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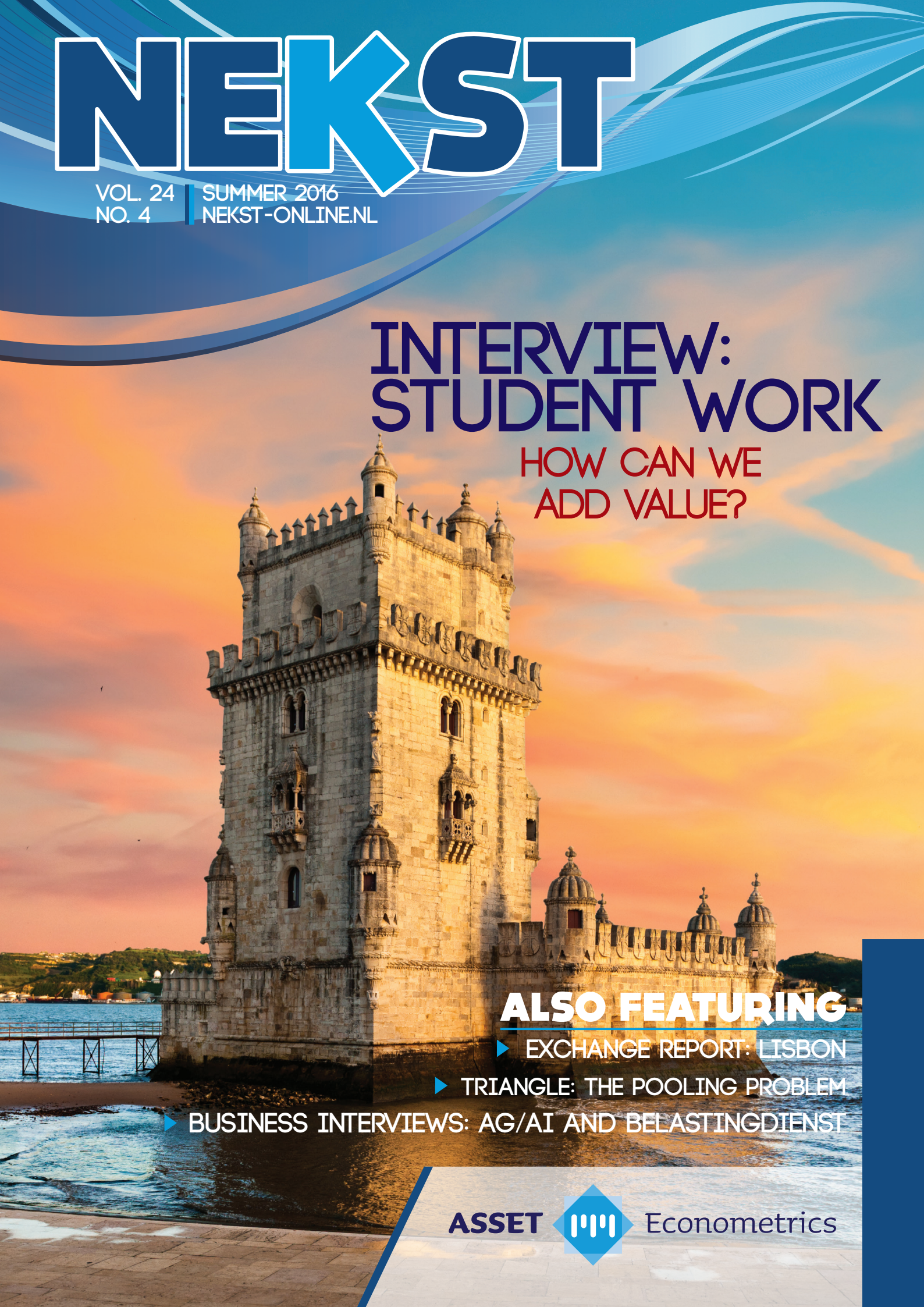


INTERVIEW: STUDENT WORK

HOW CAN WE ADD VALUE?

ALSO FEATURING

- EXCHANGE REPORT: LISBON
- TRIANGLE: THE POOLING PROBLEM
- BUSINESS INTERVIEWS: AG/AI AND BELASTINGDIENST

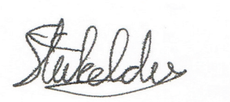
Preface

Passing On

Time flies when you are having fun! This is already the final Nekst issue of this year, and we surely did enjoy working on Nekst; hopefully you enjoyed reading Nekst equally much. For those of you that are a bit harder to please, let us give it one last try with this final issue. The first highlight is the Student Work Special, in which we interview three students about their student work related to econometrics. Furthermore, we held business interviews with AG/AI and the Belastingdienst, and Paul Visser shares his experiences as a graduate intern at ORTEC.

The first edition of the Operations Research Conference is of course also not to be missed, and other new initiatives such as the Quantitative Investment Group committee are covered as well. While all of this may sound great to you, every once in a while it is good to listen to our parents' opinions as well. Therefore, one brave parent wrote an article about the Parents Evening. Of course, as you have come to expect of us, many more interviews and activity reports can be found in this issue, such as an interview with Judith Brugman about hip-hop dancing on an international level.

As you can see, the Nekst committee has certainly not taken an early holiday. I would like to thank all editors for their hard work; I know the deadlines caused some stress here and there. You did great! Special thanks go to Lotte van Bakel and Ennia Suijkerbuijk for great work in layout and coordination. To end my final preface, I have the honor of introducing you to the people to whom we will pass on the noble tasks of writing and designing for Nekst for the next academic year: Pepijn Wissing will be the new Editor-in-Chief and Steffi van den Hanenberg will be the new lay-out editor. I am confident that Nekst has a bright future!



Stefan ten Eikelder
Editor-in-Chief

COLOPHON

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Correspondence
Asset | Econometrics
Tilburg University
Room E 1.10
P.O.Box 90153
5000 LE Tilburg
Telephone: 013 466 27 47
info@Asset-Econometrics.nl
www.Asset-Econometrics.nl
www.Nekst-Online.nl

Editorial staff
Stefan ten Eikelder
Steffi van den Hanenberg
Max van der Lee
Aurel Macias Minambres
Ennia Suijkerbuijk
Claire Vink
Mike Weltevrede
Pepijn Wissing

Lay-out editor
Lotte van Bakel

Contributions
Jeffrey Buijk
Martijn Heinen
Nick Huberts
Thomas van den Hurk
Milan van der Kamp
Goos Kant
Frieke Ketelaars
Thijs Kramer
Joep van Kroonenburg
Marieke de Leeuw
Thomas van Manen
Ahmadreza Marandi
Marieke Musegaas
Charlotte Nijman
Bart de Peuter
Ernst Roos
Lieke van Uden
Paul Visser
Edwin Weltevrede

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Few fields of science are as reputed for their difficulty as quantum mechanics. This special reveals an upcoming application of the concept: quantum computing.

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Suit up! Certainly a catchy phrase, but how should you actually dress for formal occasions? Take a look at the midpage for some tips and tricks!

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A group of former active members gathered in Utrecht to enjoy an evening as if they still were students.

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CAREER PORTAL

Dear Members,

Writing this article, I realize this will be my last tale I am telling you as chairman. This piece describes my life at this moment best, since I face two different views. One takes a look back to the past year, while the other is facing towards the upcoming year. I will never forget how privileged I was to be part of the board of this beautiful association for a whole year.

All great things must come to an end, they once told me. I have never disagreed with that saying as much as I do now. I will miss every little part of being a boardie. The year has passed by way too soon: I remember writing my first Dear Members of this year like it was yesterday. I will even miss the repeating questions of the 'Neksters' whether I had already finished my article or not.

I do not exaggerate when I state that fulfilling a position in the board of Asset I Econometrics has changed a lot in my life. I encountered both life-changing and smaller changes throughout the year. For example, this year has been an eye-opener in what my capabilities and flaws are and how to use them in the most effective way. I also developed my affection for cucumbers, pickles and Doritos Bits.

While you are enjoying your free days during the summer, the new candidate board will be preparing for next year. First of all, they have to start with acquiring knowledge about every little detail that makes our association as it is now. Thereafter, they will come up with a new policy and budget for upcoming academic year. They are already striving to make the association better, and we know for sure that their new ideas will take the association to an even higher level.

If you completely missed out the announcement of the candidate board for the academic year 2016-2017, which is quite an accomplishment given the amount of Facebook views and the number of members present at the Announcement Drink on June 7, they will be named one more time here. The candidate board for next year consists of Linda Torn, Charlotte Nijman, Tim van der Heijden, Milan van der Kamp and Anouk Verhagen. They will fulfill the positions of Chairman, Secretary, Treasurer, External Affairs and Internal Affairs, respectively. I hereby wish them all the best for the upcoming year!

As board, we strived to serve all members best. Of course, we were supported by the great help of our (active) members. A new record has been set by both the number of new active members and the current total amount of active members, which we see as one of the greatest achievements of our year. Thank you for all your effort and your contribution to the association this year. Without you, the year would not have been such a success for us and the association.

Enjoy your holiday and see you next year!

On behalf of the board,

Thijs Kramer
Chairman Asset I Econometrics 2015-2016

Practice Makes Perfect

For this edition's special we have interviewed three ambitious econometrics students that were curious about the applications of econometrics in practice, because: "In theory there is no difference between theory and practice. In practice there is." - Yogi Berra

Text by: Steffi van den Hanenberg

Roman Kazus

Age: 20
Phase: Bachelor
Company: Building Blocks
Started: September 2015

Having lots of spare time to fill, Roman Kazus reckoned he would rather spend his time exploring the applications of econometrics than wasting his time watching television. About a year ago, when he got in contact with his current employer during the Symposium 'Saving Lives' and had dinner with them afterwards, Roman got more enthusiastic about actually realizing his plans. Being a pianist at a restaurant in Oosterhout – where Roman currently lives with his parents – he was invited to perform at the wedding of one of the owners of the company. The ball started rolling and after the summer holiday, Roman was starting up his laptop at one of the flexible workspaces at the data-driven commercial decision-making company.

The application procedure was quite a happening. He started with a general meeting, which was followed up by a personality test, and another meeting afterwards. The procedure concluded with a skill test, in which programming skills and modeling competences were examined. The test was not necessarily to check what programming languages you already master, but rather to see if you have the right mindset to understand and learn quickly, something which cannot always be abstracted from grades. After the positive outcome of the test, the procedure was topped off with a last practical meeting. This might feel like quite an inspection, but Roman was not the only one that has proved himself. In total, four econometrics students are working at the firm, of which two are bachelor - but soon to be master – students, which is quite a number for a young company.

Roman is putting his expertise in practice for sixteen hours a week and can choose to work whenever and wherever he wants. Nobody is holding you back to keep the work flowing after midnight, at the office, or at home: flexibility to the limit. The three major positions at the data science company are data engineer, data scientist, and data translator. Roman fulfills the task of a data scientist. In his work, he often employs linear regression and both probit and logit models, which we all have encountered in the course 'Econometrics'. In addition, clustering algorithms, panel data, forecasting and SQL are used. A lot of statistical programming is done in R, which has an integrated suite of software facilities for data manipulation and calculation, making it more useful to exploit data than, for instance, MATLAB. Since R is also suitable for regression, it is no surprise that the software is newly introduced in the first year of the EOR bachelor program. For the graphical display and visualization of data, they make use of the software QlikView. For techniques that are used frequently so-called 'blocks' are coded, which only require input and do the work for you. "This is the most efficient way of working and it is less boring than doing similar tasks ten times over." Longing for the most efficient process possible, Roman is a good fit in the team. Also, being critical is a characteristic that every member of the company should have. This is because, although projects are handled in teams, all tasks are divided and are mostly tackled on your own. Afterwards, the team meets again and everyone discusses their findings. So, in order to maintain quality, they never deliver something without it being checked or improved by a colleague.

Since most companies know that the analysis of big data can be extremely useful, but are not aware of the details, the firms' employees, almost solely econometricians, set up brainstorm sessions with clients to discuss the possibilities of exploiting data. A data request follows, in which all data that might be useful is gathered. Next step: data cleansing. Outliers and corrupted data records are removed, because too much noise disguises relationships. Also, in practice there is no guarantee of significant findings. The biggest eye-opener for Roman was to see that lots of organizations make decisions based on their gut feeling or simple statistics such as averages. Methods that are just a little more sophisticated, for example using double exponential smoothing and including seasonality, already increase accuracy significantly. Now that Roman has caught the data madness, he finds it a good thing that the ORMS master has changed to BAOR and is extended with some more data analysis courses.

For his master thesis, Roman is free to explore the world of econometrics and operations research and can return to the company afterwards. But first, his exchange to Copenhagen will take place.

Tessa Stehouwer

Age: 24
Phase: Master
Company: Anago
Started: June 2014

Tessa was just checking Facebook when a post of her current employer looking for work students caught her eye: perfect timing. At that time, Tessa was doing a premaster and she had two days of spare time she would rather fill with solving problems in practice than in theory. To her own surprise, she, a premaster student, was hired. Apparently there is no need to be a top notch econometrician for a company to benefit from you as a working student. Now, almost two years later, Tessa is still working at the company for one day a week, next to the courses she takes in her ORMS master. To combine the job with her study, Tessa has chosen to spread the ORMS courses over the entire academic year and start with her master's thesis after the summer holiday. This is no problem, because in practice it seems that combining courses and writing a thesis at a company in one semester is challenging because of overlap anyway.

> **'You will learn what you want and maybe what you definitely do not want'**

The firm she works at, a small company located in Den Bosch, is there to create and deliver software for personnel planning and financial and process improvement for those cases where Excel is no longer sufficient. Tessa handles a variety of jobs, from building user interfaces from scratch and customizing and improving existing ones to preparing software training for clients. Her application process went pretty smooth. After submitting her résumé and motivation letter, she was invited to an interview. It was no interrogation, but a proper conversation to get to know each other and learn whether or not she would fit into the team, which seemed to be most important for the company. Tessa did not feel like she was there only to convince them, but also the other way around. No assessment was required during the procedure of becoming a work student.

At the start, she was not thrown into the deep end. Former work student Emmy was still there to show her al the ins and outs of being a work student and explain what would be expected of her. Tessa remarked that most of the activities she does have been learned through practice. She mentions that no specific courses are required, but rather your general intellect and logical reasoning capacity. Nevertheless, some Java and MATLAB programming skills did come in handy. Because of this, there was no need to worry about the company using her own software; if you know the basics of one programming language you are a quick study in the next one.

The thing Tessa has learned most from her job as a working student is how to tackle big projects, from starting a project by analyzing the problem to solving it in a structured way. Furthermore, she learned a lot from working with deadlines that also affect other people instead of just yourself and your grade, which is a whole different responsibility. Since Tessa only works one day a week, time is scarce, so therefore she mostly works on smaller parts of bigger projects. Nevertheless, she really feels like she is useful to the firm, even though she has not graduated yet. She is not just a work student, but really a part of the team. Not only that, she also benefits by getting to know what she really wants to do and would like to do for the next forty years of her life. Piece by piece, she gains experience in consultancy. The only part that she has not yet fully discovered is the contact with clients, which, due to practical reasons, is left to the regular consultants.

Tessa is feeling quite comfortable at the company. Next academic year she will start writing her master's thesis for four days a week in addition to the one day she is currently working. She felt no reason to look for other companies to write her thesis at, because she already has some interesting topics in mind and she knows she will be given any guidance that she might need. Finally, Tessa would like to encourage econometrics students to go for it. She thinks it is a pity that not many econometrics students apply to become a work student. You will learn what you want and maybe what you definitely do not want, which is okay too. "If you do not feel ready now, you will probably not feel ready after your master's either. You will have to do it eventually. So why not do it now?"

→

Valentijn Stienen
Age: 22
Phase: Master
Company: ORTEC
Started: October 2015

After writing his bachelor's thesis, Valentijn decided to postpone his master's; it was time for a road trip through the US and Canada. Next to this, it was the perfect opportunity to gain some experience at a company in the field of econometrics. Curious about how all techniques learned in his bachelor are applied in real-life situations, he just went for it without knowing whether or not – and if so, what – he could provide for a company. The main purpose for him was to get to know which particular area of econometrics would suit him best. "Or not at all", he adds. "Doing student work and being around full-time consultants is the perfect opportunity to learn and experience what you can provide a company and to discover your future interests!"

'The wide variety of problems where econometric techniques can help is enormous!'

His company sells optimization software and analytical solutions to increase the effectiveness of businesses. What business field in particular is not important; from the manufacturing sector and retail industry to the sports sector: "There is always something that can be optimized. The wide variety of problems where econometric techniques can help is enormous!" The application procedure was a little more sophisticated. As is often the case in applying for consultancy work, an assessment was required to test Valentijn's intellectual capabilities. Once he passed, everything was as thick as thieves: he was invited for a relaxed and informal conversation at the office so that the firm could find out if he would fit in their team. "In the end, this is more important than having the highest grades of your class."

As he is now working in the analytics and optimization team, Valentijn mainly focuses on the analysis and visualization of data. The latter is of great importance, Valentijn stresses, because they want the company to understand and be involved as much as possible. So, in addition to the data analysis, he also creates dashboards that show new insights in data. At the start, Valentijn was given time to develop skills in the used software. After he mastered those skills, he was assigned to a project in which he could actually use them. Indeed, team members actually benefited from his skills, as regular team members were not ashamed to ask if he could help them out. Because of this, Valentijn really feels like an additional member to the team and not "just" an intern. Throughout the process, guidance was provided by the project manager wherever needed. Fortunately, quite some techniques from class are applied in practice, such as regression, linear and combinatorial programming and game theory. Also, the mathematical way of thought in programming, but not the programming language as such, has been useful to Valentijn.

This brings us to Valentijn's main learning point during his student work: the experience of working at a real-life OR company. In practice, problems are not clearly stated on a piece of paper and are supplied with corresponding data. "You should operate differently to get a job done than in assignments of courses. Defining the problem is already done for you in your class. In practice, it is not." Instead of having it provided to you on a silver platter, you should gather your own data. Another concept that is crucial for the quality of your end result is deciding what technique to use. "In class, the assignments are subject specific and are based on the content of that particular course. Hence, the appropriate approach is clear right away. In practice there are many ways to go. It is up to you to choose which way is the best." Only after that you start modeling, solving, and implementing. Additionally, teamwork and communication come into play. "In practice you always work in teams, which is great, because you derive new insights by brainstorming with your colleagues." Valentijn states he has learned how to explain everything efficiently and clearly, both to his colleagues and the clients, but with enough detail for it to be useful.

As of September, Valentijn will start with the newly introduced BAOR master. If the travel time from Tilburg to Zoetermeer is manageable, he would like to stick with his employer during his master's thesis. The sixteen hours a week he has worked since October 2015 have helped him figure out that data analytics is absolutely up his alley. Nevertheless, Valentijn would rather switch between fields once in a while than sticking with one particular expertise of econometrics. Other fields he would like to explore in the future are for example finance and operations research. From experience, Valentijn would recommend everybody to follow an internship or work as a student assistant at a company. "It is a great experience and no time is wasted! If you have some spare time, go for it!" And if you are too busy, he would suggest you to create spare time, even if this results in study delay. "Only the experience is already worth it." Secondly, feel confident! "Do not forget that this is also an opportunity for the company, since they might have just harvested new talent! Be yourself. If they do not hire you, you would probably not be happy to work for that particular company in the first place."

All Good Things Must Come to an End

It was like yesterday that we, as small innocent high school kids studying hard on our final exams, were to decide upon our studies. Both of us decided to go for Econometrics and Operations Research. Just as our final exams then symbolized the end of our high school life, so have we almost arrived upon another end of a chapter in our lives. After three years of being a PhD student, only a few months are left before we say goodbye to Tilburg. This is another chapter that we are about to close, but there will still be more chapters to come.

'When we leave the nest, we shall not be afraid the world will run out of newborns'

We are not the only ones who will leave Tilburg University soon. Apart from other PhD students, there are also some professors who will retire and thus leave our university. For example, it will not be many years before we will have to miss the great teachings in Microeconomics by Prof. dr. Dolf Talman. Have we not all grown up with his funny jokes? Besides from Prof. dr. Dolf Talman, also the guy who introduced us to the wonders of the world of asset pricing will leave our department. Not only bachelor students, but also future master students will have to survive without Prof. dr. Hans Schumacher. Many business students will remember the always devoted Dr. Gert Nieuwenhuis. EOR students will most likely only know him from Risk Theory, but he has also been of great value to the department and will retire soon.

When one door closes another opens. Our department will not empty out since we can welcome at least three new colleagues: Dr. Jochem de Bresser, Dr. Anne Balter and Dr. Nikolaus Schweizer. After a small adventure in Groningen, Dr. Jochem de Bresser returns to Tilburg, while Dr. Anne Balter and Dr. Nikolaus Schweizer are new faces in Tilburg.

Just like in our department, students come and leave in the bachelor and master program. Many of you will finish your thesis this summer. Some are doing this by means of an internship, others are working on a theoretical thesis. For the bachelor students the chapter will not be closed yet, because many of you will continue their studies with a master program. However, many master students will close another chapter of their lives and will finally have a decent job. Nevertheless, the university is very happy to welcome many new students in the program for the next academic year. And so, when we leave the nest, we shall not be afraid the world will run out of newborns, a.k.a. freshmen.

Time flies when you are having fun and, as with every chapter in your life, the years go by. Also the past academic year has flown by as this is already our last column to write. But who knows what will come next to us? We wish you all a very nice summer and all the best for whatever comes to you after this academic year.

Nick Huberts & Marieke Musegaas

Marieke Musegaas and Nick Huberts are PhD students at the Department of Econometrics and OR. Marieke's field of research is cooperative game theory and especially OR-games. She likes doing sports, playing board games and going on holidays. Nick's field of research applies game theory to a Real Options setting which analyzes strategic investment decisions under uncertainty. He likes to play (board) games, discover the secrets of Europe's beautiful nature, attend festivals and study Hermetic and Thelemic traditions.

What Is the Pooling Problem?

The pooling problem is well-studied in the chemical process and petroleum industries. It is a generalization of a minimum cost network flow problem where products possess different specifications. The goal of solving a pooling problem is to find the lowest cost flow-rates in the network that satisfy the demands. In this article, a mathematical model of a pooling problem, called the P-formulation [6], is studied and the different approaches to solve these types of problems are mentioned.

Introduction

The pooling problem, which is a subproblem of wastewater networks, crude oil refinery planning, etc, is important because of the huge amount of money that can be saved by solving it to optimality. In a pooling problem, flow streams from different sources are mixed in intermediate tanks (pools) and blended again in the terminal points. At the pools and terminals, the quality of a mixture is given as the volume (weight) average of the qualities of the flow streams that go into them.

In the pooling problem, there are three types of tanks: **inputs** or sources, which are the tanks to store the raw materials, **pools**, which are the places to blend incoming flow streams and make new compositions, and **outputs** or terminals, which are the tanks to store the final products. According to the links among different tanks, pooling problems can be classified into three classes:

i) Standard pooling problem: In this class there is no flow stream among the pools. It means that the flow streams are in the form of input-output, input-pool and pool-output; see Figure 1.

ii) Generalized pooling problem: In this class, the complexity of the pooling problem is increased by allowing flow streams between the pools.

iii) Extended pooling problem: In this class, the problem is to maximize the profit (minimize the cost) on a standard pooling problem network while complying with constraints on nonlinearly blending fuel qualities such as those in the Environmental Protection Agency (EPA) *Title 40 Code of Federal Regulations Part 80.45*.

There are many equivalent mathematical formulations for a pooling problem, such as P-, Q-, PQ- and HYB- formulations, and all of them are formulated as a nonconvex (bilinear) problem, and consequently the problem can possibly have many local optima. These formulations vary in the way of representing specifications in the pools. For instance, in the Q-formulation the fraction of incoming flow to a pool that is contributed by an input is considered.

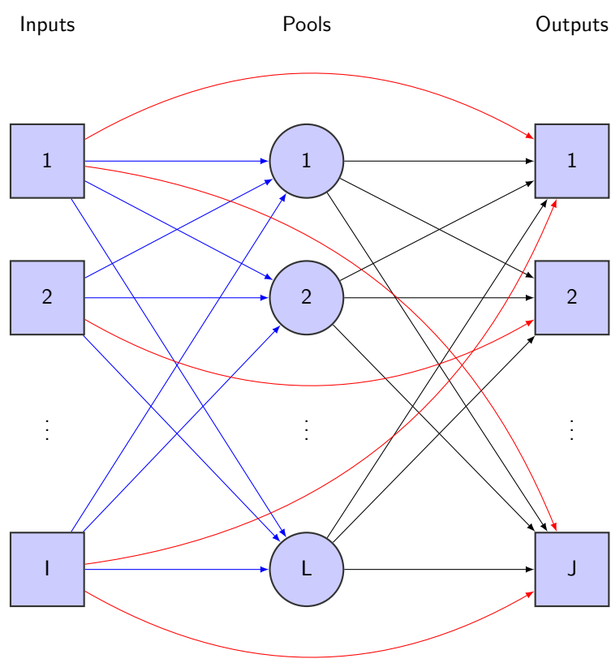

Figure 1: An example of a standard pooling problem with I inputs, L pools and J outputs.

P-Formulation

For each arc $(i,j) \in \mathcal{A}$, let c_{ij} be the cost of sending a unit flow on this arc. For each node, there is possibly a capacity restriction, which is a limit for sum of the incoming (outgoing) flows to a node. The capacity restriction is denoted by C_i for each $i \in N$. Also, there are some specifications for the inputs, e.g. the sulfur concentrations in them, which are indexed by k in a set of specifications $\mathcal{K}$ with K members. By letting y_{ij} be the flow from node i to node j, u_{ij} the restriction on y_{ij} that can be carried from i to j, and p_{lk} the concentration value of kth specification in the pool l, the P-formulation of a pooling problem can be written as the following optimization problem:

$$\min_{y,p} \quad \sum_{(i,j)\in\mathcal{A}} c_{ij}y_{ij} \tag{1}$$

s.t.

$$\sum_{i\in I} y_{il} = \sum_{j\in J} y_{lj}, \quad l \in \mathcal{L} \tag{2}$$

$$\sum_{j\in L\cup J} y_{ij} \le C_i, \quad i \in \mathcal{I} \tag{3}$$

$$\sum_{j\in J} y_{lj} \le C_l, \quad l \in \mathcal{L} \tag{4}$$

$$\sum_{i\in I\cup L} y_{ij} \le C_j, \quad j \in \mathcal{J} \tag{5}$$

$$0 \le y_{ij} \le u_{ij}, \quad (i,j) \in \mathcal{A} \tag{6}$$

$$\sum_{i\in I} \lambda_{ik}y_{il} = p_{lk} \sum_{j\in J} y_{lj}, \quad l \in \mathcal{L},\ k \in \mathcal{K} \tag{7}$$

$$\sum_{i\in I} \lambda_{ik}y_{ij} + \sum_{l\in L} p_{lk}y_{lj} \le \mu_{jk}^{max} \sum_{i\in I\cup L} y_{ij}, \quad j \in \mathcal{J},\ k \in \mathcal{K} \tag{8}$$

$$\sum_{i\in I} \lambda_{ik}y_{ij} + \sum_{l\in L} p_{lk}y_{lj} \ge \mu_{jk}^{min} \sum_{i\in I\cup L} y_{ij}, \quad j \in \mathcal{J},\ k \in \mathcal{K} \tag{9}$$

where μ_{jk}^{max} and μ_{jk}^{min} are the upper and lower bound of the kth specification in output $j \in \mathcal{J}$, and λ_{ik} is the concentration of kth specification in the input i. Here is a short interpretation of the constraints:

(2): The pools are just for mixing the incoming flow streams, and nothing is stored in them. So, the total flow-rates going into any pool goes out from the pool.

(3),(4),(5): The inputs, outputs and pools are specific tanks. Hence, they have some capacity restriction in order to store a raw material or product, or to mix some flow streams.

(6): The links in the networks represent devices that carry flows from one unit to the others (for instances, pipes). So, this constraint is due to the capacity limits on these devices.

(7): The concentration of any specification in each pool is the average of the concentrations of the specification of the incoming flow streams. In other words, for the kth specification in the pool l,

$$p_{lk} = \frac{\sum_{i\in\mathcal{I}} \lambda_{ik}y_{il}}{\sum_{i\in\mathcal{I}} y_{il}}.$$

(8),(9): As was mentioned, in addition to the pools, the flow streams are mixed in the outputs as well. Therefore, for each output j and specification k, the concentration is

$$p_{jk} = \frac{\sum_{i\in\mathcal{I}} \lambda_{ik}y_{ij} + \sum_{l\in\mathcal{L}} p_{lk}y_{lj}}{\sum_{i\in\mathcal{I}} y_{ij} + \sum_{l\in\mathcal{L}} y_{lj}}.$$

But for the outputs, there are usually some restrictions on the concentration of each specification. These restrictions appear as lower and upper bounds. So,

$$\mu_{jk}^{min} \le \frac{\sum_{i\in\mathcal{I}} \lambda_{ik}y_{ij} + \sum_{l\in\mathcal{L}} p_{lk}y_{lj}}{\sum_{i\in\mathcal{I}} y_{ij} + \sum_{l\in\mathcal{L}} y_{lj}} \le \mu_{jk}^{max}.$$

More information about different formulations can be found in [5].

Solution methods and softwares

Despite the strong $\mathcal{NP}$-hardness, which is proved in [2], much progress in solving small to moderate size instances to global optimality has been made from 1978 onward, when Harvely described the P-formulation and solved small standard pooling problems by a graphical view of them.

Regarding the solution of a pooling problem, there are many methods in the literature. In all methods, a lower and upper bound are proposed and a way of reducing the gap between them is studied. One way of getting a lower bound for a pooling problem is using convex relaxation, as done by Foulds et al. [4]. Moreover, Adhya et al. [1] introduce a Lagrangian approach to get a tighter lower bound for pooling problems. Recent work done by R. Misener et al. [8] uses a novel piecewise linear relaxation for the bilinear terms with a logarithmic number of binary terms; this is implemented to the software APOGEE in order to solve a pooling problem. The idea of relaxing bilinear terms is described here.

McCormick envelope

Assume that x and y are variables with given lower and upper bounds

$$\ell_x \le x \le u_x, \quad \ell_y \le y \le u_y.$$

Then, the following four inequalities are implied (Figure 2):

$$\begin{aligned} xy &\ge \ell_x y + \ell_y x - \ell_x\ell_y, \\ xy &\ge u_x y + u_y x - u_x u_y, \\ xy &\le \ell_x y + u_y x - \ell_x u_y, \\ xy &\le u_x y + \ell_y x - u_x\ell_y. \end{aligned}$$

By substituting xy with a new variable w, we replace a 3-dimensional surface →

$$\{(x, y, xy) : \ \ell_x \leq x \leq u_x, \quad \ell_y \leq y \leq u_y\}$$

by the convex set

$$C = \left\{ (x, y, w) : \ \ell_x \leq x \leq u_x, \quad \ell_y \leq y \leq u_y, \right.$$
$$\left. \begin{array}{r} w \geq \ell_x y + \ell_y x - \ell_x \ell_y \\ w \geq u_x y + u_y x - u_x u_y \\ w \leq \ell_x y + u_y x - \ell_x u_y \\ w \leq u_x y + \ell_y x - u_x \ell_y \end{array} \right\}$$

It is clear that C, called the McCormick envelope [5], is a polytope and the surface lies in it.

In the pooling problem (1), it is clear by the structure that:

$$\begin{array}{cc} \min_{i \in \mathcal{I}} \lambda_{ik} \leq p_{lk} \leq \max_{i \in \mathcal{I}} \lambda_{ik}, & \forall l \in \mathcal{L},\ k \in \mathcal{K}, \\ 0 \leq y_{lj} \leq C_j, & \forall j \in \mathcal{J},\ l \in \mathcal{L}. \end{array}$$

So, one can replace each $p_{lk} y_{lj}$ that appears in (1) by its McCormick envelope to get a piecewise linear relaxation.

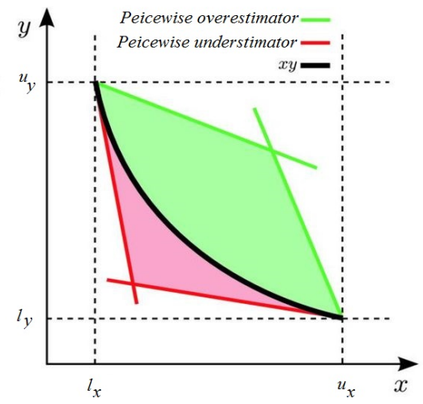

Figure 2: McCormick envelope: the union of red and green sets

To make the McCormick envelope tighter, one can split the intervals $\ell_x \leq x \leq u_x$ and $\ell_y \leq y \leq u_y$ into many intervals and construct the McCormick envelope for each pair of intervals on x and y.

Furthermore, there is another software package, called GloMIQO [7], in which a pooling problem can be solved by generating tight convex relaxations, partitioning the search space, bounding the variables, and finding good feasible solutions. ●

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Ahmadreza Marandi
PhD Candidate

Dabbling in Financial Waters

I have always seen the stock exchange as a casino for gentlemen. Can they really predict what will happen to those stocks and bonds or is it just bluffing? Sometimes, there is a way to beat the casino: counting cards. The stock exchange equivalent of counting cards is called quantitative investing.

The Quantitative Investment Group (QIG) started in February and has fifteen members. We meet every two weeks to discuss our plans for the future. This can consist of new investment strategies that we want to implement or plans to change our current portfolio to get a better result.

Although the return on investment is of course a good measurement of our performance, we do not see this as our main benchmark. We focus on learning and understanding the financial markets, which might come in handy for future jobs or internships. If we do happen to make some profit in the process, we are happy to spend it all at the bar in Esplanade.

Our members are mostly bachelor students from all years, but we are also lucky to have a few master students in our team. This is important so that we can share knowledge and make sure that the QIG has a long-term future.

Occasionally, a speaker from an investment company will come and visit us to give an interactive lecture about investing and trading strategies. Recently, an employee of Robeco visited us and in the coming weeks a lecture will be given by Deep Blue Capital. This gives us a good insight in the world of quantitative investing and new material for our own strategies. We also pitch our own strategies to receive qualitative feedback on our ideas.

Currently, we have a few trading strategies up and running. One example is the Residual Momentum Strategy. The whole idea is based on a paper by Robeco. At the moment they have billions invested in this strategy, so we thought we could give it a try as well. Through the Fama-French 3-factor model you can predict the expected return for an asset. Instead of looking at the expected return, we look at the residual return. This is the difference between the expected return from the past time period and the past return. We then rank all assets on this residual return and select the top α companies.

The first order has been placed recently and we are now simultaneously developing new strategies and looking for anomalies in the financial system, and continuously updating and checking our portfolio to make sure we are on the right track. We spent our first few months in the committee experimenting with the formula and structure of our group, but since we are now up and running we want to keep building our expertise and continue researching the financial market.

New positions become available every semester. Are you interested in the financial market and do you want to make a profit by being smarter than other brokers? Then we might just be looking for you on our team! ●

The Profession of Probability and Impact

What is a life without risks? Risks are everywhere in our daily life, as all events, favorable and unfavorable, have a certain probability of occurring and have a certain impact if they occur. This study of probability and impact, and how to deal with these risks, was the topic of Nekst's interview with Jeroen Breen, general manager of AG&AI. Actuaries often work on risk management problems in insurance and pension settings, but did you ever think about the risks involved in drilling tunnels for Amsterdam's new subway line the Noord/Zuidlijn?

Text by: Stefan ten Eikelder

Jeroen Breen
General Manager AG/AI

The Royal Actuarial Association (AG) is the platform for all actuarial professionals in the Netherlands. Breen estimates that almost all Dutch actuarial professionals are member of the association. Amongst others, AG offers knowledge exchange, by means of presentations, seminars, conferences and mandatory trainings on actuarial topics. Furthermore, AG promotes the profession and fulfills an important advisory role in many societal debates involving pensions and insurances. The mandatory trainings, better known as Continued Professional Development (CDP) are provided by the Actuarial Institute (AI). AI furthermore offers multiple part-time degrees on a variety of levels.

Educating a new generation of actuaries

Actuarial professionals can be more or less split into two groups: actuarial analysts and actuaries. The HBO bachelor's degree of actuarial analyst prepares one for a career as a business professional where the main question in solving problems will most often be: how? On the other hand, an actuary considers the question: why? One can call themselves an actuary AG once the programme Executive Master of Actuarial Science (EMAS) has been completed. Students who finished QFAS at Tilburg University are immediately eligible for this part-time degree, others might have to take some extra courses.

Currently, each year approximately 25 actuaries graduate after completing EMAS, but Jeroen strives for more. This is only natural given the fact that society is changing fast and as a result more and more domains offer possibilities for actuaries to be of added value. In the more traditional sense, actuaries are occupied with pension and insurance activities, but they also find employment in risk management at banks. It does not stop there though. The call for actuaries has grown recently in other fields as well. For example, in Australia 50% of all actuaries works outside of the financial world. One can think of the mining industry, airports and airlines, like Qantas, or large infrastructure projects where risks with large impact have to be dealt with since the probability of those events is unknown.

From navy to actuary

The career path of Jeroen Breen's becoming an actuary is certainly an interesting one. After secondary school, he was determined to become a naval officer. Hence, he started with that, but during his third year he was not so sure about becoming a naval officer anymore. As completion of that year meant he had to stay in the navy for at least ten years, he decided to call it a day, and instead become a mathematics teacher. Therefore, he went to Eindhoven and studied mathematics at Eindhoven University of Technology, which he extended with a degree for mathematics teacher. It was during this last year that the profession of actuary caught his eye. At a conference in Eindhoven, on the topic of mathematics in the financial world, a couple of actuaries were amongst the speakers. Jeroen was certainly interested and he concluded that if he really wanted to become a mathematics teacher there would always be possibilities for that in the future. Instead of becoming a teacher, he applied at a small actuarial advisory firm in Amsterdam which later changed names to Mercer, and was given a position as junior consultant. At the same time he started studying actuarial sciences and became an actuary AG some years later. He later also worked as an actuary and managing director at Willis Towers Watson.

After more than twenty years as an actuary in a consulting role Jeroen was looking for a change. "The consulting component in the work was nice, but I wanted to apply my skills in a different position. When the function of general manager of the AG&AI became available I did not hesitate and applied for the job."

This career move meant in no way that Jeroen was less involved in societal challenges in the actuarial domain. On the contrary. In his current position he has more influence on such debates: "If I have an opinion on something, for example the degree to which AG should be present in political debates, I can actually try to do something about it." AG contributes to many debates on pensions and insurance both when asked by, for example, the government, as well as on own initiative. Jeroen: "Last year we published a report on the hybrid system for disability allowance. The same day, members of Parliament asked questions during so called question time in the House of Representatives. The work that we do as actuaries and at AG is relevant to the public for the simple reason that everyone has a pension and nobody understands anything about it."

Opportunities and challenges

One of the responsibilities of AG is not only to connect actuaries and knowledge but also to keep all actuaries on the forefronts of the field. With more and more data becoming available the traditional concept of insurance is under pressure. In that concept, the population of an insurer is split into several homogeneous risk groups, where everyone in the same group is assumed to have the same risk and hence pays a similar premium. However with more and more data available, more individual risk estimates are possible. Jeroen: "Suppose someone receives a disability allowance due to a chronic back injury but the insurance company finds out that this person is posting pictures of a kitesurf holiday in Curaçao on Facebook. This is of course strange, but the question is whether or not the insurer can use that particular piece of data? On the one hand, it is private information, only intended to be seen by friends on Facebook. On the other hand, most people find it acceptable that this example raises questions at the insurance company. If we are moving more and more towards individual premium, the case where n=1, what are the consequences? If I know that you smoke and eat unhealthy, while I do not, should we pay the same premium? Most insurance systems are built on solidarity, but should I show solidarity to you in this case? Those are all important questions for which we do not have an immediate answer."

This led us to asking Jeroen about the future of the profession of actuary. It has often been said that due to technological advancements, many jobs will cease to exist. "Two out of three children who are currently in primary school will work in a profession that does not even exist yet. Professions that were popular five years ago, might not even exist five years from now." Jeroen also mentions the advancements of robots:

> **'Societal relevance? Everyone has a pension yet few people really understand what it means'**

"Traditional work might disappear, but work involving humans will not. And we must not forget that new jobs will arise as well." The profession of actuary is certainly one with a large human factor. "As a consultant I learned that most questions asked by clients were not actually the questions they really wanted an answer to. An actuary must therefore have good communication skills to find out the real underlying question." To facilitate that, all actuaries AG receive communication and soft skills trainings facilitated by, for instance, AI. Hence, if you are interested in becoming an actuary you of course need quantitative skills, but being socially involved and having communication skills are just as important.

What will the future bring for actuaries? Jeroen: "In ten years, I hope 25% is working in non-traditional actuary areas. Furthermore, I hope for an increase in actuaries working in education, more actuaries in management functions and of course in the field of big data, for example HR analytics." Actuarial sciences is a practical science, as opposed to a more 'theoretical' science such as econometrics. As a study of risks and certainties it can basically be applied to anything. "I see only opportunities. There are, of course, also threats, but with the right education and knowledge you will be able to respond optimally."

Outsmarting Competition

April 26, the day of the Operations Research Conference (ORC)! This unique event was organized for the very first time and took place in 's-Hertogenbosch at the Brabanthallen. The committee from Tilburg teamed up with two study associations from Eindhoven, GEWIS and Industria, to turn this day into a success.

Thomas van den Hurk

AGE: 22

Began studies in 2012

After meeting up with fellow econometricians at Tilburg Central Station, we took the train to 's-Hertogenbosch, and arrived at the Brabanthallen around 9.00 hours for the registration procedure. We picked up our badges and received the information for the whole day. I drank my (first of many) freshly-made orange juice, and took a seat for the opening of the day. The chairman of the ORC, Alexander van Eerden, welcomed us and Emile Aarts and Bob Nieme held a lecture, which was a good introduction about the topic.

After the opening and plenary speeches, it was time for the first parallel company lectures, presented by EyeOn and Quintiq. Since I had visited Quintiq before, I was enthusiastic that I could see more of EyeOn, a consultancy firm specialized in the field of forecasting and planning. It was nice to meet a new company. After their presentation, the employees of EyeOn told us that we could enter a competition to win a special beer package! For this, one has to come up with an idea to forecast the sales for an unknown brand of beer. When the first round had ended, it was time for a coffee break, followed by the second company lectures by Vanderlande and Building Blocks. I attended the lecture of Vanderlande, a supplier in automated material handling solutions.

At 13.00 hours, is was time for our well-deserved lunch. During the lunch, we had the opportunity to talk with the employees that were present during the lectures. Once everyone had filled their stomach, we went to the company cases. I was assigned to the company case of OM Partners. They first gave a short introduction about the company itself, since most of the attendees were not familiar with the company profile of OM Partners. They told us about their definition of a consultancy firm, which was different compared to the general idea of consultancy. Next to the consultancy part, they also provide software solutions in the area of supply chain planning, in particular for mill products. After this short introduction, we were done with listening for a while and could start with the case. We were asked to give advice on a Sales & Operations Planning system for a dynamic multinational. The main idea was to transform a daily planning into a planning for the upcoming twenty years, and we had to decide on what was relevant and what was not. Unfortunately, the judges did not think our planning was the best, but nevertheless we had a good time and we got to know the company better.

There was yet more in store for us when the case ended: the closing plenary speech, where two more speakers gave us insight on Operations Research related topics. The first speaker was Walther Ploos van Amstel, whose speech focused on sustainable city logistics, urban consolidation centers and horizontal and vertical collaboration. It was interesting to hear more about the challenges that we are soon to come across. The second speaker was Bert Pauli, the vice-governor in the province of Noord-Brabant.

The day ended with a networking event, during which it was time to enjoy some drinks, and again had the opportunity to talk with employees of all the companies that were present. Upon departure, we received a goodie bag along with a bright orange umbrella which, unfortunately, turned out to be useful later that evening. All in all, it was a very interesting day, during which I got to know several companies in the field of OR along with enlightening speakers who gave their opinions about relevant topics.

EMAS

Estimation of the Refinery Planning Optimization

The refining industry has to deal with assessing the value they gain, and are thus willing to pay maximally, from each of the crudes they purchase; a complicated process due to the many different production processes within a refinery. Assessing which refinery planning is optimal on the basis of such aspects therefore takes a long time. This report discusses the way in which we, together with ORTEC, will attempt to estimate the refinery planning optimization and thereby reduce the computation time required, such that the refinery has more up-to-date information. Some difficulties inherent to the methodology applied in the refining business will be outlined, together with the proposed solution.

Basics of the refining business

Refineries, the large metal factories we all most likely know due to their appearance rather than their functionality, rework crude oils (also simply referred to as crudes) into products such as kerosine, gasoline, but also lesser known products such as needle coke, which finds its application in the production of electrodes. While the way these are made is a different subject altogether due to the fact that it is a combination of many difficult chemical processes, it is important to realize that the crudes a refinery uses are more than just simple black substances that are drilled up from the ground; each crude has its own set of characteristic values. These concern aspects such as the percentage amount of kerosine or residue they contain, but also their sulphur content, octane content, and many other characteristics. All of these characteristics are well documented as many are important to some degree in either the process of refining or the maintaining of regulations that are set upon all manner of aspects within the refining business. Since not all crudes are the same in these aspects the quantities of each crude can have significant impact on the refinery planning that is created by the optimization process. Our main driver of the estimation will come from these aspects, assessing scenarios where certain crudes are available in smaller or larger quantity than originally expected.

Not only do crudes differ among each other, also refineries are heterogeneous: they can not only contain different distilling units, but are also able to drastically change their setup from one month to the next. For example, they can first focus mainly on fuel oils, and afterwards shift their focus to the production of butanes. In this way, they are in some sense able to respond to the developments of the market, and produce the products with highest demand.

This heterogeneity in the aspects of the refining business can cause the price a certain refinery is willing to pay for a crude to differ from the market price. For example, if a refinery efficiently produces mainly naphtha it might be willing to pay more for crudes that are particularly suitable for this purpose, while a refinery that produces butanes has considerably less use for such crudes and thus has a willingness to pay for those crudes that is lower than the market price. Similarly, crude oils are in some regard substitutes to each other, and thus if one is relatively cheap compared to its substitute, a refinery might be inclined to buy the former. This can have significant effects on what the outcome of the optimal refinery plan will be, and thus needs to be taken into account when we estimate it.

The model

The process of creating the refinery plan can be very time consuming, as it is the result of a very large optimization problem, and usually needs to be done seperately for every scenario the refinery is interested in. ORTEC therefore wants to create a method to accurately estimate the planning outcome (particularly projected profits) in a fraction of the time it currently takes. This will enable a refinery to perform their planning more often and have them more up to date with regards to developments in the market and refinery itself.

The optimization process for creating the refinery planning contains a very large amount of inputs: variables such as the characteristics of the crudes, price information, and many parameters describing the setup of the refinery. The proposed method of approach to this problem will be to construct a metamodel - a model of the model. This practice is commonly applied in the field of simulation, when the true model takes a long time to run. Thus, instead a simplified model is created that is able to obtain a reasonably accurate outcome in a fraction of the time the true model would need. This model takes as its own inputs a set of variables $X = \{x_1, ..., x_n\}$ and their known true model outcomes $Y = \{y_1, ..., y_n\}$. This could either be historical data or certain points of data that are calculated exactly by the optimization process and consequently used for estimating the other points in the same time period. The use of historical data, however, does come with the condition that it is a valid representation of the refinery as it is in the present and future. The reason this is unsure is because most refineries are able to restructure their setup relatively fast, and could thus from one month to another completely shift their focus to producing more of another type of refinery product. This might invalidate relationships between input variables and output variables that we deduced from historical data.

The result of the metamodel will be a model that is able to make an approximation of $y = f(x)$ in the form of $y = \hat{f}(x) + \epsilon(x)$. There are multiple ways this can be achieved as there are a number of different metamodeling techniques, but the method that our main focus will be on is kriging. This is a technique that, based on data points that we have information about, will estimate other points of interest according to the following equation:

$$y(x) = \sum_{j=1}^{m} \beta_j f_j(x) + Z(x), \tag{1}$$

where f_j denotes a known independent basis function, and $\beta_j \in \mathbb{R}$ is an unknown parameter, the coefficient corresponding to the basis function. $Z(x)$ is a Gaussian process defined by $Z(x) \sim N(0, k)$, with k being a stationary covariance function, also referred to as a covariance kernel. It is important to realize that where most conventional metamodels assume that $\epsilon(x)$ are independent and identically distributed (usually $N(0, \sigma^2)$), kriging assumes the errors are not independent at all, but are a systematic function of x. The basis functions f model the way the mean behaves; if for these basis function we take a zeroth order polynomial we reduce the kriging model to an ordinary kriging method, where the outcome is modelled as $\mu_m + Z(x)$, with μ_m representing the constant mean among the m data points considered. Otherwise, the model is generally named universal kriging, where the mean depends on the absolute location of the data points within the domain, meaning it can differ across regions of the region of interest.

The kernel on which the Gaussian process depends is something that measures similarity between observations X, as is shown in Equation 2, where the kernel is split up between σ^2 - the process variance - and $r(x, x')$ - the correlation function between x and x'.

$$k(x, x') = \sigma^2 r(x, x') = \sigma^2 r_{xx'} \quad \forall x, x' \in B \ (= \prod_{j=1}^{d} [a_j, b_j]), \tag{2}$$

where B is the hypercube defined as $\prod_{j=1}^{d} [a_j, b_j]$, with a_j, $b_j \in \mathbb{R}$ and $a_j \leq b_j$ for $j = 1, ..., d$, indicating the domains of the component values of $x \in \mathbb{R}^d$.
This implies that the Gaussian process will give deviations to points of interest that are very close to points we know their exact value of differently to those that are relatively far away. This can be seen from Equation 3, which shows the Gaussian exponential kernel, one that is often used in the kriging literature, both in simulation and in machine learning.

$$k(x_i, x_j^T) = \sigma^2 \prod_{s=1}^{d} \exp\left(-\theta_i (x_s^{(i)} - x_s^{(j)T})^2\right) \quad \forall \theta_i \in \mathbb{R}^+, \tag{3}$$

Estimation issues

Kriging models are able to produce quite accurate estimates of functional values, because they are able to incorporate highly nonlinear effects. There are, however, two substantial issues that need to be addressed before we can go about creating our metamodel. The first issue concerns the problem kriging experiences when the data is very high dimensional: as the dimensionality increases kriging becomes significantly slower in estimating a model, something which counteracts our objective of faster calculation of projected profits for all scenarios. Although we have a single output, the objective value of the optimization problem, the inputs we have can be as numerous as 50,000, as we have a very large set of crude oil characteristics and prices. Clearly, this will be problematic for the efficiency of the kriging model, as with such a vast number of correlations that need to be calculated the time to construct the model could well exceed the time that is used to calculate the profits through the regular optimization process. Thus, we need to decrease the number of inputs of the model while maintaining as much explanatory power as possible.

One way we could achieve this is by screening the data. The purpose of screening is the identification and retention of the input variables and interaction terms that are most important in explaining the outcome and the removal of those that are least important. In the context of metamodeling this is often done by use of experimental design (also called design of experiments), where a selection of the data $x_1, ...x_m$ are used to calculate their respective outcomes $y_1, ...y_m$, with $m << n$, and subsequently used in sensitivity analysis so that their importance to the outcome can be analyzed. In order to identify many effects (individual and interaction effects of the variables), we need to select the vectors to observe in a way that incorporates as much variation as possible. [4] defines a method that creates supersaturated designs ($m < d$) by 'near-orthogonality'. Loss of orthogonality is always the →

case in supersaturated designs as the number of sampled points is smaller than the number of dimensions in the data, and thus certain effects can be hard to distinguish. Thus, in order to come as close to orthogonality as possible, [4] defines the function $r_{ij} = c_i^T c_j / d$, which measures the correlation between two columns c_i and c_j of the design matrix. A value of $r_{ij} = 0$ would mean the two columns are orthogonal. This method uses a design matrix which codes its variable values to plus or minus one, however, meaning that the variable either takes a high or low value, respectively. The downside of this is that the variables are set at either one of two possible values, and thus mainly focusses on linear effects, rather than being able to identify nonlinear effects. To identify those nonlinear effects we would need more points of data and the screening process would be more time consuming. However, in our situation the identification of nonlinear effects might be desirable, as generally the chemical processes that are modelled contain nonlinear effects. In [3] variables are screened in another way. They start out by grouping all variables into a single large group and assess whether or not the group has a joint significant effect on the outcome when their values are changed in tandem. If this is the case, the group is split up into two new groups and these groups are tested again. Unimportant groups are discarded, and the method continues until all important factors have been assessed individually and all unimportant factors have thus been discarded along the way. This method is called sequential bifurcation, and was first developed by [2].

The second problem we have concerns which data points we should take; if we have plenty of historical data available (assuming that it is representative) we could quite easily use this to construct our model, but if we do not have this data available we are in a different situation. In that case we want to calculate the certain scenarios of the refinery planning by the optimization process, and use the results to construct our model. We do, however, require those sample points to be informative about the whole population, because if we only sample 'light' crude scenarios we will most likely incorrectly predict the profits of 'heavy' crude scenarios. The classic simulation problems will apply experimental design here as well, spreading out points over the domain (either at the edges or uniformly distributed), and this is something that would be applicable here too. Particularly the uniformly distributed data points are applicable, as those are more useful in estimating nonlinear effects. However, we could also apply clustering on the crude characteristics, categorizing the crudes in several groups, with crudes belonging to the same group having characteristics that are relatively similar. If we would then take samples from those groups we would be getting information that is representative for as many others as possible.

Conclusion

With these methods we will estimate the refinery planning scenarios faster than the optimization problem can calculate them, and provide the refineries with information that is more up to date than the scenarios they currently have. The resulting methodology is not only applicable to the refining business, but finds applications in many situation where high dimensionality poses an issue. The problem of data with very high dimensions is something that is experiencing a lot more research than in previous decades, as with the rise of big data it is becoming more relevant and "simple" increases in computing power no longer suffice to work around these problems. This research will implement several recent developments from this field in order to create a fast metamodel to aid refineries in keeping their data up to date.

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Paul Visser
Age: 25
Began studies in 2010

Optimizing Society

Almost every academic experiences a crisis at some point. A sense of helplessness, a realization that no matter how much you seek to study or understand the world, some things are not that easily solved outside the classroom. I had mine during my PhD-research. While studying quite fundamental and theoretical network optimization algorithms, I went on a so-called "working holiday" to the rural areas of northern Ghana. The people I met there lacked electricity, drinking water and other basics. To make matters worse, their harvest was extremely poor that year due to a relentless drought. It was clear to me that my mathematical proof that some algorithms can be implemented in O(N) rather than O(N log N) running time would not improve their health or living conditions. I felt disappointed and helpless for a while. So many years invested in research and study, and there seemed to be very little I could do. It took a grand experience to shake this feeling off…

In 2007, I was one of the finalists for the Franz Edelman Award. This renowned prize is awarded yearly to the best implementation of optimization algorithms worldwide. My team helped Coca-Cola achieve huge savings in costs and emissions by optimizing their beverage distribution. But the winners, Dr. Marco Zaider (Memorial Sloan-Kettering Cancer Center) and Prof. Eva K. Lee (Georgia Institute of Technology), saved a considerable amount of lives by using advanced optimization techniques for cancer therapy. Their work improved the survival rate of cancer patients, reduced the side effects of treatment, and reduced costs of the health care system. This made me see the value of mathematics and optimization in a new light.

A few months later, a contact at TNT Express asked me: if a matching algorithm between demand and supply can be executed in polynomial time, why do you not use this to solve the world's food problem? It made me realize that we could do better, and apply our knowledge for the common good. As a result, we implemented the same optimization algorithm we applied at Coca-Cola to improve how the World Food Program (WFP) distributes food in various African countries. Every euro they save in transportation costs is directly put into more food for people in need.

Nowadays, a considerable amount of colleagues, both at Tilburg University and ORTEC (my other employer), are focused on optimizing the world. Prof. Den Hertog and his researchers have improved the cancer therapy I mentioned earlier, and Prof. Fleuren and his researchers are engaged with the WFP for all kinds of food optimization projects. Similarly, ORTEC has a strong cooperation with North Star Alliance, an organization that brings quality and sustainable health services to isolated populations. Optimization enables North Star to decide on the optimal location of their clinics and number of people they employ at their Roadside Wellness Centers. The project's impact was recently recognized by the UN's Business Action on Health Awards. And this is only the tip of the iceberg. There are many more inspiring examples from all over the world.

Tilburg University has a tagline - "Understanding Society". Understanding the way people act and live is a great thing, but understanding without taking action is useless. We should not only understand, but roll up our sleeves and fix the world's problems. So, I am very much in favor of a new tagline. And who knows, maybe we all need a dip now and then to think about life, see things from a new perspective, and put our energy where it matters. With our optimization techniques and knowledge of econometrics, finance and operations research, we are sitting on a goldmine. Are you ready to put it to good use? Let's optimize society!

Goos Kant

Goos Kant is a part time full professor at the Department of Econometrics and OR, as well as partner and member of the supervisory board of ORTEC. His research interests include logistics and supply chain optimization.

BECOME ACTIVE

It Is Thrilling When a Business Immediately Uses Your Research

Merle Willemsen started her job at PGGM during her internship, which meant that she could immediately apply her thesis research on freedom of choice. Now she is doing a traineeship at PGGM.

What was your thesis research about?
Freedom of choice is hip, so I wanted to look into that. You see more and more differences between people and in their needs. We already have a limited number of options in the Netherlands, but no one makes much use of them yet. I found that interesting. Why was that? Why do people not use them?

My research was about that. On one hand, it was a factual approach, a data analysis. What are the options now; how are they used (or not)? After that, I started looking at why people do not use those options. In addition, I looked at behavioral patterns. I compiled questionnaires and looked at the differences between groups of people. For example, differences in education levels, income, health, or working versus retired.

And... Do people want more freedom of choice?
People with a higher education take more advantage of the freedom of choice. That is because they know more about the options, but also because they have more financial resources. Those with less education also want more freedom of choice, but that is not always possible yet. For example, the less-educated tend to prefer a large, one-time payout at the beginning of their retirement period. Ill people also have that need, which is not that surprising.

And then you were offered a job at PGGM, besides your internship...
I was able to directly put my research into practice – to see what we could improve with that research, what we could do with the results. The fact that a company like that is also prepared to immediately do something worthwhile with your research is tremendously thrilling.

'The Netspar track prepares you well for the industry'

As part of my job, I have looked into things like how we might better design communications and the selection process. I have also looked at product options: what are the consumer's needs and how can we serve them better?

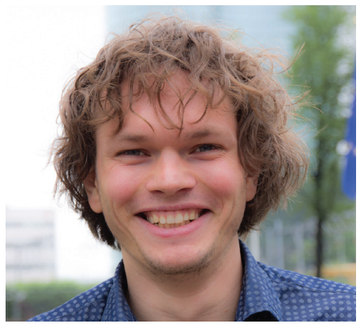
What did you think of the Netspar track?
Before I went into it, I did not expect I would like pensions and retirement so much. My thesis for my bachelor's degree was on health status and investment profiles. I studied life course and life cycle, and their impact on your economic status. Pension and retirement affects so much. Social factors and economic factors come together here. The Netspar track reveals that combination very clearly. It prepares you well for the industry.

In five years' time...?
As part of my traineeship, I have already gained experience in marketing intelligence and public affairs. My interests center primarily on data analysis, a mathematical approach, but also how you communicate that to the outside world. How do you translate those complexities for participants? I hope to pursue that further.

Numbers Are Never Just Numbers

Working at Belastingdienst obviously impacts and helps an enormous amount of people. Quite recently, they introduced an interesting new department, where currently quite some econometricians are working. The Belastingdienst invited us to interview one of these employees, who was a student at Tilburg University himself not so long ago.

Text by: Max van der Lee



Wouter Ludwig
Data Scientist Belastingdienst

Wouter Ludwig (29) was a member of the TEV, the predecessor of Asset I Econometrics, during his four and a half years studying Econometrics, and the master Operations Research and Management Science subsequently. Wouter joined the Belastingdienst after first having worked for Deloitte and ProRail.

Why did you choose for econometrics at Tilburg University, and how was your experience studying there?

"I was almost eighteen years old when I chose to study in Tilburg, but the choice of studying econometrics was one I had made much earlier. Already in the second year of secondary school, I told my fellow students I dreamed of a career of being a fortune teller; not one with a crystal ball, no, I wanted to predict events with mathematics. During my time at secondary school I came upon the fact that mathematics suited me very well. However, I also had a strong interest in economics and applying this with mathematics. Therefore I knew econometrics was a perfect decision. I chose to study in Tilburg, because it was important for me that I could find a room, which was much easier in Tilburg than elsewhere. This meant that I moved to Tilburg almost right away into my room, where I have lived and enjoyed my entire study."

What did you do in your previous jobs?

"I started my career at Deloitte, where I worked for about six to eight months. At Deloitte I worked in the department Data Quality & Integrity, a department which made the accountants' work easier. We used data analysis to find, for example, suspicious costs in ledgers or double costs. The job was all the way in Amstelveen, and I was still living in Utrecht. Here I got much more freedom, for I could choose which projects I wanted to work on, and especially how. Again I was placed in a data analysis department surrounded by many experienced railway traffic analysts. The department was relatively new and had lots of potential to improve by using our quantitative knowledge. We drew conclusions by using numbers which others could not make before. For instance, we answered the question how many red light signals there are each year and why the signals where red."

'What amazes me the most is the impact your job has here'

Tilburg, meaning it was an extremely difficult job to keep up with. I also had problems with the small amount of freedom that I got at my job, which made it difficult for me to enjoy it. Once we had developed these checks the fun part for me was over, and we had to use this check over and over again to earn as much money as possible, instead of developing something new again."

"After Deloitte I worked for approximately five years for ProRail in

Why did you leave ProRail for the Belastingdienst if you were doing so well there?

"I stumbled upon a vacancy for the Belastingdienst after working at ProRail for five years. It was a point in my career where I believed that, if I did not take the chance to work elsewhere, I would have never left ProRail. I enjoyed my time at ProRail a lot, but if I wanted to see more and experience something different, this was the perfect moment to move on. I was also having troubles with the fact that people came to me with questions about data, but when I had a question, there was nobody who could help me with these difficult problems in my field. At the Belastingdienst there are many who are much more specialized in fields like pseudonymization and cryptography than me, and are capable of helping me resulting in solving more difficult projects."

"The vacancy I ran into was for a new department within the Belastingdienst, meaning there was a lot of work to be done, which was another important reason for me to want to work there. The work in the beginning was especially spadework, something I very much liked together with the freedom they offered. We started with very little and there was a lot to improve, making this process and these past two years very rewarding. The Belastingdienst does offer a lot of freedom, such as which opportunities you want to take and how you approach problems, although some other things are more structured here. You are appointed to one project with a specific team for a longer period of time, but with a lot of freedom within the project. Every member of the team can work on the aspects he or she likes the most or which lies within their specialization. Our department also organizes plenty of drinks, dinners and other social activities, making sure you have a good time here at the Belastingdienst."

What is the function you do?

"Well, they call it a data scientist, but sometimes it is also called a business analyst; so I am somewhere in between. It mostly depends on what you like doing, and where your specialties lay. We look for people who like working with data, programming, analyzing, testing, etcetera. Almost half of the new employees of the department have studied econometrics, but we also have loads of mathematicians and physicians. We have grown enormously since I started working here, meaning we had to move our department to another floor after we went from 10 to over 40 employees. We work in a very young and talented team, and almost everyone is in between 25 and 35 years old. Depending on what project you are working on, you also work together with other departments. What amazes me

the most is the impact your job has here; only a minor change of 1% can mean a difference in millions of Euros for the Dutch society."

What skills do you need for your job?

"Everyone here needs to have at least a solid basis in working with data and programming. We work a lot with SAS, which is easy to learn with a little programming experience. When you start at the Belastingdienst, they send you on a one-week class in SAS. We also take training programs once in a while in certain techniques and soft skills that you are expected to use. Having experience in SQL can help you a lot here, but I personally did it without SQL and had no problems with learning SAS and SQL in a few weeks. I also like using open-source, such as Python, and maybe R in the near future. The department really adapts with its time and wants to keep up and improve. It is important to have at least one quality you are excellent at to make an addition to the team we already have."

How many people work at the Belastingdienst?

"The following lesson is something you do not learn while studying, but only with work experience. What is it that you really want to know? I can give you any number, and all of them can be true or very wrong. It all depends on definitions and how you see things, so multiple answers can be correct. Different interpretations can give you different numbers. You can waste a lot of time comparing these numbers, but all you can say really is that the Belastingdienst is big. This lesson holds up for many things within life and work, and is important to remember. Numbers are never just numbers, there is always some story behind them."

More than 30,000 employees work at the Belastingdienst, which consists of a total of six divisions. The Belastingdienst takes care of more than taxes and premiums only. For instance, did you know that customs is also part of the Belastingdienst.

What else do you do apart from working at the Belastingdienst?

"I used to play a lot of draughts, but due to a lack of time to invest in improving myself, I have decided to quit playing actively. At the moment I am the number six of the Netherlands in draughts, an accomplishment I am very proud of. I even wrote my thesis about draughts; it was about improving the Swiss-system which is used a lot in both draughts and chess tournaments to rank players, by comparing them without having played against each other. It was used for a while by the Dutch draughts association to rank us at the national championships. During my time in Tilburg I played lots, which resulted in me being European champion for students, and participation in the World Mind Games in Beijing of 2008." ●

The Ultimate Spy Tool

In an age during which everything is digitally recorded, logged and stored for who knows how many years, privacy – or lack thereof – is one of the hottest topics in the political landscape. Of course, one could install a bunch of digital hurdles to keep intruders such as the infamous NSA out of their system; the reality of it is that one of the most potent tools to bypass all of these precautions finds its origin in our beloved mathematics. Most of you, like me, will shiver a little at the sound of this technique, but the time has come to dive – or just dip a toe – into the world of quantum computing.

Text by: Pepijn Wissing

Qua…what?

Let us first establish some basic idea of what quantum mechanics actually is. Most of you will have heard of Schrödinger's cat at some point; that is not what we will be discussing at all. In this article, we will be introducing a radically different example, aptly named "Schrödinger's phone". Suppose, someday, you are fiddling around with your new smartphone when you suddenly drop it on the floor and you are unable to see whether its screen is now broken or not. At this exact moment, the phone will both be broken and not broken, since you have not observed its state. This state is known as a quantum superposition. As you might imagine, this state stops being a superposition when observation takes place: once you pick your phone back up to check for damages, it is either broken or not broken.

Are you not confused yet? Do not worry; we will go one step further. In the discussion below, we will use a situation from physics, in which quantum mechanics are commonly applied. Consider an electron with two possible configurations: up or down. Then the most general state is defined as

$$c_1 \cdot |\uparrow\rangle + c_2 \cdot |\downarrow\rangle$$

where c_1 and c_2 are coefficients and $|\uparrow\rangle$ is Dirac notation for the quantum state that will always give the result 'up' when converted to classical logic by observation; likewise, $|\downarrow\rangle$, will always be converted to 'down'. The coefficients c_1 and c_2 dictate probabilities for the system to be in either configuration when observed. The probability for a specified configuration is given by the square of the absolute value of the coefficient and – like always – the probabilities should add up to one. Then, we have:

$$P_{up} = |c_1|^2 \quad P_{down} = |c_2|^2$$

$$P_{up\ or\ down} = P_{up} + P_{down} = 1$$

Now, continuing with the example: if the electron can be in state up and in state down, in quantum mechanics, it can also be in the state where it is $\frac{3i}{5}$ in 'up' and $\frac{4}{5}$ in 'down', since $|\frac{3i}{5}|^2+|\frac{4}{5}|^2 = \frac{9}{25}+\frac{16}{25} = 1$. In this description, only the relative sizes of the different components matter, as well as their angle to each other on the complex plane.

Next-level computers

In classical computers, data is encoded into long sequences of binary bits, each of which is always in one of two definite states: either 0 or 1. Quantum computers, however, use quantum bits (qubits) which can be in superpositions of states. So, similar to the way your phone was both broken and not broken, these qubits are both 0 and 1 – and everything in between. In general, this means that a quantum computer with n qubits can be in any superposition of up to 2^n different states simultaneously; a normal computer can be in only one of these 2^n states at any one time. By now, you might be wondering how one could possibly use these strange, seemingly undetermined qubits to do anything useful.

This is where the quantum computer works its magic. The qubits are set to a controlled initial state that represents the problem at hand in some way, after which the qubits are manipulated by a fixed sequence of quantum logic gates, called a quantum algorithm. At the end of this algorithm, the state of the qubits is observed, which collapses the system into exactly one of the 2^n states, quite similarly to the way your phone became either broken or not broken, when you picked it up. Of course, there is still much, much more detail to discuss, but to keep you sane until at least the start of next year's lectures, we will leave the technical discussion here and consider some of the applications.

Encryption schemes

What is widely accepted as one of the most effective ways to encrypt some string of binary bits is known as the RSA scheme, which is based on prime factorization. The RSA algorithm involves a public and private key: the public key (*n*,*e*) can be known by everyone and is used for encryption of a message. The idea is that messages encrypted by the public key can only be decrypted within a reasonable time with the private key *d*, which will never have to be transmitted. The basic principle is to find three large positive integers *e*, *d* and *n*, such that for some binary message *M*, equivalent to some positive integer *m*, it holds that $(m^e)^d = m \bmod (n)$, so that even if one would know *e* and *n* or even *m*, it would be extremely difficult to find *d*. Naturally, an approach that will always be effective is simply trying all possible combinations, of which there are exponentially many.

Interested in the RSA algorithm and other cryptography methods? Take a look at the Cryptography Special in Nekst 1 2013-2014!

Of course, trying all possible combinations is something that computers are quite good at. The problem is that it takes an exponentially growing amount of time to do so: for large numbers with many large key primes, it can take up to tens of years to break a single number, with the current state of technology. This, in turn, allows the sender/receiver plenty of time to change up the set of key primes frequently enough, so that no-one will ever be able to decrypt their communication in time. This is very much a recurring theme in the collection of encryption techniques: they are mostly built on the premise that decrypting anything will simply take too much time to be relevant.

However, the development of quantum computing might change all of that, via clever use of quantum algorithms. For example, the – currently only theoretically applicable – quantum algorithm, known as Schor's algorithm, is able to solve the prime factorization problem in polynomial time, which means that the time it will take to crack a number will grow relatively slowly when the size of the number you are trying to crack increases. In other words, all of the information on your computer, smartphone and tablet that is currently being protected by simply delaying intruders past the point of relevance, will become vulnerable when quantum computers become operational, simply because they are much, much faster.

Time-traveling data

But the uses of quantum mechanics do not stop there! At the TU Delft, Ronald Hanson and his team of researchers have recently proven that one of the most counterintuitive theories in quantum mechanics is actually reality, by showing that two particles that were 1.3 kilometers apart shared the same properties. To a simple econometrician such as myself, this did not sound like such a big deal. However, there is one very important thing to remember: the qubits in a quantum computer are also based on particles. Hence, if the qubits in two quantum computers would share the same properties (and thus convey the same information) we would in fact be able to 'teleport' information from one computer to the other, without the use of Internet or any traditional means of data transportation.

Theorizing a little further, this would mean that it would potentially be possible to transfer information across large distances without any time passing, which would be faster than the speed of light. This, in turn, means that theoretically, we would be able to receive information about some event that we are physically unable to have observed yet. One cannot even begin to imagine the effect of such a technology on modern day trade and espionage.

While quantum computing is still in its infancy, we can very well conclude that one of the most powerful tools in modern-day espionage has definitely been born in the form of quantum computing; even still, it might be a while before Q is able to fit this one into 007's box of toys.

SUIT UP

Nonverbal communication is extremely important for a conversation, and your appearance is certainly a part of this. For any formal meeting or interview you want to appear professional, so read the tips on these pages to stand out!

General tips
- Always unbutton your suit before sitting down, or you risk ruining it.
- Smile! This is so important, but so easily forgotten. It will make you look more approachable, attractive and friendly.
- Most importantly, be yourself! If you are trying to impress your future boss, lying could only result in negative results in the future.

Blouse & blazer
When buying a suit, the number one point to check is how the shoulders fit. Sleeve cuffs should be exposed about half an inch. The top button of a two-button (or the middle button of a three-button) suit should fall at or above the navel.

Tie
Your tie should just reach the waistband of your trousers, or be slightly shorter. Moreover, your tie should always be darker than your dress shirt.

Buttons up or not?
It is common to always button the top one, or the middle one in case of three buttons. The rest of the buttons should be left open.

Belt
Your belt always needs to match with your shoes, but does not have to be worn if the suit actually fits perfectly.

Shoes
If your suit is black, make sure your shoes are also black or dark brown. For any other color suit, both brown and black shoes are always accepted if they are neat.

Socks
Make sure that your socks are long enough, so that there is no exposed leg when you are sitting down.

Make up & accessories
Accessories should be kept simple: basic pumps, modest jewelry, light make up and light perfume. Think simple, sleek and chic.

Pantsuit or skirt?
All suits and skirts should be tailored to fit close to the body, however also not too tight. Skirts should hit at the knee or below. Furthermore, the decision between a pantsuit or a skirt depends on your own confidence. The trick is to always wear what suit you feel most comfortable in.

Suit
Some styles look better on particular body types, and if you buy a business suit that does not fit your body type, it may hang strangely on you, causing it to look less professional. If you want it to look flattering, then choose the style that is right for you. Blouses should be conservative, freshly pressed and always tucked in. Also, try to stay simple with patterns for both a blouse or shirt and the suit itself.

Shoes
Wear scuff-free heels or flats in a neutral color. If you go for heels, try not to wear anything higher than three or four inches.

Monkey Matchmaker

After the exams of the second semester were finished, the informal activity with EY, a sunset safari, was planned. The safari consisted of boat safari and a safari by foot, and it would end with an African barbecue in the Beekse Bergen. That sounds great, right? Therefore, I was glad to hear that I was selected to participate in the informal activity.

On June 9 my friend Amy and I gathered at Tilburg University around 16.00 hours to cycle to the Beekse Bergen. We were lucky, because it was a beautiful day; the sun shone and it was not too hot. A half hour later we arrived at the Beekse Bergen, while all the other visitors were leaving the park. That was the nice thing about this activity: we could visit the zoo after closing time. So no one is walking in your way, no screaming or annoying children and always a good view of the animals. Around 17.15 hours all twenty participants and the employees of EY had arrived and the Sunset Safari could start. Everyone else had already left the park, but we had only just entered.

First, we had a safari by boat. After we were all on board and had taken a seat, the safari started. The ranger took us to the other side of the park and we saw animals all around us. We chatted with the consultant of EY about all kinds of things. The first stop with the boat was at the ring-tailed lemur. These monkeys are the only animals from the Madagascar movie that actually live on the island. The ranger told us that this group of lemurs consisted of only male bachelorette lemurs. Eventually, all these monkeys should be placed in female ring-tailed lemur groups across Europe. So, in every zoo there are matchmakers who match a male lemur with a group of female lemurs, when another male has to leave. How cool is that, if you can say at a party that your job is matchmaker of monkeys?! After this stop, we continued and eventually arrived at the other side of the park.

From there, we continued our safari by foot. That was a special experience, because we were the only visitors that were walking through the park. This meant that no one could get in your way and you could see everything very well. The sun was also still shining, so it could not be better. We walked along the crocodiles, hippos, tigers and rhinos. Sometimes, we stopped at animals stays so that the ranger could explain more about the animal species. This was also the case at the gorillas and the chimpanzees' residence, where we got the wonderful tip that if you ever in your life must choose between staying among gorillas or chimpanzees, always choose the gorillas. Apparently, gorillas are gentler than the chimpanzees. So, if you ever end up in this situation, you know what to do from now on.

By now it was about 20.30 hours and everyone was hungry. But, before we walked to the barbecue, we had to stop at the elephant residence. In May this year an elephant foal was born, and we could not leave the park without seeing this little elephant girl, named Madiba. After we saw this cute elephant baby, we quickly walked back to the restaurant, because everyone was starving.

We ended the activity with an African barbecue. Luckily, we could sit outside in the sun. When the start signal was given we all attacked the buffet as hungry lions. We enjoyed the food, while chatting with EY consultants and fellow students. Around 21.30 hours, everyone was finished and it was time to go home. The EY employees said goodbye and we all cycled back to Tilburg.

I had a great evening; the weather was good and we were with a nice group of people. Besides, it was nice walking through a deserted park. I really enjoyed this activity very much. ●

THE TEACHER

Passion and Perseverance

Text by: Claire Vink

On May 10, Steffi and I were scheduled for an interview with Bas Werker. We were both very excited to interview a professor and to hear the story behind a lecturer. Unfortunately, I faced some problems with transportation, but luckily professor Werker was more than understanding, so we still got the chance to start the interview an hour later than planned.

Background

Bas Werker lived in the south of Limburg until he started his studies in econometrics in Tilburg. At that time, the study program was four years and was not subdivided into a bachelor and a master program. He graduated from Tilburg University with a specialization in financial econometrics and even today this is still his field of expertise. After obtaining the degree he also worked in Toulouse and Brussels for some time.

Worth mentioning is that while Bas was an econometrics student in Tilburg, he was also an active member of Asset | Econometrics, which was called 'Tilburgse Econometristen Vereniging' (TEV) back then. He enjoyed being an active member, as the study association did not only provide help with exams and career related events, but also fun social activities.

As many of you known, Bas is currently a professor at Tilburg University. Besides teaching master students, he also educates employees of firms, which is known as executive education. Similar to many professors at Tilburg University, Bas does fundamental research, but additionally he also does research on social-economic problems. For example, he tries to find answers to problems regarding insurance policies.

Occupations

Bas is fortunate enough to have a lot of freedom within his weekly schedule, because except for scheduled lectures he has the possibility to plan everything by himself. Besides the lectures, his week consists of many appointments with PhD students or other colleagues, mostly to discuss certain difficulties regarding a particular research topic. As many of you may recognize, thoroughly thinking about a certain problem without interruption is often more efficient than focusing on it multiple times for half an hour. Therefore, he also tries to work from home once a week and fully focus on a specific research project. Once a year, Bas prefers to work at another university for about a month. By escaping from his current surroundings he finds even more space to think about his current research. It also allows him to brainstorm with different colleagues, which may lead to new perceptions.

> **'Remember to always choose what makes you happy'**

Roughly speaking, Bas' work consists of four parts, and he would not be able to choose between any of them, since the combination of the four makes his work so enjoyable; every part has its own beauty. For example, when educating students, he finds it exciting to continuously search for a balance between on the one hand making hard theorems or applications understandable, and on the other hand not omitting too many details. To make the subjects less abstract, he also tries to show what can be achieved by applying the just explained theorems. The same holds for executive education, which is sometimes even more challenging, since you have to explain to already educated people that something they have been doing for years can be done better or that it is actually wrong.

While teaching gives him a lot of joy, he would not want to miss doing research. Solving a problem that might seem impossible at first gives a totally different kind of satisfaction than educating students.

Bas is definitely someone who does not fear a problem. This is also visible in his life outside of academics. He realized that he was having some dissatisfaction with the decision-making process in politics and, instead of complaining about it, he became a local chairman of D66. To clarify, he is not the chairman of the party, so he does not directly focus on the decision making or on certain viewpoints. Instead, Bas focusses more on the organization within the party.

Current research

Recently, Bas has been working on a project with Ramon van den Akker and one of his PhD students, Bo Zhou, currently visiting Chicago, about unit root tests. These tests examine whether

a time series variable is non-stationary and possesses a unit root. There did exist methods to test whether a time series was stationary or not, but it was never proven whether these tests were optimal or not. Together they eventually provided a proof that these tests are indeed optimal. This is of great importance, since the confirmation ensures academics that the particular method is definitely the best to use. So, the unit root test does not have to be questioned anymore, which I consider to be quite an achievement!

Besides this ground-breaking project, Bas has also written a report (with Theo Nijman and Lans Bovenberg) about pensions for the Dutch Senate. Currently, pension systems contain fixed annuities, but in this report they elaborate on the ins and outs of a pension system with variable annuities. Of course, there are higher risks related to a variable annuity, but at the same time the payout might be higher. The main question is how to construct these variable annuities in such a way that it would be beneficial for Dutch retirees.

The question itself is already challenging enough, but writing down your findings in a structured and understandable way for the members of the Senate is a challenge on its own. Bas states: "Next to explaining your findings through use of clear pictures, it is also important to clearly state the consequences that are related to certain choices. Eventually, politicians make the final call, but the past has shown that politicians are not always aware of the effects that are related to their decisions." Therefore, he considers clearly mentioning all the consequences of particular decisions to be the main goal of the project. If this succeeds, no claim can be made afterwards that they were not fully aware of the side effects.

Experiences over the years

Bas never does research alone. Over the years he has been working with different colleagues from different fields of expertise. Most of the time, he works with mathematicians and people in finance, but he has also worked with lawyers, for example. This may be quite tough, as ideas and mindsets sometimes completely contradict, but it often leads to interesting new perceptions.

Being a researcher for quite a long time, Bas thinks that doggedness is definitely the key to success. A problem that you have not solved yet should be so frustrating that you cannot stop thinking about it. This determination to solve the problem is essential for a researcher, since 98% of the time you will be stuck. For example, it took him about 17 years to solve a certain problem. Of course, over the years you start focusing on different problems as well, but the determination to solve it should always remain. Are you not afraid to get stuck all the time, and do you have the perseverance to solve difficult problems? Then you should consider becoming a researcher.

About three years ago, Bas was asked to become an associate editor of Econometrica. Obviously, he was truly honored to be asked for the most important magazine within his field of expertise. Furthermore, he also considers the Best Master Lecturer Award, which he won last year, to be one of the highlights of his career. He always tries to make his classes as interesting as possible, and this award shows that he has been doing a great job, which he finds to be a very nice recognition.

Words of wisdom

Nowadays, many students are busy with making future plans. Students seem to fear that just obtaining a diploma is not enough, and feel the need to do extra activities to distinguish themselves from the crowd. It seems that more and more students do things that look good on their resume instead of doing what they truly love. This is in contradiction with the mindset of Bas, because throughout his life he has not been planning much. Of course, Bas thinks that you should plan a few weeks ahead to study for your exam, but he thinks you should not make future plans over a span of five years.

Throughout his life, Bas has never set his mind on a certain future plan, or tried to follow a certain (career) path. On the contrary, he made more impulsive decisions based on what came along. As he explains: "Throughout your life you will be exposed to some opportunities and you have to think carefully about these certain opportunities. However, remember to always choose for what makes you happy instead of what might seem to be best for your resume. Just do what you love and you will become the greatest and best version of yourself."

As we talked it became quite clear that Bas is not a man of regrets. His philosophy is that you should never worry about something that you cannot change. Besides, Bas mentions, "Do not forget that you will never know what exactly would have happened if you had done something differently, so you will never know for sure if it would have made you happier."

Concluding, I can say that it was a more than wonderful interview. Judging on his enthusiasm and passion for his work, Bas is definitely in the right spot. I hope to find a job that I enjoy as much as Bas enjoys his. His wise words were a good self-reflection, since they made me think about my own choices. Do I make decision based on what I love, or do I make decisions purely based on what might be good for my future? What about you: do you follow your heart? ●

Bert & Ernie Questions

Bert or Ernie?
Ernie

Theory or practice?
Theory

Beer or wine?
Wine

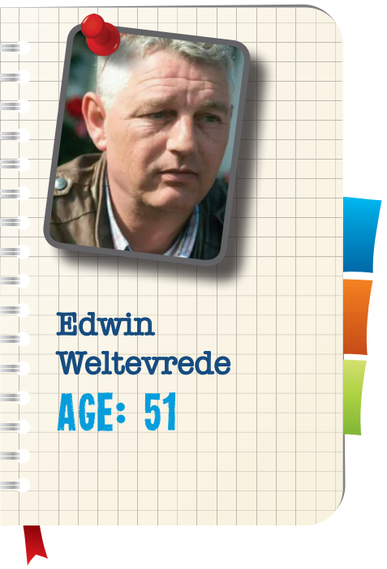
Stress or boredom?
Stress

Cinema or theatre?
Theatre

Listening or speaking?
Listening

A Look Behind the Scenes

It was a great night: exciting and fun. We were curious as to how our son, and students in general, live their student lives and what they experience: a look behind the scenes. What do they do? Where do their interests lie? How do they experience life? How do they develop themselves? These were some questions that drew us to join this event, which took place two hours away from where we live.



The reception was good: coffee and cake were served, along with soft drinks and some snacks. The organization had done its best to make this into a wonderful night. What we personally liked very much was seeing how students, besides studying 'hard', still choose to develop themselves by joining one of the student or study associations besides their studies, and how this contributes to their personal development. We saw how many students are very enthusiastic about their studies and life in general. For example, I spoke with a girl named Anouk. The next semester, she will go on an exchange to Boston, where she already found a room on campus. It looked like she had everything for her future set out. Also, some people are looking to do their master's degree abroad. Our son, for example, wishes to do his in Nottingham, because this is the only university that offers the degree he is interested in. All in all, these are the people that will build the future and who will have to keep our world good to live in.

> **'We saw how many students are very enthusiastic about their studies and life in general'**

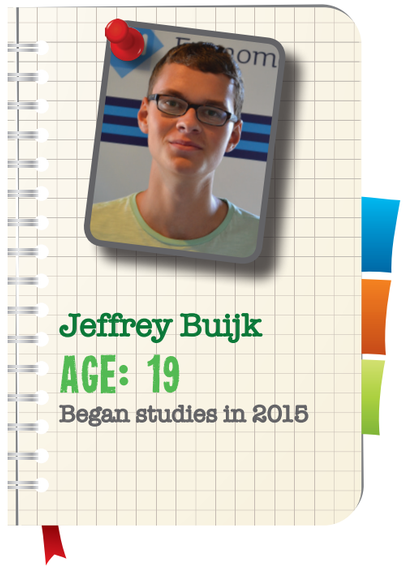
The official part of the night started with an introduction of the study association and its committees. We were actually shocked to see that there were so many committees, sixteen in total. We also learned about some of the sponsors that made events possible. Someone named Bart told about the OR Conference, which invited both interesting speakers and companies such as Deloitte. Some other committees were also highlighted, such as the Promotion committee and the Nekst committee, which publishes this magazine every three months. This magazine is sent to members, professors, and companies.

Afterwards, a quiz was held. It included questions on all kinds of subjects, such as music, history, and logic. This diversity appealed to us very much. My wife particularly liked the mathematical and logical questions, even though they were quite hard. The students were so enthusiastic that parents, especially yours truly, sometimes had no say in answering because an answer had already been written down. We learned a lot during the quiz, such as the number of master's degrees that are offered at Tilburg University, which was a lot, somewhere around sixty. At the end of the evening, we were offered a tour through the building where the board of Asset | Econometrics was settled, and where our sons and daughters do their committee work. However, we still had to drive for over two hours, so we decided against it and went home.

In conclusion, even though I had hoped to learn a little bit more about the study of econometrics itself and the possibilities it offers for the future, I thought the night was very successful in offering a look behind the scenes of Asset | Econometrics and what keeps our children busy. Being active is of course a vital step in shaping them for the future. ●

The Most Loops I Saw in One Park

Friday April 8 was the Members Day of Asset | Econometrics. This year, we went to Walibi, where I had never been to before so I did not know what I had to expect of it. Nevertheless, I made the right decision to go and spend this day with my friends at Walibi.



It was 9.00 hours in the morning when we met each other at Tilburg Central Station. We went to Walibi by bus, which I thought would be a long ride. Luckily, it was not that busy on the road, so it did not take long until we arrived at Walibi. Upon arrival, we first wanted to make a photo with the whole group but, because some people were getting our tickets, unfortunately not everyone was on the picture.

After waiting a few minutes, we could enter Walibi and choose which rollercoaster we would go to first. We decided to simply go to the first rollercoaster we saw, although we did not even know what rollercoaster it was. Because we went on a Friday, there were not that many people in the park, so we did not have to wait long at each rollercoaster. This meant we could board our first rollercoaster after waiting for about ten minutes. We then decided to walk through the park without having an idea in which order we would board which rollercoaster, and just board one if we walked past it and it looked nice.

When we had boarded about three rollercoasters, we decided to take a break and enjoy our lunch on a bench. Luckily, the weather was really nice this day so we could lunch outside and enjoy the sun most of the time. We also needed the break a little bit because there are so many rollercoasters with loops at Walibi that it was almost impossible to go back to back in rollercoasters without becoming sick.

After the lunch, we decided to first go to a wooden rollercoaster, and afterwards to Goliath, the most famous one at Walibi. Following Goliath, we went to a new rollercoaster that had opened about a month earlier and, in my opinion, was the nicest rollercoaster at Walibi. We finished our day at Walibi in the rollercoaster we started our day with and afterwards gathered at the exit to go back to Tilburg.

Because I had never been to Walibi before I did not know what I had to expect of it, but in my opinion it is a really nice park. Because there are a lot of rollercoasters that are really fast and have a lot of loops, it is a perfect park to go to if you are a student. Also, the newer rollercoasters are becoming better and better. The only downside of the park is that there is no theme, which some other parks do have; all rollercoasters are just placed in the park without having a theme connecting them.

Back in Tilburg, we finished our day with a dinner. We all had the choice to end the Members Day by having a dinner together at Café Polly, and half of the group decided that this was a good idea, so we had dinner with about twenty people. It was a nice way to end this great day and a good start of the weekend. I am definitely looking forward to next year's Members Day. ●

A Cidade da Luz – Lisboa

Writing this article, I am just recovering from my surfing class at Costa da Caparica, one of the many beautiful beaches only half an hour away from Lisbon. Lisbon, the city of seven hills, of sun, of Fado, of incredibly nice people and now, also the city where I found my second home. Lisbon, the city of my exchange.

When I started studying Econometrics and Operations Research, the one thing I was sure about was that I wanted to go on exchange. And now that I am here in Lisbon, enjoying life the fullest, it is a choice I will definitely never regret. I know this sounds cliché, but these six months of living abroad, experiencing a new culture, meeting people from all over the world, traveling to beautiful places, partying a lot and studying a bit are the best six months of my life so far.

How it all began

For my first 'real' experience abroad I wanted to stay in Europe, just to have the people you love a bit closer. Besides that, I wanted to go to southern Europe, mainly because of the weather and the 'southern mentality'. After going on holidays to Lisbon and Madrid I found the two candidates for my exchange destination. I had fallen in love with Lisbon's atmosphere – free and relaxed –, the steep little alleys, the miradouros with magnificent views on the Rio Tejo (river Tagus), the passionate and kind Portuguese people and the delicious Portuguese food; the choice was made quite easily and the only thing left was applying. One month after application I received the news that I was accepted to the university of my first choice!

After more than a year of preparations, but most of all looking forward extremely much to this experience, it was finally time to pack my bags and go to Lisbon. As I arrived at Lisbon airport, my buddy from university was already there waiting for me. Being the perfect gentleman, he opened every door for me, carried my way too heavy suitcases and drove me to the Airbnb I was staying the first few nights. Me exchange had started for real. I arrived one week before the start of classes, which gave me some time to settle down, arrange a Portuguese phone number and a transport card, and sign up for the Erasmus organizations. The other days I spent my time well exploring Belém, the old neighbourhoods of Mouraria and Alfama, trendy Chiado and downtown Baixa. I saw what Lisbon's nightlife had to offer, and most importantly, I met new people. I could not wait for what was ahead of me.

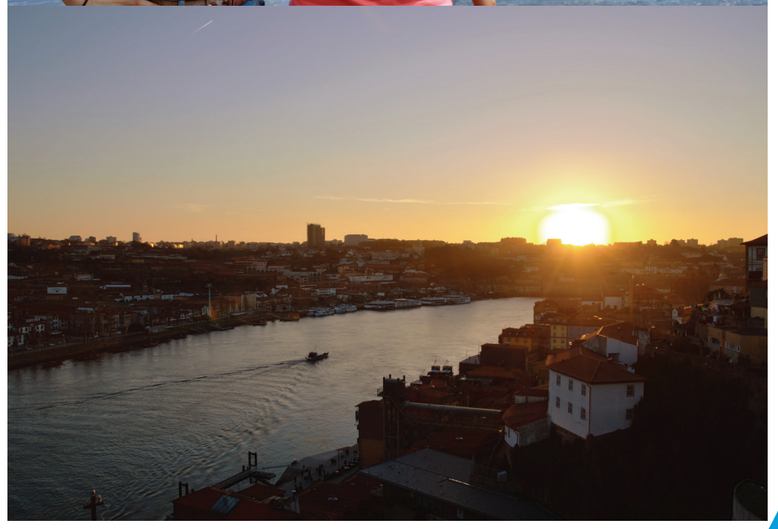
What exchange is all about

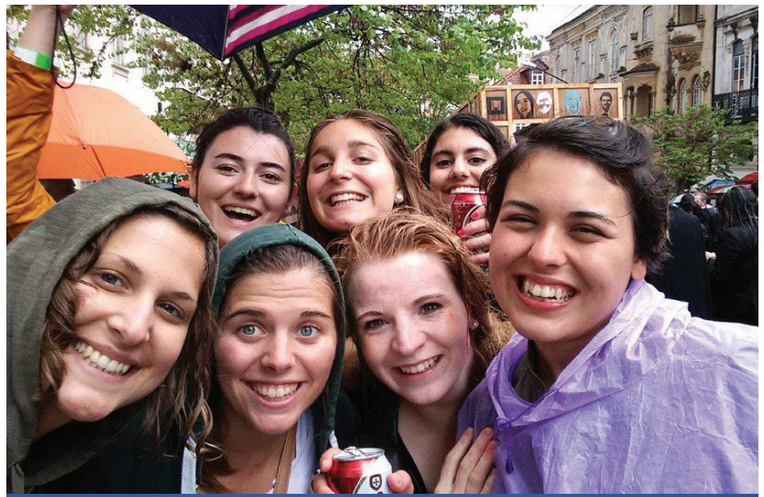
Obviously, all of this meant dealing with different cultures. Although the culture shock might not have been that big as I was staying in Europe, there are certainly differences between Dutch and Portuguese people. Whereas us Dutchies are really down to earth and quite objective, the Portuguese are extremely proud of their culture, their rich history, their achievements and their people, and they will almost never refrain from any opportunity to show their love and passion for Portugal. Food is always on their minds and just after they started the day with espresso and a pastel de nata, they forget they had breakfast and start thinking about how to prepare the bacalhau for lunch. If you ever find a Portuguese in a rare moment of not thinking about food, be prepared to talk about football; especially the everlasting rivalry between Benfica, Porto, and Sporting, or the brilliance of Cristiano Ronaldo. And for those of you really considering to go to Portugal, greet every person you are introduced to with two kisses (unless you are a man, you will get some suspicious looks), do not forget to always arrive at least thirty minutes late, do not say 'no' too quickly, even if you really do not agree (our Dutch directness does not really fit in). Furthermore, you should of course develop a strong relationship with the sun and the sea; Portuguese people love it (and who could blame them with all those beautiful beaches?). Embrace the Portuguese people and their habits, and they will embrace you!

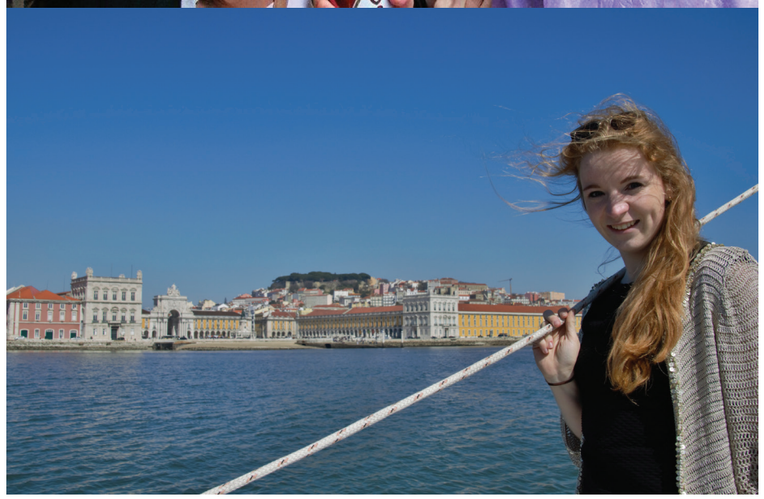
Besides Portuguese people, most people you meet are exchange students from all over the world. These are people with the same mindset as you and they are up for everything to make the most out of this adventure. Having dinner and drinks, going to the beach with new friends and making trips; it is all part of the experience. Although an exchange lasts only six months, the friendships you develop are really intense. I know I made friends for life and have places to visit all over the world.

Take me anywhere

Speaking of which, I think everyone who goes on an exchange grabs the opportunity to discover a little bit more of the world and I am no exception. Besides getting to know Lisbon inside out, Portugal is a beautiful country and has lots to offer. With its lovely cities, beaches and islands, Portugal is always surprising. My first little trip took me to Sintra, only half an hour away from Lisbon. Known for its romantic palaces and castles, Sintra is like a living fairy tale and a place I brought all my visitors to. Of course you cannot visit Portugal without going to the city of the Port wine, Oporto. Oporto is completely different from Lisbon, but charming in its own way. The city is the inspiration source for J.K. Rowling's Harry Potter series, so I think you can imagine how captivating the city is. Overlooking the mouth of the Douro river, you can feel the magic. Moreover, I visited Coimbra, the city with the longest history of academic traditions. One of the best traditions is called Queima das Fitas: a week-long celebration of the end of the academic year with as highlight the Cortejo, a parade of decorated floats, each in the color of their respective faculties, during which all drinks are given away for free. Despite how much I enjoyed visiting these cities, the trips that impressed me most were my trips to the islands of Madeira (Madeira Archipelago) and São Miguel (Azores Archipelago). Both →







islands are absolutely stunning, nature at its best: São Miguel is beautifully green, has peaceful lakes and relaxing thermal pools and Madeira, the island of flowers, has impressive mountains, levadas, but also the vibrant city of Funchal. These are the places that make me want to explore more of the world's beauty.

Universidade Católica Portugesa - Lisboa

You might doubt it by now, but I also studied this semester. The university where I enhanced my knowledge is Universidade Católica Portugesa – Lisboa. Católica Lisbon is a private university, ranked in the list of Top European Business Schools by the Financial Times. For me this ranking was a nice extra, but not the main reason I chose to go to this university. Despite being already in the fourth year of the EOR program, I had my doubts on whether or not I made the right choice. The theoretical approach of Tilburg University and lack of practical application often made me wonder whether the EOR program is best for me. Therefore, going on exchange was the perfect opportunity to broaden my horizon, discover what fits me and what not; I could escape from all the doubts I had. Católica, as a business school, offers several management and economics courses and the five courses I am taking are Strategy, Organizational Behavior, Marketing, Health Economics and Data Management Tools. Compared to Tilburg University, the teaching methods at Católica are a bit different. For each course, lectures are mandatory (at least the practical ones) and your presence and participation have quite some impact on your final grade. Each course has a group project, two midterms - which make sure you keep up with the materials covered – and a grading system in which 10/20 is enough to pass the course.

Having almost finished the midterms (and I expect that to be without any problems), I can say that there are definitely some interesting aspects about management and it is good to be aware of the concepts, but I do think that it lacks a bit of a challenge. I am still not sure whether or not the EOR program is best for me, but my future is most probably not in management studies.

This is not a goodbye, but a see you soon

Time has flown by very fast, so unfortunately my exchange is almost coming to end. But the coming weeks still have a lot in store for me: The Festas de Lisboa, to celebrate Santo António, are waiting for us, the European Championship will set the city on fire, I will travel the Portuguese coast up north, explore the beaches of the Algarve and visit Oporto once more. But most of all, I will enjoy every single minute left with the wonderful people I met and I will create new memories. This adventure was an experience I will never forget and I am sure it is only the beginning of many more experiences abroad. This city has given me so much and I am sad to leave, but Portugal, and especially Lisbon, will always have a special place in my heart. Quoting one of the greatest poets of the 20th century, the Portuguese Fernando Pessoa, I would like to end this article with a sentence which for me summarizes my exchange:

"O valor das coisas não está no tempo que elas duram, mas na intensidade com que acontecem. Por isso, existem momentos inesquecíveis, coisas inexplicáveis e pessoas incomparáveis."

Obrigada! ●

Marieke de Leeuw
AGE: 18
Began studies in 2015

A Tricky Pub Quiz

With the prospect of our last exams, there was still one Freshmen Activity to be organized. This year, the last activity was a pub quiz, preceded by a delicious dinner. We ended with a beer race drink. With all the fun of this evening, we were able to gather courage again to prepare for the final straws of the academic year.

For dinner, we gathered at 17.50 hours at Happy Italy, because everybody loves pizza (or, you could also take a pasta if you prefer that, although I think that is pretty crazy). We arrived with approximately thirty students, so we had to spread ourselves over three tables. Each table could order their pizza and drinks one by one (of course, the table where I was sitting at was the last one to order). However, the fact that everyone could have a nice chat with each other compensated for that. With our stomachs filled with pizzas or pastas and beer or soda, we went to Café Qwibus to pursue this Freshmen Activity. Fortunately, there were enough bicycles for everyone to get a lift to the café, otherwise, some of us had to walk all the way there.

When we arrived, the groups for the main part of this activity, the pub quiz, were announced. Friends were split among different groups so that you could get to know other people better.

The pub quiz consisted of a few rounds, like trivia, music, spelling bee, audio, et cetera. Furthermore, there was a sheet on each table with some bonus questions (actually they were all trick questions). Our group contained four people with all different fields of knowledge, especially a music freak, who lead us to victory eventually, hurray! We won two bags of Haribo Goldbären! However, there was some plot twist…..

All our effort was in vain, because what they had not told us was that there was an extra final round, in which the winning group of the evening was to be determined. This round was inspired by the TV show 'Miljoenenjacht': from each group there was one member who had to stand behind a desk. Our representative started at the first desk, because we won the pub quiz. An unknown amount of questions were posed and the people behind the 'desk' (actually this was a bar stool) had to be the first one to whack it. For each correct answer, you could move one place closer to the first desk. If your answer was wrong you had to take a step back and so on. Long story short: it is a game of general knowledge but mostly very much luck. Unfortunately, due to a trick question (again), our representative did not win the final and therefore we did not win the big prize of the evening, which was an hour of bowling with your team. Yes, we were very happy with the youth sentiment of those gummy bears, but bowling is also a lot of fun.

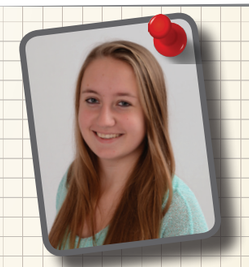
After the pub quiz, it was time for the beer race. This event was not only meant for freshmen, but for all econometrics students, and took place in the same café as the pub quiz. However, some people had to catch their trains because they do not live in Tilburg (yet), so they left immediately after the pub quiz ended. Others stayed for a couple of (free) beers and left just in time for the last train. Only the die-hards stayed to take part in the beer race. They had to form teams of four members; the team that was fastest to 'ad' their glasses wins the race.

All in all, this last freshmen activity was a great ending of our first year of being an econometrician. Hopefully, many more of these memorable evenings will follow during the coming years of our studies. ●

(Hip-)Hopping on a Plane

Text by: Pepijn Wissing

From her early youth, Judith has been competing in show-dance competitions with Let's Dance in her hometown. Since the start of her studies in Tilburg, she has joined another dance team: a hip-hop crew this time. For most of us, it would be either one or the other; not for Judith. In addition to her already busy first year of studies, she juggles multiple training sessions every week and frequently travels to distant corners of the country for dancing contests; she has even started to check out the international competition!



Judith Brugman
AGE: 18
Began studies in 2015

Fierce competition

Having decided that she was going to keep dancing with the team from her hometown, Judith found herself stumbling upon an advertisement on Facebook, and even though she did not have any hip-hop experience yet, she thought to herself: "Well, I can always try it!" Similar to all new applicants, every existing member of the team has to audition at the start of the season. So, when Judith was one of the 25 girls to audition for one of the twelve spots on the team, Judith did not like her chances too much. Evidently, she performed very well at the auditions, as she was one of the inexperienced girls to be selected for the team.

Judith mentions that one of the effects of this auditioning procedure is that there are new girls joining every year. This keeps the group fresh, and allows them to compete in the beginner class each year; if the same group of girls would be together for a longer period of time, they would have to compete at a higher level. Overall, the current team is mostly made up by third-year students, and Judith is the youngest on the team. With the summer vacation coming up, next season's auditions are also coming ever closer. Judith is definitely going to give it her all to get back on the team, though she fears that because of their accomplishments this year, the team will have drawn more publicity than before, which may lead to a larger number of girls auditioning this year; something that could cause the competition to become even steeper. Judith tells us that even if she would not get to be on the team again, she will still be dancing with Let's Dance and she would attend the open training sessions to increase her chances in 2017.

The contest

A dancing contest is quite similar to most other jury based sports. "Upon arrival, everyone is in this large open area; there are no dressing rooms or anything like that, so everyone just kind of hangs out there. Then, all of the teams – there are about fifteen teams in each division – get a time frame of about two minutes, within which they can do pretty much whatever they want to impress the judges. The judges rank the teams in five areas, such as musicality and synchrony. Then, based on the five areas, a joined ranking is created. The top three of the day is made public at the end of the day; the exact ranking of the rest of the teams is published at a later time."

'The skill level in some countries is just so much higher'

You might wonder why these competitions have to take an entire day – or weekend – when there are fifteen teams that each perform for about two minutes. "Well," Judith explains, "there are many different levels and age groups: we are in the over-eighteen-beginners group, but there are also the novice, intermediate and advanced levels, all of which have several age groups. I think there are classes for over eighteen, under eighteen, under sixteen, under fourteen, and the under ten. But what takes the most time by far, are the solos: there are many soloists, who also get

a few minutes each to perform for the judges." Some quick arithmetic confirms that when this many dancers all have to perform sequentially, everyone is in for quite a long day of dance.

Judith is quite clear when asked whether she would like to perform in the solo's competition at some point: "No. No, I am just never going to put myself through that. Not ever." The main thing that she feels could prove to be problematic for her would be the fact that a large part of the solo's performance is based on improvisation. This is caused by the fact that the music on which the dancers have to perform their piece is not known beforehand, and as such, the speed – beats per minute, something that is quite vital for a hip-hop performance – is also not known beforehand. Judith feels that she simply lacks the experience and the feeling to just come up with something on the spot.

That being said, Judith does feel like she and the rest of her team have a reasonable say in the choreography that they are performing. The choreography is normally made by their trainer, but when the girls have an idea that could improve the dance in some way, he usually listens. Judith tells us that their choreography is changed on a very regular basis, albeit with small changes every time. "A choreography typically consists of three main parts; we pretty much always change one of these parts between contests. Then we see if the judges like the changes, and repeat the process to continuously improve our performance. This makes our choreo better, and keeps it fresh for the dancers!"

Going international

Judith is particularly proud of their participation in the European Championships in Germany. Through their performance at the National Championships, Judith's crew managed to receive an invitation for this weekend-spanning event. "Well, we did not really feel like we were in any position to win," Judith tells us humbly, "but we all agreed to go anyway. It was such a great experience!" All of the teams had to perform on Friday; the best four teams would qualify for the finals on Sunday. The remaining teams would get another chance to show their skill and qualify for the finals on Saturday. "Friday's performance was not that good, but Saturday's felt way better. Unfortunately – but as we expected – we did not rank high enough to continue to the finals."

Still, Judith is happy with their performance. She tells us that she particularly liked to see the teams from other countries dance. "The skill level in some countries is just so much higher. Teams from the UK, for instance, would already incorporate all kinds of acrobatics in their dance. That is not something you ever see in the Dutch competition." What is next for Judith and her team, she does not really know. She does not expect to be able to finish much higher at the European Championship, seeing there will be new girls joining every year. However, she feels that they could perform well more consistently in the national competition.

Student or teacher

Before she moved to Tilburg, Judith would also teach dancing to the younger groups at Let's Dance; that did not require any education aside from hands-on experience. What exactly she would teach the younglings is hard to explain, as show-dance just has a little bit of everything. Even though she used to really like to do it, these days it just does not fit into her schedule anymore to travel back to her hometown to go teaching, as her own training sessions are scheduled at around the same time. Unfortunately, teaching at her association in Tilburg is not really an option either, since she does not have the required education.

All in all, we have seen that Judith's life is packed full with dance, and that she has been rather successful in pursuing her passion; so far, it has already lead her to an international stage. Who knows what else is in store for this hip-hopping econometrician! ●

For videos visit
NEKST-ONLINE

Dining as Kings

Martijn Heinen
AGE: 24
Began studies in 2010

Finally, after waiting for a long time it was finally April 22: time for the annual Former Active Members (FAM) dinner. After a fantastic 007 KOALA, the Old Active Members could finally meet again at an informal activity of Asset | Econometrics. We were ready for a dinner and an old-fashioned night out.

Weeks before the dinner took place, and while many even had not decided whether they wanted to be present or not, a WhatsApp group was created. It was created by Thijs Verhaegh, an exemplary old active member, to make sure that we could enjoy a traditional beer after the dinner. However, first things first: we were expected at 19.00 hours in 'Stadskasteel Oudaen' in Utrecht.

Willem Jongen and I recognized the location immediately as the reputed location of the Bain board dinner. Knowing that only luxury lied ahead of us we started the evening with a nice glass of wine. At the first sip the former External Affairs said: "This is the best wine I have ever had. It is already delicious at the first sip." Apparently,

he needs to be loaded before he can enjoy the wine he usually consumes. Still, this was promising for the rest of the evening to come. At the starter the anarchy already began. There was the choice of Dutch shrimps, lamb and a vegetarian dish and (of course) everyone had already forgotten what he or she had ordered. Fortunately, thanks to the digital age, the administration was well prepared. The necessary e-mails could be retrieved from the smartphone to determine what was ordered, and by whom.

Since the group was quite large (26 highly regarded former active members), we decided to switch places in between courses. While the next dish was being served all members would stand up to have a nice chat with each other. Meanwhile, the waiters were running around with bottles to keep Willem and his friends accommodated with enough wine. For the main course we sat back at the long medieval-style table. While the main dishes were eaten and the wine was drunk many of the old members were convinced, with the necessary power of persuasion, to go out. Based on the opinion of the recent established 'Utrechters' we ended up at a cozy pub named Grand Cafe Friends. To our great surprise we found our long lost Tilburg life once again. No one else than 'de Jongens Van Je Weet Wel' were present to give a live concert. Unfortunately, for the Tilburg delegation the enjoyment could not last long. After a beer or four, some dance moves and good conversations with lost friends they had to take the train back to Tilburg. However, this was no reason to stop the party.

A note has to be made here that while the author of this article prolonged the evening in Tilburg, the Utrecht party kept going on with as sole winner our very own Thijs Verhaegh, who looked forward for this event for so long and was the last man standing.

Thanks to the Albert Heijn To Go at Utrecht Central Station the party could indeed continue. We equipped ourselves with a few well chilled beers to survive the trip of an hour from Utrecht to Tilburg. The previous encounter with 'de Jongens Van je Weet Wel' led us to the place to be: Polly. Due to the slowly increasing amount of alcohol and decreasing cognitive ability nothing more remains to be told. The companionship left the pub before the lights went on only to wake up the next day with a slight hangover.

Overall, it was a wonderful evening showing once again that the connection between active members is stronger than time, and hopefully this is a reason for all current members to join the (A)FAM once they graduate (or before). ●

How I Met Your Candidate Board

Milan van der Kamp
AGE: 21
Began studies in 2013

After weeks of studying and almost starting to consider the library my new home, it was the perfect time for the Asset | Econometrics Football Tournament and the Announcement Drink! On June 7, this legendary football event took place at T.S.V.V Merlijn, after which we went to Café Qwibus for the drink.

How I would describe a real econometrician? I would not know, but my fellow teammates came up with the idea to name our team 'Drunk & Autistic', abbreviated by D&A. After a great lunch, Linda's beautiful voice was heard loud and clear over the sports complex and the football tournament started. We had our break in the first round, after which we had our first match against team Tesla Taxi. Even with Ridho as our unofficial captain, we were not that good. Maybe I should add that this was the same for all other matches as well. We are just not really good at playing football, but that does live up to our name.

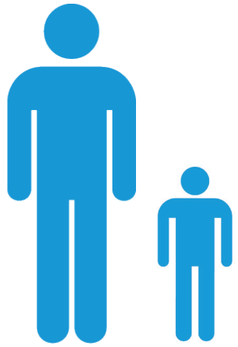
After the tournament, it was time for the barbecue. Due to the very high temperature that day, some people were having red heads, arms and legs, me in particular. Nevertheless, after a day of playing sports, people had started to crave for food. People were wondering whether I would be joining them for the Announcement Drink as well, to which I responded: "I do not know, only if I am not too tired." Nobody guessed that I would join the board of next year. They also asked of whom I thought that they would join the board. Knowing all the candidates, I was just throwing names that were not on that list. It worked, and I convinced many guys with names that were not on the list.

Around 22.00 hours, the Announcement drink started. Out of all the new candidate boards at Asset, we were the first to be announced. Hence, after tonight, it was no longer a secret and we did not have to go to the city centre in secret in order to not be spot. Arriving there, Bas van Wely immediately said: "I heard you would become the next External Affairs." I denied all theories, but I am still wondering whether it was a real guess or if he was just trying to annoy me.

The theme of this night was 'How I met your candidate board'. I immediately thought that I would be taking the role of Barney; an expectation that was met soon after the video had started. The video, consisting of our 'best' or 'most-charming' pictures, was followed by an insane amount of people who wanted to congratulate us. As time passed by, the level of drunkenness rose and so did the amount of broken glasses. At some point, a pineapple flew through the bar, and hit the barkeeper, who was not really happy about that. Tim's best idea concerning the pineapple was to eat it, and peel it with his teeth.

The next day at 9.00 hours, the candidate board had to gather at the Astrics rooms to do all kinds of silly tasks. I hope this is not what I applied for. All in all, I really enjoyed the day and I would like to thank the Drinks & Activities committee for the tournament and thank the board for the great announcement. ●

THE FATHER OF...
TOM VAN OOL



Friendly Football Family

Text by: Aurel Macias Minambres

On June 3, Claire and I went to the beautiful town of Waspik, which is roughly located between Dordrecht and Den Bosch. We visited our fellow student Tom there, to get to know more about his father, Piet van Ool. After a very nice dinner prepared by Tom's mother, we sat down in the garden and struck up a conversation.

Piet's life in a nutshell

Petrus Jacobus Maria van Ool, usually named Piet van Ool, was born and raised in Veulen, a municipality near Venray (Limburg). After secondary school, he first went to a technical school. However, he did not like this as much as expected, so he ended up becoming a teacher. Piet was born in a family of six boys, and had no sisters at all. His mother always wanted a daughter, but that, sadly for her, never happened. The father of Piet always said "If you have boys, the girls will come along", of which Piet himself thinks that was more the case back then than nowadays.

After his studies to become a teacher, Piet went to a domestic science school to become a teacher in mathematics. After a fusion of several smaller schools, which Piet was not all too happy about, he roamed around for a couple of years, teaching at different schools. Piet: "At one of these schools, a project had started in which teachers could get into the business world, with the opportunity to return to teaching." Piet joined this program and had several different jobs. During his years as a teacher he obtained knowledge of programming, so he started in the business world as an instructor on process supporting software packages, which were commonly used in logistics.

At that time, he also had two (still young) sons, Tom and his older brother Bas. This became somewhat of a problem for the job as an instructor. He felt a total of three problems: For starters, in consultancy, you are supposed to know everything. This is not to the liking of Piet, who is very honest and will not say he knows everything when he does not, although if you would ask him a question he would kindly look up the answer. Also, he did not feel part of the companies he was working for, something he did not like. Lastly, the travel distances were very inconvenient, given his young kids. It was in this time that he resigned and started his current job in Raamsdonksveer, also on internal system programming.

Looking back at those years, there are two things Piet might have done differently. Firstly, he would have liked to have kids earlier. Secondly, he thinks he would rather have studied mathematics or physics, but at that time he was not sure whether or not he was smart enough for that. Therefore, he decided to go for studies that did not fully concentrate on mathematics. Piet thinks that especially statistics is hard, or rather, it starts out really easy and suddenly gets unbearable.

Do it with passion, or not at all

Piet's passion for computers is also pursued in his free time; Piet is interested in new concepts. Since a year or two, he uses Linux, the open-source operating system with the penguin. He likes the transparency Linux provides; "if you have some basic computer knowledge you can see all the Linux processes in the code." Another reason for using Linux is that Piet thinks companies such as Microsoft and Google are too commercial, using data of individual users.

Another hobby of Piet where his love for new concepts comes alive is gardening. Piet liked to tell us about the concept of square-foot gardening, which he said was a very keen idea for students. On a small patch of land one can use a combination of vermiculite, compost and turf to make plants grow like crazy. The best thing about this is, in his view, that this system is extremely efficient, and furthermore that in this way, his groceries are unsprayed. "My dad beats the world", Tom says.

One of the family's main hobbies is football. Tom has been practicing football for a long time himself, to the extent of going back to Waspik every week just for football. Piet was quite a

decent football player himself, but got a tough injury before he turned eighteen. Piet's father was a very keen football player as well: he was scouted by PSV, but had to decline because of the work on the farm. Still, one of the families' favorite activities is watching Tom play football. They do not necessarily like watching football on TV, but when Tom plays, both of his parents really like to be there. For years this has been one of the activities that bonds the family, and they do this far more often than, for instance, going to an amusement park. When Tom and his brother were kids, they did not do many of those 'special' things, as their parents felt those things were not really necessary because of their rural youth. Football, on the other hand, which is really something for the whole family, is more amazing to them.

Like father, like son. Or not?

When Tom himself was born, it was his mother who decided upon the name. Piet already made the last minute decision to name Tom's brother Bas, so now it was her turn to choose. At a very young age, Tom already had some characteristics of his father. Something that his mother describes as 'being too good' was already seen at a very young age. Tom himself had to add something here: "I do not like it when someone does not give it his all, for instance in a football match." His father has somewhat the same traits, shown in different places. Tom was a very loving kid, always smiling and beloved by many. He was always happy and felt very gifted about everything he could do. He also wanted to be the very best, though.

Tom more or less feels he has more of his characteristics and looks from his mother than his father, although he does have his mathematics skills. However, he never felt like he was really good at mathematics until he started studying in Tilburg, first Business Economics and later Econometrics. His father did not see Tom's mathematical skills either, which he felt as a small miss on his part. Tom's brother, on the other hand, is more like their dad.

The most important thing that Piet always wanted to say to Tom is that he "has to go for his first thought". Interestingly, this is what Tom usually does already. When the bunch of 'Waspikkers' who turned twelve went to a secondary school in the west, Tom went eastwards, all alone, to the school he really felt was 'right'. Tom is very dedicated in what he does, but in the view of his father always acting upon your first thought can be hard.

Politics

On a final note, Piet wanted to talk a little more about some unique political viewpoints of his. He sees the globalization as a good thing, but also feels there are large cultural problems. For instance, a unified language would help us understand each other. English is the closest to a unified language we can get, but the main problem with using English for this purpose is the hostility towards some English-speaking countries (especially USA) from several other countries. If we would instead just use a language, besides our mother tongue, that is not bound to anything, this problem would be solved. From this point of view, Piet likes Esperanto. Esperanto is a created language combining elements from mainly Spanish and English, with easy grammar. Sadly, in his view, it does not really work out. Something else Piet likes from a political view is the Pirate Party. The organization is active all over Europe, and their most important point is direct democracy, which means that people can vote about smaller matters themselves.

After learning about Piet's history, his ideals and his take on interesting concepts and ideas, along with learning some interesting things about Tom (who had to go to a party with his football friends), we were taken back to Tilburg. We would like to thank the whole Van Ool family for their time, hospitality and great cooking. ●

Heroes for Three Days

Did you happen to stumble upon around forty ridiculously dressed and extremely noisy students in the city of Roermond? This was probably us, battling for victory during the Asset | Econometrics Active Members Weekend, which took place from April 1 to 3.

A proper preparation

It was already a few weeks earlier when the fun started, as the groups were announced. Each group was assigned a team of well-known superheroes. Nina, Lieke, Pepijn, and I had the honor to represent the super strong, crime fighting, well shielded, heavily armed, grass green, Teenage Mutant Ninja Turtles! Since some preparations had to be made, we planned a meeting. Of course, outfits had to be arranged, which Pepijn and Nina took care of. Moreover, a beautiful team flag was designed, and the basis was laid down for some extremely catchy team slogans, which are told to still make some people wake up screaming in the middle of the night up until today.

At the day of departure we met at Nina's place. Fully dressed with painted shirts, sports bras as bandanas, drainers as shields, and of course armed with weapons, we set foot for the central station of Tilburg where we would meet our competition for the weekend. It was immediately clear that if we were to claim the cup, we had to be at the top of our game. The other teams were the Justice League, Fantastic Four, Team Hulk (I think they were meant to represent some bigger group of heroes, of which they just solely picked the Hulk…), Mega Mindy, Batman, Spiderman, and finally the X-men.

Fighting Kuhn-Tucker

The location for the weekend was still unknown. All we knew was that we had to take the train in the direction of Maastricht. During the train ride, we had some puzzles to solve which led to a set of coordinates, which in turn led to the location of residence. We were only able to solve the puzzles partially, leaving us with some gaps in the coordinates. Luckily for us, a good old guess worked out pretty well, as at some point the coordinates pointed to a group accommodation called 'de Bekerhof' in a very small village named Hunsel. Still not entirely sure whether we were correct, Pepijn decided to act boldly and give the place a call, to ask whether they were expecting a large group of students. Bingo! After hearing some very comical mispronunciations of 'Asset', we came to the conclusion that this was the right place, scoring the first points for the Ninja Turtles.

As we approached Roermond, we were told to get out at the next station. After a short walk it was clear why all these superheroes had to come here; the evil villain Kuhn-Tucker was conducting very dangerous experiments in Roermond, and only us superheroes could stop him. This resulted in a real quest through the city, during which we had to climb trees, get a grip on Kuhn-Tuckers assistant, and record a cool superhero scene. Luckily for us, we quickly found two German girls who were visiting Roermond with their grandparents, and were more than happy to help us with these challenging but noble tasks. Moreover, during this quest we revealed our secret weapon: our team slogan, which was "When I say Ninja, you say… TURTLES!" Later in the afternoon we left Roermond, and took off for Hunsel. During this bus trip, our superhero powers were again immediately tested, given the enormously high temperature, which made even the Human Torch (you know, that Fantastic Four fire guy) break a sweat.

After unpacking our stuff, it was time for dinner, which once again made clear how far teams were willing to go in order to place their mark on the weekend. Seeing the Mega Mindy crew cooking in their pink leggings was enjoyable at first, but after receiving a plate of pink pasta this joy disappeared quickly. Some superheroes claimed the pasta worked liked kryptonite, resulting in Superman and a Hulk to leave the battle early that night, and seek rest in their hideouts. However, this could quite easily be a romanced story, since some other, less heroic, yellow colored liquid could also have played a role.

The organization did not fail to entertain us that evening, having prepared several games, puzzles, and even a true cantus. During one of these games, clues could be obtained about the, at that time still unknown, location of the IBT. At some point during the cantus, Pepijn and I thought it was a good idea to hijack the microphone and sing, which might not have been such a good idea after all. Well, it was a very enjoyable night which went on until the early morning.

Superhoeroes and villains

Games and puzzles. These word characterize the Saturday morning and afternoon. From real brain crackers to very sportive activities, there was something to excel at for every superhero. Nina and I beat our opponents in a face-to-face tug of war by canoe, but unfortunately finding the minimum steps required to sort a sequence of numbers came too early in the morning for us. My personal highlight, and I think many agree, was the capture-the-flag Stratego we played in the woods nearby the residence. In short, every team hid its team flag in its assigned quadrant of the woods. Then everyone received a card which signified a certain rank of soldier. Every rank could defeat some set of other ranks, and could also be defeated by another set of ranks. The teams' jobs were to capture the flags of the other teams and to bring them to the center of the woods, attacking or being attacked by other teams' soldiers. The Ninja Turtles were off to a flaming start, and captured another team's flag within minutes. However, it turned out that we cheated, since a person signifying a 'bomb', which I was at that moment, was apparently not allowed to carry the flag. What a pity! The second round was not that successful for us, and moreover our flag got stolen at the end of the round, forcing us to return to the residence without it. Superheroes acting as villains themselves, it is unheard of! The afternoon ended with an exciting end game, testing all aspects a superhero team should possess, leading to a great show.

Dinner time turned out to be our time to shine, since the Ninja Turtles were given control over the barbecue, and obviously the one controlling the food has complete power over a group of hungry people. I have not told you before that the other teams had not yet been very cooperative in joining the "When I say Ninja, you say Turtles!" initiative. However, when not playing along with our shouting resulted in not getting any food, our heroic econometricians certainly seemed to suddenly have had a change of heart. Long story short, people were shouting "Turtles!" as if their lives depended on it, and hence Pepijn and I were more than pleased.

After the barbecue party, the competitive part of the weekend was over and we were all entitled to some relaxation. Later in the evening, we all gathered to, according to the tradition, head over to the nearest village's bar to have some fun. Given the size of the village Hunsel, we went without high expectations, but I must say this was unjustified. Knowing we were coming, extra preparations were made to entertain the guests from Tilburg. Extra speakers and show lights were arranged, and even the village's best DJs were booked to get those superhero feet going. At some point during the night, the Ninja Turtles were shocked, as we saw our stolen flag rise from the crowd. It turned out the X-men were the bad guys in our midst, calling it a joke; well, I did not get it… After being recommended loads of local parties by the regular guests of the pub, it was time to head back to the residence, where the after party started. While enjoying a campfire, superhero movies were shown. Moreover, a true four-man rave party was initiated, which undoubtedly bothered the neighbors in their sleep. As the birds started to wake up for their morning rituals, we decided to get some hours of sleep in preparation for the last day of the weekend.

The Sunday brought little surprise, as – of course – the residence had to be cleaned. Tasks were divided according to the final ranking, leaving us sixth in the list with cleaning the 'party area'. After all bags were packed, we left Hunsel to go for the traditional swimming session, after which the bus trip back to Tilburg marked the end of a great weekend.

As a final remark, I would like to thank the AMW committee for organizing the enjoyable weekend, congratulate team Batman on their victory, and especially thank the Ninja Turtles for the amazing time!

My First, but Definitely not My Last!

On the beautiful evening of Tuesday April 19, sixty econometricians gathered at Café Boulevard. This evening was expected to be particularly special, as it would be an evening of beer, laughter, and the most wonderful songs. Excited and curious about the night that laid ahead of us, Anouk, Lotte, and I entered Café Boulevard for the Astrics Beer Cantus.

Charlotte Nijman
AGE: 21
Began studies in 2012

The moment we entered, it was already quite crowded. We joined a table of freshmen and stared at the empty beer can. Where was the beer? This was no fun yet. The absence of golden liquid forced us to a casual conversation about the weather, the Cramer-Rao lower bound, and other semi-interesting subjects. Time passed by and at 20.00 hours sharp there was the very first pint of the evening. With beer in our hands, we were ready to sing!

After a loud applause, the Astrics Cantus boys came in; Björn Floor, Erwin van Oosten, Pepijn van den Brink, Tom Scholtze, Masum Rahman and Bas van Wely. The guys looked as if they were real gentlemen, with their white shirts, black bow ties, and angry looking faces. Apparently beer cantuses are real business. Pepijn started to explain the basic beer cantus rules to everyone. Going to the toilet was not allowed and drinking while singing was out of the question. Violators of these rules were forced to do shots.

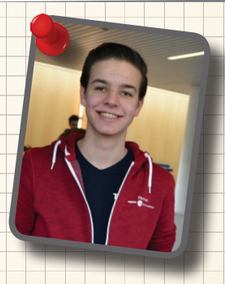
Okay, now we could really begin. At this moment in time, I was still quite suspicious. As this was my very first beer cantus, I was curious about what was going to happen. Were those people really going to sing? Would that not be quite awkward? But when the cantus singers sang the first notes of the Dutch anthem, my doubts disappeared. Everyone placed a hand on their heart and sang loudly (although the second part is always hard to remember). Still wiping off our tears of love for our homeland, we took our glasses. 'Ein Prosit' started and we could finally drink. By the way, did you know that 'TEV is VET' refers to the 'Vijf En Twintigste' year of the association?

After a few songs such as the popular 'Let it go' and the classics 'Brabant' and 'You will never walk alone', everyone was already really social and it was very cozy. My neighbor had become very confident about his singing talents and dance moves, and screamed the last sentences of 'Jan Klaassen'. His confidence increased to such heights that he made a crucial mistake. Pepijn had noticed that during singing 'Jan Klaassen' my neighbor had taken a little sip of his beer. Of course, he had to be punished for this unforgivable mistake. The wheel of shots decided he had to do a flamingo shot. Standing on one leg, he drunk his beer and satisfied the cantus singers.

Many beers later, Pepijn announced a break and the possibility to go to the toilet (I remember the happy faces of all econometricians). Everyone hurried to the toilet and came back with a very relieved expression on their face. After the break, the bomb burst and the real fun began. Cantus singers had no control anymore and all boundaries vanished. A freshman started to chug a whole can of beer, people were singing - or more like screaming - songs (the correctness of the lyrics was not that important anymore) and someone emptied his stomach in one of the beer cans. Taking my coat off the floor (the coat rack had broken down), I headed home. While cycling home I smiled; what an amazing night!

Bata Business

Every year in April, thousands of students gather to collectively try to lose the weight gained from an intense year of studying by running from Nijmegen to Enschede. As I gathered my bags before departure, it hit me hard that this weekend would be quite the physical challenge for me. Although over the past year I had reached new personal heights as far as sleep deprivation is concerned, the same could not be said for any of my athletic endeavors.



Thomas van Manen
AGE: 21
Began studies in 2012

At around 19.00 hours I departed on my journey together with Yvonne, as some pre-race checks had to be done in Nijmegen, the city where we would later start the race. Even though we arrived there early, roughly four hours before we actually had to start, the sports center in Nijmegen was already bursting with anticipation.

As the sky darkened and the night approached, the runners for the first few stages arrived. Once again we managed to gather a great crew, consisting of runners from both Asset | Econometrics and Asset | Accounting & Finance. Finally, at roughly 01.00 hours on Saturday, we departed for the 44th edition of the Batavierenrace.

We were off to an amazing start, as Martin from A&F flew through the hills around Nijmegen, quickly propelling us to the top of the standings. The rest of the night went by quietly. There is something very soothing about driving in the Dutch countryside in the pitch black darkness for hours, with the occasional pit stop to switch runners. Unfortunately, this calmness tends to vanish abruptly at times, as it might turn out that you managed to misread the directions entirely, and actually did have to take that right hand turn a few minutes ago.

Another nightly highlight occurred when we hit a traffic jam consisting of roughly 200 minivans, all trying to get to the next pit stop, forcing Martijn and Tim to get out and do an unexpected warming up to make sure they would arrive at the next stop on time.

As the hours passed, the darkness started to disappear and finally everyone from the night crew had finished their run, at which point they passed the virtual baton to the morning runners.

'I want to make a special shout-out to the incredibly helpful farmer boy'

My recollection of their amazing performances is somewhat hazy, since I had been driving all night, and finally blacked out in the back of the van. However, I want to make a special shout-out to the incredibly helpful farmer boy, who managed to pull our van out of the fifty centimeters of mud we managed to dig ourselves into. Without him, we would undoubtedly still be stuck far away in the meadows of Twente.

As the afternoon approached, the moment I dreaded drew dangerously close. I actually had to run myself. Considering the fact that my last serious run had been during the previous Batavierenrace, exactly one year ago, I was expecting a considerable amount of pain and suffering in the near future. Luckily Thijs (who ended up running nearly thirty kilometers himself) managed to pull me through it.

The final stages had arrived. As had also become tradition, Janneke ran the last stage for the women, and she did so admirably. With one stage left, Alex managed to surprise everyone, including himself, with a ridiculous race where he ended in the upper regions of the very strong field. All these incredible efforts combined got us to the 47th place out of more than 300 competing teams! An achievement to be proud of.

Of course, the Batavierenrace is not complete without the Batavierenfeesten. With the grandeur of a large festival, this party always is one of the highlights of the year! While some were able to enjoy it longer than others due to lack of sleep and sore feet, everyone made sure to get the full Batavieren experience.

Unfortunately, next morning the lights went on at 9.00 hours, and everyone was requested politely but decisively to move his or her ass, bringing the Batavierenrace 2016 to its end. I want to congratulate all runners for their amazing performances, and cannot wait to join next year! Hopefully with a little bit more training under my belt.

LIVING IN LODGES

A Perfect Bed in a Perfect Place

I had not even finished telling Aurel that it was such beautiful weather and that the rain would only come tonight when all hell broke loose. We were on our way to Maureen's and it started raining cats and dogs. When we arrived, it was quite difficult to find the right entrance at first, but in the end we managed to enter the house of the interviewee, a 19-year-old second year bachelor student in Econometrics.
Text by: Mike Weltevrede

Maureen originally hails from Roosendaal, only thirty minutes by train from Tilburg. Before she moved to Tilburg to live in lodges, she commuted every day to get to the university. Maureen found this quite doable. Not only did it not take long, it also enabled her to do some last minute work or wake up before attending class. She was not actively looking for a room though, but the opportunity simply presented itself. Her cousin had actually been living in the room Maureen is now occupying, and she asked whether Maureen would be willing to take over the room. Maureen agreed and a little while later she was living at Spoordijk 82, right next to Interpolis.

Maureen's room consists of two parts. When entering the room, you immediately stumble upon the bed, which is just big enough to fit in that partition. Given my semi-OCD, I was very satisfied to see such a perfect fit. Turning right then, there is the second partition. It contains, according to herself, everything that Maureen needs. There is a couch, a television, a desk, and much more. Well, not that much, it is still a student's home. There are some birthday flags still hanging from the walls, since Maureen recently held a birthday party here, although it was not her own. Across the hall, there is a kitchen. This is convenient since Maureen does not have a sink in her own room, so this is where she gets her cup of water and such. The large window gives a great opportunity to learn the train schedule by heart, something which Maureen actually did, as you look out on the train tracks. Personally, I would find it quite annoying to be living right next to the tracks, but Maureen explained that she got used to it quite quickly. She even likes how the floor vibrates a bit when cargo trains pass by.

What do you like about your room and the house?
Well, I live very close to the city center, which is a great thing. I am not bothered that much by the fact that I live somewhat far away from the university. It might be particularly annoying when it rains, but I kind of like the shower to wake me up in the morning. I also love to just go out with my friends and have a drink at some bar, so the location is convenient when returning home late. Usually, I also have dinner with my friends. This is mostly also done at my place, since I do have the most room. Right now, Lieke is getting groceries for dinner tonight. When she gets here, it will be a surprise to me what we will be having for dinner. We generally vary in the way we cook. Sometimes, we do something easy - like potatoes with vegetables - and sometimes we look for a recipe on the internet. As for my preference, I do not really have one. Sometimes it is also nice to eat simple and at other times I love to whip up something more complex from a cooking book.

What about your roommates, how do you like them?
My roommates are great too. Even though I do not talk to them often, since a few of them are already working, they are always in for a chat when we do meet. We also have a comfortable area under the staircase. We have several couches there where people generally sit when friends are coming over. It can get cozy really easily. I also do not find many annoying traits in them. They do not play music loudly, for example. Sometimes, however, it can be quite a mess, but we have a cleaning lady who comes by weekly so it is generally no problem.

Maureen does still go to her parents every weekend. Besides the obvious reason that everything is done for her there and she can just relax, her family sounds really nice to be around. Her father is quite handy and he is also the one who painted the walls of Maureen's room and placed the paintings. Maureen's friends from high school go back home to Roosendaal in the weekend as well, so that is another reason to go back and meet up with them. Lastly, Maureen particularly loves the food that is cooked back home. Even though Maureen and her friends try to replicate some recipes every now and then to also achieve such culinary success, it will never match the meals she receives back in Roosendaal.

All in all, it seems that Maureen is happy to be living in lodges. It is not only easy to experience a more vivid social life, but it also enables Maureen to be more active in general. She really wanted me to write that she loved being in the Introduction Activity committee, so here we are. One last thing that we asked Maureen was whether there was still someone she would like to invite in her room to have a chat with. Even though I put forward a lot of, in my opinion, great examples, she still struggled. In the end, Maureen thought that it might be funny to invite the entire Nekst committee to see if we actually fit in her room. Challenge accepted, we will come by in the next couple of weeks!

Bert & Ernie Questions

Bert or Ernie?
Ernie

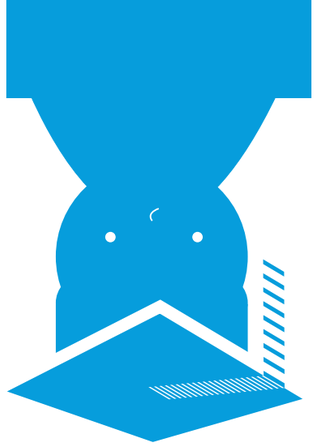
Tilburg or Roosendaal?
Breda

Vegetables or fruit?
Fruit

Computer or pen and paper?
Pen and paper

Beach or exploring?
Exploring

Bunnies or penguins?
Bunnies



Asset | Econometrics congratulates...

Name: Brian Hendrikx
Title: Closed Form Approximation of Conditionally Indexed Liabilities
Supervisors: Prof.dr. B.J.M. Werker, Prof.dr. A.M.B. De Waegenaere

Name: Ruud Wagemaker
Title: A GPU based parallel algorithm for the vehicle routing problem with time windows
Supervisors: Prof.dr. G. Kant, Dr.ir.ing. M.J.P. Peeters

Name: Stan Albers
Title: An investigation into the robustness of solutions of a real-time Traffic Management System under varying prediction quality of train traffic
Supervisors: Dr. G. Gürkan, Dr. R.C.M. Brekelmans

Name: Hao Sun
Title: Sensitivities in Asset Liability Management
Supervisors: Prof.dr. J.M. Schumacher, Prof.dr. B.J.M. Werker

Name: Ellen Ceelen
Title: The effects of con guration changes on the performance of lithography systems
Supervisors: Prof.dr. B.J.M. Werker, Dr. T. Klein

Name: Alexandru Panici
Title: Volume Flexibility and Capacity Choice: A Real Options Approach for a Two-Stage Sequential Investment
Supervisors: Prof.dr. P.M. Kort, X. Wen MSc.

Name: Nejc Znidar
Title: Modeling Future Mortality and Evaluating-mortality risks
Supervisors: Dr.ir. G.W.P. Charlier, Prof.dr. A.M.B. De Waegenaere

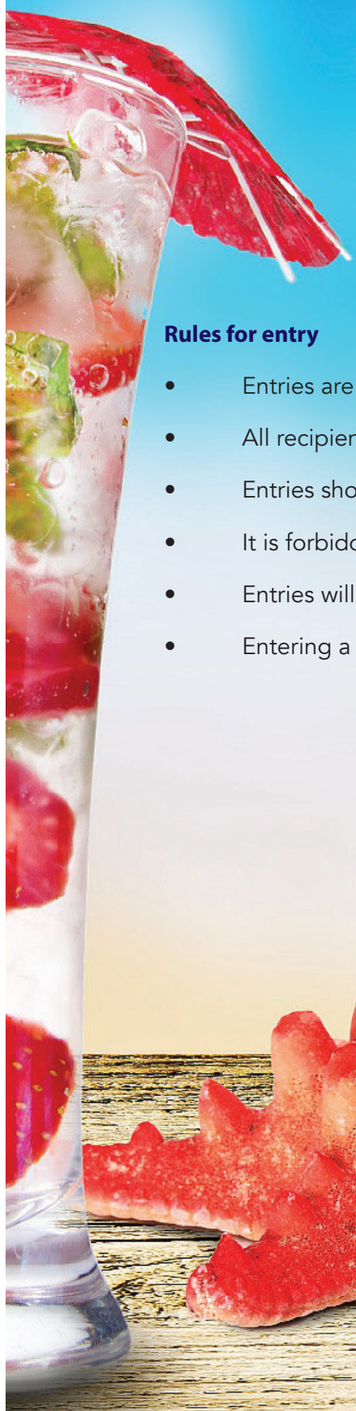
...on obtaining their Master's degree.

Easter Egg Hunt!

While many of you browsed the previous edition of Nekst in search of hidden easter eggs, there can only be one winner. The answer was **fifteen eggs**, and the winner of the Easter Egg Hunt is **Maureen Los**! As a reward, she can come and pick up the prize at room E1.10. Congratulations!

Fan Photos!

The start of summer means the start of another edition of Asset | Econometrics' Summer Photo Contest! The task is simple: pick up the free summer promotion item, an electric hand fan that sprays water, at room E1.10 and take a picture of you using it. Sending in the most original photo wins you a crate of beer or a delicious pie.



Rules for entry

- Entries are to be sent to Nekst@Asset-Econometrics.nl before September 16, 2016.
- All recipients of Nekst are allowed (and encouraged) to enter the competition.
- Entries should show both the person entering for the contest and the electric hand fan.
- It is forbidden to edit your submission with Photoshop or any other photo-editing software.
- Entries will be assessed on originality by this year's and next year's Editor-in-Chief.
- Entering a submission to this competition constitutes acceptance of the rules.

Quatsch!

Zeger van Nieuwenhove: 'Ik wil nog wel graag eens in een auto ongeluk zitten.'

Thijs Kramer: 'Nu mijn kont nat is, is hij nog geweldiger dan eerst.'

Laura Verloop: 'Je kan wel fatsoenlijk tellen, maar je telling klopt niet.'

Björn Floor: 'Je moet opletten dat je het toetje aan het einde eet, anders gaat het echt fout.'

Juul van Schijndel tijdens 30 Seconds: 'Een voetbalclub in Enschede.' Nikkie Damen: 'Volendam.'

Tim Laurensse: 'Ik wist niet dat je nacho's ook zelf kon maken.'

'Waar vlogen de vliegtuigen in op 9/11?' Linda Torn: 'Empire state of mind.'

Max Smedts: 'Ansjovis is sowieso een groente.'

Casper Kroot: 'Ik ging twee jaar lang iedere dag naar de sportschool, maar toen dacht ik 'Maar pizza is ook wel lekker!' en stopte ik.'

Zeger van Nieuwenhove: 'Achter in de achtbaan ga je sneller dan voorin.'

Maureen Los: 'Ik denk altijd dat pinguins heel leuk zijn, maar als ik ze dan zie dan zijn ze lelijk en kunnen ze niets.'

Wise words of ...
Dick den Hertog: 'Mathematics is emotions.'

Quatsch?

Over the past few months, the editorial staff of Nekst received many quotes that relate to the study of Econometrics and to the activities organized by Asset | Econometrics. Therefore, we present to you a selection of some striking and funny quotes! Please mail all remarkable quotes you have heard to Nekst@Asset-Econometrics.nl!

PUZZLE

It is summer, so hopefully we are enjoying good weather. In case you wonder what to do all day on a sunny day, Nekst is here to help. Why not crack your brain on this puzzle?

On a local market in a far-away country, a market stand has fresh fruits for sale. The prices satisfy the following equation:

APPLE = BANANA – LEMON

Furthermore, it is noted that each of the letters in the equation above represents one of the digits from 0 to 9. Each letter represents the same digit in all words, and different letters represent different digits. Assume there are no leading zeros. Determine which digit corresponds to each letter, to find out what the price of an apple is.

Please send your solution to Nekst@Asset-Econometrics.nl before September 16. A crate of beer or a delicious pie, whichever the winner prefers, will be waiting for whoever has the best (partial) solution. Please note that, as before, every recipient of this magazine is eligible to send in their solution, so members of the department are invited to participate as well. Good luck!

For elaboration visit NEKST-ONLINE

Willem Jongen is the winner of the previous puzzle. As a reward, he can come and pick up a crate of beer or a pie at room E1.10. The solution of the previous puzzle can be found on www.Nekst-Online.nl.

Agenda
Summer 2016

Asset Party
Tuesday August 23

Are you ready for the first party of the academic year? Then make sure to go the Asset Party in Café de Boekanier, which takes place during the TOP-week!

Tilburg University Cantus
Monday September 5

The very first cantus of 2016-2017 will be a good one for sure: the Tilburg University Cantus (TUC) takes place on Monday September 5. Do you want to participate in this event with unlimited beer and thousands of other students? Then make sure to reserve your ticket in time!

Training Day
Tuesday September 13

While EOR teaches you very valuable quantitative skills, qualitative skills can also come in handy. During the Training Day, several trainings will be given to Econometrics students, for instance related to soft skills and data visualization.

Landelijke Econometristen Sport Toernooi
Thursday September 29

This year's LEST will include a Sport & Games Tournament besides the regular Football Tournament. Furthermore, you can also take part in a barbecue, drink, party and even a sleep-over at Erasmus University!

DMM & Constitution Drink
Wednesday August 31

The new board of Asset | Econometrics will officially be installed during the Department Members Meeting (DMM), which takes place on August 31. Afterwards, our first drink of the new academic year will take place in Café Qwibus. We hope to you see you there!

Introduction Activity
Tuesday September 6

The freshmen of next year will have the possibility to get to know each other better during the Introduction Activity, followed by a barbecue afterwards. Do you want to be a volunteer? Then send an email to intro@Asset-Econometrics.nl.

Asset Kick-Off Party
Wednesday September 21

The Asset Kick-Off Party will take place on September 21. Do you want to have a great night with lots of free beer? Then make sure to be there!

LotYA, Game Afternoon & Drink
Tuesday October 4

Who is the best professor of our department? On October 4, the Lecturer of the Year Awards will take place, where you can thank your teachers. Afterwards, the annual – and very successful – Game Afternoon will take place, where you can play numerous games and score a free pizza. See you there!

VINCENTIUS VERENIGING


AEGON