuarieel Instituut®

TiasNimbas Business School

TILBURG UNIVERSITY

In association with: Eindhoven University of Technology

LED

by Bart Maassen

A week before the Landelijke Econometristen Dag (LED) I got a call from the LED-committee with an exciting message: they put me off the waiting list and, hence, invited me for the LED 2014. I was quite fortunate, knowing that the chances for a second year student to join the LED are quite low. However, let me be an example for all the second year students for next year: just apply yourself one minute after the opening of the subscriptions for second year students. Then, you might be lucky.

For those who are not familiar with the LED, I will give a brief introduction. Each year one of the six econometrics study associations located in the Netherlands organizes the biggest meeting of econometricians and relevant companies. An important node to make: even though the name is in Dutch, non-Dutch speaking students are not excluded. Besides this general information, what is the LED? A day of pretending to be a big boy. A day of checking your fellow students (or later competitors) from other universities. A day of pure decadence. A day of listing to boring companies, but also to companies capturing your interest. A day of finding out what is next after studying, or maybe during your study time as well. A day of meeting the world outside the university. And lastly, a day of free beer. Yes, it should be a good day. This year it was up to VESTING | Econometrics Groningen. The Led would take place in Nieuwegein on Tuesday the 11th of February. In the morning we took the bus to Nieuwegein with approximately 30 students from Maastricht. The LED started with a speaker, followed by two cases of a (preferred) company and ending with another speaker. After that, the LED still continued with a drink and a dinner, followed by the party. The first speaker was Alessio

Rastani, an independent market trader. He gained a certain notoriety for stating on life TV that he enjoyed the recession, since it is easier to make money in a bad economy. A controversial figure, you could say. Whenever you are interested in any trading, go to his website www.leadingtrader.com and find out about his catching motivation, one that I cannot present in a bit of writing. The cases, with a lunch in between, were interesting. Even though they were neither in my interest (PGGM and Achmea) it was good to see what you can add to a company with your 'econometrics skills'.

During the lunch and the drinks you had the possibility to talk to all the present companies. I definitely can recommend this to everyone, since half an hour of talking to one of them gives you more information than a case of two hours. Afterwards, it was time for the last speaker, Margot Scheltema. She is one of the most influential women in the Netherlands. She talked about her career and gave a bit of a motivational speech for all the women.

The dinner was one of those dinners that are better than an average Christmas meal. Together with other students and companies we enjoyed the dinner. Afterwards, we went to the hostel where we would stay for the night. We dropped our belongings, changed from our suits to more fancy outfits and went to the party where free beer was provided; an offer nobody can refuse. The next morning, Maastricht students were, traditionally, the first to wake up (6.20 in the morning) and leaving the party as the last man standing.

Just some last words. Join the LED whenever you can. In my case there was no time pressure since I am not done studying in the coming three years. Thus, I can take my time to orient myself. Make sure you buy a good suit, can tie your tie and start looking around what's next.

LED








A new generation of actuaries

If you want to distinguish yourself from other risk professionals, choose EMAS!

by Actuarial Institute

There is still a growing need for those skilled in the complexities of actuarial science – professionals who can accurately assess and skilfully manage risk in today's unpredictable global environment.

In response to this need the Executive Master of Actuarial Science (EMAS) has been developed. EMAS is a winning collaboration between two Dutch institutions: the Dutch Actuarial Institute (AI) with its close ties to the Royal Dutch Actuarieel Genootschap and international actuarial communities (such as the International Actuarial Association (IAA) and the Groupe Consultatif) and top-ranked TiasNimbas Business School. Together they deliver an excellent MSc-accredited **(NVAO)** programme with unparalleled career impact.

Risk is the possibility that an undesirable event will occur

The future is uncertain and full of risk. Risk is the possibility that an undesirable event will occur, but risk also means an opportunity. That's exactly where actuaries come into the picture.

Risk comes in many forms. Everyone and every organization faces risk. Actuaries are especially knowledgeable in measuring and managing risk, ergo without good risk management programs, our economy cannot thrive.

Actuaries come from all sorts of backgrounds, though clearly they share a love of maths. As problem solvers and strategic thinkers they have a deep understanding of financial systems. To illustrate a few of the problems actuaries solve:

- They determine how much an insurance company should charge for auto insurance, taking into account many factors such as the car that is being insured and details about the driver;
- They develop insurance products so that you can for instance enjoy adventurous recreational activities such as rock climbing or kite surfing while feeling secure that if something happens the possible loss or costs are being taking care of;
- Actuaries also help and advice companies and pension funds establish their retirement plans;

- And last but not least actuaries advice insurers and pension funds in managing their assets and liabilities and develop ways to manage financial risk.

In a nutshell: risk is at the heart of the problems actuaries solve.

Why should you become an actuary?

As an actuary you have the opportunity to work in specialist areas of insurance, pensions, benefits, healthcare, investments and banking, or for any large organisation where risk management plays an important role, or for a consultancy advising on all sorts of different projects.

As mentioned earlier actuaries solve problems in tune with what's happening in business through their interpretation of statistical data and knowledge of social and economic systems. The unique skills you develop as an actuary are often of key importance behind many high-level strategic decisions made by large companies and governments. These decisions have on many occasions a positive impact on legislation, businesses and individuals.

In other words: actuaries combine good business sense with safeguarding the public's financial interests, upholding the highest professional standards. Once you're qualified, actuarial skills can take you anywhere in the world.

Career opportunity

For the fourth year in a row Dutch magazine Elsevier (June 14 2013) has chosen the profession of actuary as best job in the Netherlands. The Dutch survey Studie en werk 2013 of Elsevier and SEO Economic Research, shows that the actuarial profession scores best for a top level job/career for starters (higher professional education (HBO) and university education (WO)). With a rating of 8.1 the profession ranks first in the top 12 of best jobs in 2013 in the Netherlands before credit analyst and dentist. The survey yearly ranks 12 jobs that provide an optimal mix of six characteristics of a good job: income, employment outlook, attractive benefits, a function on graduation level, overall satisfaction and a work week that is appropriate to the desired number of hours. SEO examined how graduates of higher professional education and academics perform compared to recent graduates with a similar training in the same sector.

EMAS, actuarial science meets the profession

The Executive Master of Actuarial Science (EMAS) started for the first time in september 2010. In January 2014 EMAS 4 starts. Participants to EMAS often have a Bachelor's or Master's degree in Actuarial Science or in Econometrics or (Applied) Mathematics. Depending on their previous education, they have completed one or more modules in the Premaster programme offered by the Dutch Actuarial Institute in order to meet the entry requirements for the EMAS programme. In case of the Master Econometrics and Operations Research, track Actuarial Sciences (Maastricht University) direct admission to EMAS is possible.

EMAS is aimed at young professionals who are active at an academic level and who are looking for ways to broaden and deepen their knowledge. One of the main goals of the programme is to make full use of the opportunities that arise in such a situation. The curriculum mixes concentrated lectures and tutorials with case-based learning in which students work together in small groups and is rounded off by thesis work on an individual basis. The programme is structured in such a way that it is indeed possible for participants to combine work with study and to optimize the cross-fertilization between working and learning. Experience on the job can be incorporated into courses and case studies. Insights developed in the educational pro-

gramme are translated back into practice, giving rise to further reflection. EMAS is accredited as an Academic Master by the Dutch-Flemish Accreditation Organisation (NVAO). Upon completion, you receive the (inter)nationally recognised MSc title. Furthermore EMAS prepares you to gain a full Actuary AG (AAG) qualification which is granted by the Royal Dutch Actuarial Association (AG). AG is the professional association of actuaries and actuarial specialists in the Netherlands, of which nearly all actuaries are member.

Link between theory and professional life

The EMAS programme provides in-depth coverage both of the body of actuarial knowledge and the required competences. In particular, the EMAS programme provides participants with the knowledge and competences associated to the status of a fully qualified actuary.

Participants monitor their progress by feedback they receive from instructors and by regular meetings with a mentor who is assigned to them specifically for the purpose of monitoring personal development. In this way it is ensured that participants not only become familiar with state-of-the-art academic knowledge and insights, but also develop the competencies required to apply these insights in practice.

Broaden and deepen your actuarial knowledge, start EMAS

Are you interested in starting EMAS? Or do you want to receive more information? Please do not hesitate and contact us at:

Dutch Actuarial Institute
'Johan de Witt huis'
Groenewoudsedijk 80
P.O. Box 2433
3500 GK UTRECHT
The Netherlands
T +31 (0)30 6866157
E info@ag-ai.nl
W www.ag-ai.nl

Impressions from **Research Lecture and Block Opening Party**

Impressions from **Adventure Tour**

The Vectum Babies

By Jim Bemelen

During the LEVT committee meetings in the beginning of the year, a lot of things were discussed between Suzanne de Boef and me. During one of these meetings we were talking about lovebirds within Vectum. At some point, Suzanne said that it would be really amazing if there would be a Vectum baby. At that point, my brain got activated by the remark of Suzanne, and I started digging in my brain for possible clues on the existence of a Vectum baby.

After a while, my brain stopped at the name Katrin van Boxtel, my mathematics teacher in my second year of high school. In the beginning of the year, I found out that she was a Vectum alumni and president of Vectum in 2000-2001. I knew that she was married with another old Vectum member Rik Frehen, so I had already found a Vectum couple. After some investigation, I found out that they did not have one Vectum baby, but even two Vectum babies! Now that we knew that Vectum babies actually exist we wanted to know more about them, so I sent an e-mail to Katrin.

On a cold Saturday morning, I picked up Ellissa, our treasurer. She lives in Sittard, the same city where the Vectum babies live as well. Together we found our way to a nice family house across a triangular lawn where the kids from the neighbourhood can play. Katrin opened the door of the house and welcomed us to come in. We entered a cosy living room where we immediately saw them, the two adorable Vectum babies. They are a boy and a girl. The oldest one is Maarten, he is almost 4, and the youngest is Julia, she is almost 2,5 years old. Maarten and Julia were very active and luckily not shy at all. Thanks to our dedicated alumni officer, Leann Poeth, we had a nice ice breaker. She gave us a Maastricht University hoodie as a present for the kids. As you can see on the picture the kids were very happy with it.

After a short recap with Katrin about my high school period, we started with the interview. Katrin and Rik tell us that it is definitely possible to combine work with kids. The first period was though and it made it even harder that the kids were born closely after each other. They both say that they really like their job and that this is more important than the pay check you get at the end of the month. Children demand a lot of time so you need to have a job

that is flexible and not a standard 9 to 5 job. They mention that as long the kids are healthy, their planning works out fine. On weekdays, Katrin takes care of the kids most of the time. At the moment, Rik is assistant professor at Tilburg University. Next to his master in Econometrics he also did a PhD at Maastricht University. Katrin works as a SAP consultant. She says that if we want to know more about being a SAP consultant, we can ask her. In the past, both of them were used to be teachers at my high school. Rik mentions that the nice thing about teaching is that you can really help people. Meanwhile, Julia and Maarten are enjoying a sandwich made by Katrin. Julia says that she is looking forward to the fries she will get tonight. After some more talking we found out that Rik is born and raised in Landgraaf, just like me, and that Katrin is from Nuenen, just like Marie, our vice-president. Rik mentions that they do not really have future plans; they live from day to day. They both say that as an Econometrician you can work at a lot of places, as the study gives you a solid basis of analytical skills and intellectual ability. After some more talking, Ellissa asked where it all started.

Katrin says that she was president during Rik's first year. They knew one another for a while already before they became a couple. It all happened thanks to a Mathematical Statistics exam, the perfect way to fall in love for Econometricians. As the exam was really difficult they both walked out on it. In the end everybody passed the exam as

the grades were scaled up, except Katrin and Rik. After that, they spend a lot of hours together to study for the resit. Katrin tells us that Rik kissed her at some point during studying and that she kissed back and that she would just see where this would go. Now, they are already 12 years together and they got married last summer. Rik says with a smile, that his friends advised him not to go with Katrin as she had had some boyfriends before.

In the meantime, Julia started to make a puzzle. You can immediately see that this was a real Vectum baby who likes to have a challenge. Katrin says that Julia looks more like her and that Maarten looks more like Rik. Rik and Katrin both mention that they look back to a great time at Vectum and Maastricht University. They mention that they still remember the lessons of Hans Peters, Ton Storcken and Jean-Pierre Urbain. Rik mentions that he uses teaching skills from his teachers to improve his own way of teaching. Rik says that they made friendships for live during their Vectum period and that they are still in contact with them. Katrin confirms this. Rik was even the best man at a wedding of another old Vectum member.

As a final remark, Rik says that he doesn't like to say "you have to enjoy your study, as it is the best period of your life". You decide what your life looks like and you just make the best out of it. After some more chatting, we finally had to leave after a 2-hour interview. We said goodbye to the Vectum babies and thanked Katrin and Rik for their hospitality. Maybe, after a few years, we can welcome the first generation of Vectum babies at SCOPE | Vectum.

Puzzle

Compensating Errors

The class had been given a sum to do, involving three positive whole numbers (which in this case means greater than zero). During the break, two classmates compared notes.
' Oops. I added the three numbers instead of multiplying them,'said George.
'You're lucky, then,' said Henrietta. 'It's the same answer either way. '

What were the three numbers? What would they have been if there had been only two of them, or four of them, again with the sum equal to their product?

Solution to the Puzzle

PerVectum issue 2, 2013-2014

The smallest possible number of party guests is seven: two small girls and one boy, their father and mother, and their father’s father and mother.

Impressions from **Active Member Dinner**

Study Abroad

Exchange Semester in Milan

by Evy Zeptner

Over a year ago, I entered the computer room at the SBE, as my programming tutorial was about to begin. My friends were already there. However, I noticed that there was something different going on. They seemed extremely enthusiastic and happy. Apparently they had just heard about their study abroad destinations; Australia, Canada and France! It appeared they also already knew my destination before I knew it myself! They were all very eager to tell me, as I got my first preference: Università Bocconi in Milan!

From the first moment onwards, I knew that I wanted to learn the Italian language. I've been on holiday to Italy many times before, and every time I found it a bit of a pity that I couldn't speak Italian. Therefore, I registered for the 'Erasmus Intensive Language Course' in Perugia, as soon as I was offered the possibility. On the 1st of August, I started my Italian adventure. I went to Perugia to do the language course, which would take a month.

On the first day, all exchange students had to do an entrance test. As you could say my knowledge of Italian didn't really exceed the words 'pizza, spaghetti, and gelato', I was

a bit surprised that they did not put me in the complete beginner's group. Most of my group members had done some Italian before, and if they didn't, they were Spanish. We had 20 contact hours a week, and as the teachers only spoke Italian (they refused to speak in English) and with half the class being Spanish (It seemed that most of them couldn't speak any English) I managed to learn some acceptable level of Italian in four weeks.

During the weekends we had time to bring our newly learned Italian into practice. The first weekend I went to Firenze, together with Joost, who was there to visit me. I had been to this city before, but it stays beautiful, no matter how often you go there. It's an old and typical Italian city, but unfortunately it is full of tourists. During the second weekend, I went to Siena together

with two of my house mates. Siena is a small, old city in Tuscany and usually it is a peaceful place. However, we went there on the day of 'Il Palio', a horse race which is organized every year. The entire city was decorated with different flags that represented the different districts and the different horses and horse riders which would later on ride the race. It was madness; It was 35 degrees, every inhabitant of Siena was dressed up and supporting its own district and tourists were already collecting on the main square 5 hours before the start of the race. That's what we did as well, sitting in the sun for 5 hours, waiting for a 5-minute race. Sounds crazy right? When the horses and their riders were presented, the entire square became completely silent. But when the horses entered the square, people got crazy. My friends and I were lucky to have a place close to the most difficult angle, which made it even more exciting to watch the race. We even saw someone falling of his horse, which was really scary, considering the speed they have. After the race, my friends and I all agreed that all the waiting was definitely worth it! In my last weekend, my friend and I went on a trip to a more southern part of Italy, namely Naples, Capri and Pompeii. Capri was beautiful, but really expensive and Pompeii was really impressive. However, Naples was just a different world compared to all northern and central Italian cities I had seen before. Naples is a city which has many beautiful buildings and has

beautiful surroundings. However, it is very deteriorated, there is garbage everywhere and the richest buildings are just not well contained.

After 4 weeks, summer was coming to an end, and it was time for a new adventure. We all received our EILC certificate and it was time to say goodbye. We were all moving to different cities in Italy; some went to the north, while others went all the way down to Sicily. For me, it was time to take the train to Milan. I already arranged housing before, so I only had to find my room and pick up the keys. My room appeared to be really nice. It was on the fifth floor and had a balcony, and thus a view all over Milan. After a few days, it was time to meet my flat mates; 2 Italian guys who were both in their third year at Bocconi. They appeared to be really nice and they immediately let me join their group of friends, which consisted only of Italian people. As I was still willing to improve my Italian, I told them not to speak in English, but to continue in Italian. I did not regret this choice, but sometimes it was a bit hard, as you have to stay concentrated all the time. Although my Italian improved rapidly, it was sometimes hard to understand the conversations, especially when we were sitting in a bar or when they started joking about.

The Italian language was not the only thing I learned from them. They also taught me some things about the Italian kitchen. Making spaghetti in the way I was used to do it, was surely not the Italian way to do it. First, I needed to put way more water in the kettle, the ordinary salt which I put in the water had to be sea salt and I had to use less sauce. The supermarkets fitted their high demands on pastas and tomato sauce perfectly. There were entire shelves filled with these things. Moreover, as probably applies to most Dutch, we know the difference between spaghetti and penne, but spaghetti is spaghetti. For Italians, there are over 5 different types of spaghetti, all varying in thickness and texture and it is really important to combine the right spaghetti to the right sauce. Obviously I let my Italian friends do the shopping for our dinners together, I didn't even dare to give my Dutch view on these choices…

They are also very different in the way they dress. Clothes, shoes and haircuts are really important. Girls always wear heels when they go out and boys use the mirror way more often than we are used to. The cultural differences which were apparent in both clothing and food are differences I really loved. They just put a lot of passion in everything they do.

Of course it wasn't all about getting to know the culture. I also had to go to university and make sure that I passed all my courses. Although I choose Milan instead of Rome because of the bigger range of English courses, I did choose one of my five courses in Italian. This was probably the biggest challenge of my exchange. I was

the only exchange student in this class and the teacher even admitted that she speaks faster than the average Italian. In the end, I fortunately did manage to get a good grade for this course. Now my knowledge of Italian consist of roughly B1/2 level, plus some extra vocabulary in the field of technology and innovations (which is of course very useful on my future holidays in Italy ;)) All the other courses were not extremely easy, but very doable compared to the courses in Maastricht.

I also made a few trips to cities in the neighbourhood. I went to Bergamo, Como, and Monterosso. The last one is part of Cinque Terre, five beautiful picturesque cities on the coast. We went there to have a swim in the sea during the last hot weekend in September. On top of that, I also went abroad during my exchange. After the midterms, I went to Grenoble to visit Joost. Grenoble appeared to be a very beautiful city in the middle of the mountains. And, for those who know Joost a bit, it won't come as a big surprise that we did a cycling tour through the Alps, which was very nice, but also very exhausting! During my stay in France, I also experienced that Italian and French are quite similar. Although at the end of secondary school my level of French was quite okay, I couldn't say anything in French anymore without completely mixing it with Italian. The only thing I could was answering questions with 'si', instead of 'oui'… So I decided to let Joost do all the talking and keep my own mouth shut for

the rest of the weekend.

The advice that everyone gives to you is that you have to enjoy every moment of you exchange, as time flies. I can only confirm this. Also, for those who are doubting whether to stay in Europe or to go to another continent, I can only say that I did not regret my choice to stay within Europe for a single moment. Even within a range of 1200 km, cultural differences are noticeable and there will be students from all over the world anyway. The biggest advantage of going to France, Spain, Italy or any other country within Europe compared to for example going to the USA or Australia, is that you have the opportunity to learn a new language. This will be beneficial for the rest of your life. To all current second year students: I hope you will enjoy your exchange just as much as I did!

Upcoming Events

April 10th Study Trip Brussels

April 15th SCOPE Block Opening Drink: Easter Theme
In block 5 SCOPE | Vectum is responsible for organising the Block Opening Party. The activities commitee and the board will transform the Preuverij into an Easter garden!

April 17th Case Day
4 companies will come to the SBE with an interesting case related to their daily work. This gives you a great opportunity to focus on your career!

April 22th Research Lecture and Board Info Evening
Assitent Professor Stephan Smeekes will tell about his research in the field of Econometrics. After the lecture, we will provide information on being a board member of SCOPE | Vectum.

April 23th Kempen & Co Inhouse Day
The Kempen & Co Inhouse Day provides you with interesting insights into what it is like to work in this merchant bank.

April 29th Bowling

May 1st MIcompany Recruitment Dinner
During this three-course dinner, you get the chance to get to know MIcompany better and ask all your pressing questions.

May 7th Deloitte Lunch Lecture
You get to know one of the biggest and leading Consultancy firms in the world during a delicious lunch.

May 8th Squash Tournament

May 13th Beer Games Party

May 20th Walking Dinner

June 13th, 14th & 15th Members Weekend

Dates may be subject to changes.
Please check www.scope-vectum.nl for updated information and subscription forms.