# nekst>>

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## *Special*

Do sports and physical activity improve your academic performance?

**>> Interview**
AEGON

**>> Familiar Faces**
Jaron Kappers

**>> Report**
Asset Ski Trip

ASSET Econometrics

## Spring fever

The third edition of Nekst is here and with that, spring has come. And with spring comes spring fever... literally and figuratively. At this moment, I have been coughing for over two weeks while testing negative for COVID-19 every time. Could it be that I have spring fever instead? I feel more energetic than two months ago, my hands have the urge to clean, the plants in our garden have been taken care of, and best of all I feel happier and brighter! Now, I am no doctor, but it seems clear to me. I have the big S.F. ... and I am here for it!

This Nekst we have many refreshing articles for you to relax with in the sun. We have not one, but two interviews for you, starring Derk van den Bosch of AEGON and Melissa van Wingerden, the winner of the Johan de Witt prize! Our editorial staff also worked on two cool specials. When you are feeling alone, open Nekst right in the middle to find your perfect match. And if the sun is a little too hot for you, we have a report about the one and only Asset Ski Trip to cool you down! On a more serious note, I also want to highlight a very special Familiar Faces. It is written by Jaron Kappers and I recommend all of you to read it with care.

Of course, that is not all for this Nekst since we have the return of some well-known articles like The Teacher, Greetings From, the Puzzle and many more. This leaves me with just one thing to say: go take your copy to the park, sit down in the grass (with a 'despo') and as always: enjoy!

Yours sincerely,

**Juliëtte Tillie**
Editor-In-Chief

# Table of Contents

Interview: AEGON

Meet the Board 2.0

Event: Landelijke Econometristen Dag

Report: Ski Trip

Familiar Faces: Jaron Kappers

Greetings from .... Ottawa

Interview: Melissa van Wingerden

## Advertisements



## Articles




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ASSET Econometrics

# Dear Members,

This is already the third time that I am addressing you all, and my board year is slowly coming to an end. With COVID-19 almost being a thing of the past, all members are clearly enjoying themselves. Due to the restrictions being lifted, we as a board had to tack repeatedly in the past few weeks, to organize all events in an offline sphere. On the first night that the restrictions were lifted we organized an awesome pub quiz for all of you. The attendance for this event was awesome. The only problem was that almost the entire board had to go in quarantine, which was a tough pill to swallow. On the formal side we were also able to organize awesome events, with the biggest of them being our annual Econometric Consultancy Tour. With over 35 econometricians from Tilburg and our friends from Maastricht, we went on a trip visiting Utrecht, Amsterdam and Den Bosch. We went to four companies including Valcon and Amsterdam Data Collective.

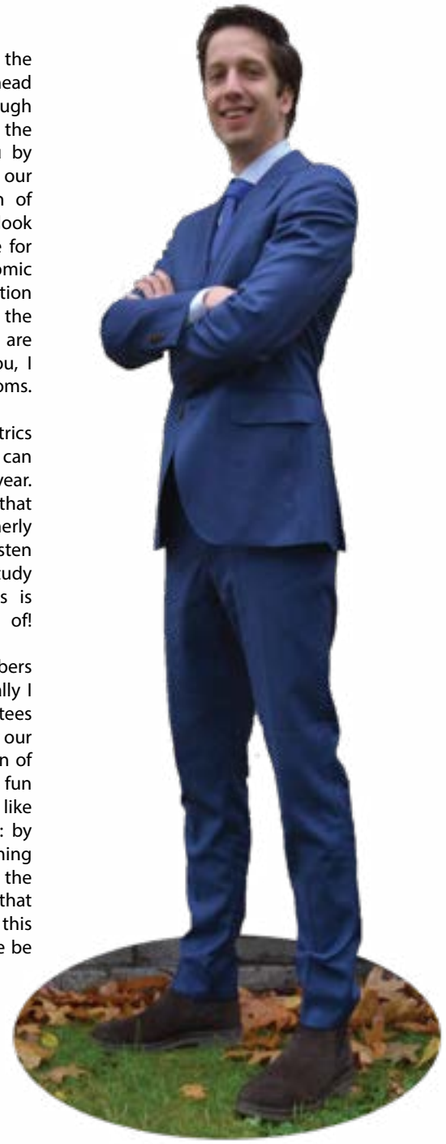
Some of the awesome activities that we are organizing this upcoming semester are among others the Batavierenrace, which we will be joining together with our orange buddies from Asset | IB&M. Furthermore, the first edition of the Olden Goldies Date Dinner is hosted in April, where a lot of econometricians will try to find a girlfriend, or a boyfriend of course. The last event I want to highlight for all of you is our European Business Tour that will take place in May. Jessica wrote an article about the committees adventures up to this trip, which you can read in this Nekst.

Looming on the horizon again are the exams, which are difficult times ahead for most of you. Guiding you through these difficult times are of course the guidelines that are provided to you by Asset | Econometrics. A vital part of our policy was of course the expansion of our array of guidelines. You can all look forward to picking up your guideline for Philosophy of Economics and Economic Ethics, Econometrics and Introduction Finance and Actuarial Science in the upcoming few weeks. If the exams are becoming too much for some of you, I would suggest you drop by at the rooms.

On March 15 Asset | Econometrics turned 43 years old. I believe we can look back on another eventful year. Not everyone of you might know that we as Asset | Econometrics, formerly known as Tilburgse Econometristen Vereniging (TEV), is the oldest study association in Tilburg. I believe this is something that we can be proud of!

Ending this edition of the Dear Members I want to break with tradition. Normally I would thank all our awesome committees for all the incredible work they do for our association. Followed by an expression of my wish to see you all at one of our fun events. However, this time I would like to close this edition a little different: by advising all of you to enjoy the upcoming months and to get the most out of the remainder of your student time now that that is all possible again! Lastly, enjoy this edition of Nekst and may be the force be with you.

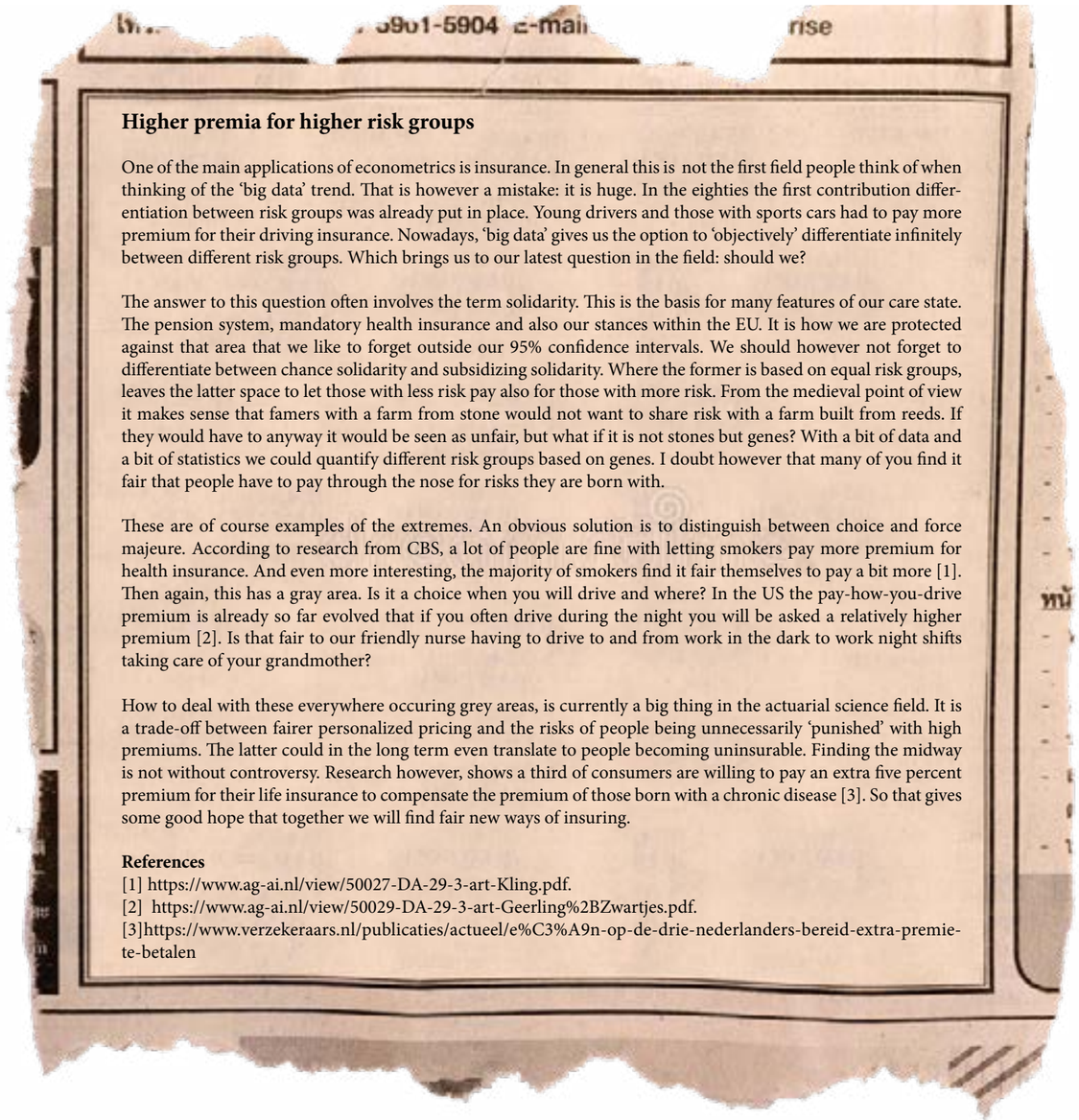
**Wout Temmink**
*Chairman Asset | Econometrics 2021-2022*



# The Latest

**Welcome back to 'the Latest'. This Nekst we inform you about the discussion on higher premia for higher risk groups and the use of big data in this subject.**

written by **Tamara Dert**



### Higher premia for higher risk groups

One of the main applications of econometrics is insurance. In general this is not the first field people think of when thinking of the 'big data' trend. That is however a mistake: it is huge. In the eighties the first contribution differentiation between risk groups was already put in place. Young drivers and those with sports cars had to pay more premium for their driving insurance. Nowadays, 'big data' gives us the option to 'objectively' differentiate infinitely between different risk groups. Which brings us to our latest question in the field: should we?

The answer to this question often involves the term solidarity. This is the basis for many features of our care state. The pension system, mandatory health insurance and also our stances within the EU. It is how we are protected against that area that we like to forget outside our 95% confidence intervals. We should however not forget to differentiate between chance solidarity and subsidizing solidarity. Where the former is based on equal risk groups, leaves the latter space to let those with less risk pay also for those with more risk. From the medieval point of view it makes sense that famers with a farm from stone would not want to share risk with a farm built from reeds. If they would have to anyway it would be seen as unfair, but what if it is not stones but genes? With a bit of data and a bit of statistics we could quantify different risk groups based on genes. I doubt however that many of you find it fair that people have to pay through the nose for risks they are born with.

These are of course examples of the extremes. An obvious solution is to distinguish between choice and force majeure. According to research from CBS, a lot of people are fine with letting smokers pay more premium for health insurance. And even more interesting, the majority of smokers find it fair themselves to pay a bit more [1]. Then again, this has a gray area. Is it a choice when you will drive and where? In the US the pay-how-you-drive premium is already so far evolved that if you often drive during the night you will be asked a relatively higher premium [2]. Is that fair to our friendly nurse having to drive to and from work in the dark to work night shifts taking care of your grandmother?

How to deal with these everywhere occuring grey areas, is currently a big thing in the actuarial science field. It is a trade-off between fairer personalized pricing and the risks of people being unnecessarily 'punished' with high premiums. The latter could in the long term even translate to people becoming uninsurable. Finding the midway is not without controversy. Research however, shows a third of consumers are willing to pay an extra five percent premium for their life insurance to compensate the premium of those born with a chronic disease [3]. So that gives some good hope that together we will find fair new ways of insuring.

**References**

[1] https://www.ag-ai.nl/view/50027-DA-29-3-art-Kling.pdf.
[2] https://www.ag-ai.nl/view/50029-DA-29-3-art-Geerling%2BZwartjes.pdf.
[3]https://www.verzekeraars.nl/publicaties/actueel/e%C3%A9n-op-de-drie-nederlanders-bereid-extra-premie-te-betalen





# Irrational Numbers

**My wife's birthday is March 14. During the first few years of our relationship, I had problems remembering this date. Luckily I quickly found out she was precisely 50 days older than I am, which gave me a method to calculate her birthday starting with mine. Because this was a calculation that goes back in time this method was not without risk. If you start the calculation too late you will find out that you missed her birthday, which would explain why she won't talk to you for the last few weeks. The advantage of doing the same calculation over and over again is that at some point you know the answer by heart. This holds in my case for the answers of all the exercises of my course Combinatorial Optimization and also for my wife's birthday.**

Years later I found out that March 14 is called Pi-day. The reason for this is that the first three significant digits of π (3.14) could be interpreted as the 14th day of the 3rd month. The standard way of celebrating this day is by eating pie. For me this is all quite silly. First of all the Gregorian calendar, the decimal system, the Greek alphabet and pies are relatively modern human-made inventions, chosen arbitrarily among many equivalent options. Not the worst option I admit. Imagine what could have happened if they had chosen the Roman letter T for the ratio of a circle's circumference to its diameter. Disgusting. Tea is in the best case just a liquid for ill people.

Anyway, my main objection to Pi-day is that 3.14 is just a poor approximation of π. It is better than the one from the Bible (which is 3), but worse than the one my father learned at school (22/7). The number π is an irrational number. It is not equal to 3, 3.14, 22/7, 355/113 or any number with a finite number of decimals. Celebrating Pi-day would be a denial of this fact. You can get away with this if you are ignorant, but that should not hold for readers of Nekst.

Of course, there are many other less famous irrational numbers. My lifetime hobby is athletics and with my current physical condition, hammer throw is the only discipline I can do. The trainer of our Sunday morning hammer throw gang graduated from the School of Arts. In a Facebook post he stated that the golden ratio was equal to 1.618. Of course, this is wrong. Since it appears in an exercise of Combinatorial Optimization, I know by heart that it is equal to ½(1+√5) which is also an irrational number. So I told our trainer that by representing the golden ratio with a rational number he was not just wrong but also spat on its beauty. He was not really impressed and did not seem to understand the problem. None of the other athletes gave me any support and after some discussion they concluded I was a 'stomme beta' ('stupid beta'). We continued the training as if nothing had happened. Later I realised I was lucky I got away with it. The first mathematician that proved that not all numbers can be represented by a fraction of two integers was Hippasus of Metapontum, a Greek philosopher and follower of Pythagoras. His discovery of irrational numbers was so shocking for the other Pythagoreans that Hippasus was drowned at sea.

Dear brothers and sisters in math: You will understand that for us Pi-day is a pagan party that we should not celebrate. If you want an excuse for eating pie on this day one option is to find a partner with this day of birth. If you do not succeed and you are so desperate that you would even accept a mother-in-law with this birthday, you can contact me. Maybe I can help. ●

**René Peeters**
*is dairy farmer and part time assistant professor in mathematics and operations research. He is specialized in disrete mathematics, in particular in algebraic graph theory and combinatorial optimization.*

# Predicting the Fluctuations in the Financial Market

written by **Flora Poon** and **Timo van Oorstchot**

**AEGON N.V. is a well-known Dutchinsurer, bank and asset management company with over 22,000 colleagues across Europe, Asia and America. Within this company, econometricians are working on the construction of models that covers the dynamics and the complexity of the financial market. By using these models, they try to confine the short and long term risks in the financial market.**

On Friday morning, March 3, we had an online interview with Derk van den Bosch. He is participating in the technical development program at AEGON N.V. This six-year program gives the opportunity to gain insights into the different business units of AEGON and to discover one's true interests. Every two years, participants rotate through the different functional areas by selecting their favorite positions. Derk started at the asset management unit and now works for AEGON's insurance unit.

### Student life

As a student, Derk started his Bachelor's degree in Econometrics and Operational Research at Tilburg University back in 2013. He was active at Asset | Econometrics and was part of the EPD committee. Right after he started his Master Quantitative Finance and Actuarial Science (QFAS) he participated in the Landelijke Econometristendag (LED). The reason he preferred QFAS was the practice-oriented aspect of this Master's degree, because the other courses felt somewhat more abstract. Furthermore, he thinks that quantitative finance is a good combination between the financial market and recent activities or events in the world to which the knowledge of the courses can be applied. At the LED, he connected with an employee from AEGON, who offered him a thesis internship at Aegon Asset Management. After his internship, he decided to stay in the company and participate in the Technical Development Program.

### Varied functions and positions

AEGON is divided into several business units. Most people will know AEGON as an insurance company, but you can also work in one of the other units, such as Aegon Bank (Knab), Aegon Asset Management or Aegon Hypotheken (mortgages). Because there are different directions within the company, there is plenty of room to expand your knowledge and find your best fitting position. It is even possible to follow part-time courses that will contribute to your personal growth. The financial costs will be covered by AEGON, since they value self-improvement as very important.

**Derk van den Bosch**

**Quantitive Risk Analyst**

Graduated Master QFAS

### Team structure

Currently, Derk works in the Risk Methodology team at the insurer, in which he is working on the modeling of market risk (specifically, the risks associated with credit and alternative investments). His team consists of 20 colleagues of which one person has the role of the manager, who is responsible for the whole team. This group is separated into four clusters of five people that work together on a specific field within the Methodology domain (e.g., market risk). A big advantage is that the team is relatively young, a large part of his colleagues are under the age of 35. This contributes to a good team spirit and a close connection. After the working hours, they plan weekly activities to get to know each other on a more personal level. Last week for example, they all enjoyed a trip to the cinema and they are planning to go to the AEGON bar soon.

### *Tasks and personal achievements*

When asked about Derks best achievement within AEGON, we discovered that this was a pretty hard question to answer, but he could specify it by explaining a recent task he successfully completed at the insurance part of AEGON. After the financial crisis in 2008, all banks are being monitored more closely by De Nederlandsche Bank (DNB), which set up some rules AEGON has to abide by. An example of such a rule is that there must be enough capital to survive a 1-in-200 year shock.

As an insurance company, AEGON has many long-dated liabilities which have to be paid somewhere far in the future (think of a pension obligation that AEGON has). These liabilities are very sensitive to changes in interest rates and spreads. Therefore, AEGON invests a large portion of their assets in bonds, which have a similar sensitivity to change in interest rates and spreads (i.e., this is working as a sort of a hedge against interest rate risk and spread risk).

The Dynamic Volatility Adjustment, the model on which Derk worked, is used to quantify the 1-in-200 year spread risk for these investments (and related liabilities). The most critical assumption for this model is that AEGON is a buy-and-hold investor; AEGON does not sell its investments before maturity, also not after a severe market shock such as the one recently caused by the Russian-Ukraine war. This assumption effectively results in AEGON not needing to hold capital for the short-term losses that will rebound in the future. This effect refers to the pull-to-par effect; as long as the bond does not default, the short-term price risk does not impact the coupon and principal payments in the end (i.e., the payments are made in full and on time). The main challenge of this model is to be able to quantify the 1-in-200 year risk and to convince DNB that our modeling


was both accurate and prudent. After an intensive six-month dialogue with DNB, they approved the model without terms and conditions which was a great achievement for AEGON.

### AEGON's future plans

After explaining one of Derks achievements within AEGON, we were curious about some future plans of the company. For two years there has been a new CEO at AEGON who has made some changes, especially when it comes to predictability. They also have plans on focusing a bit more on Eastern Europe and canceling investments which are not profitable at all. "However, our main goal is to make AEGON a boringly predictable company in the best sense of the word", he explained. This can be accomplished by ensuring that the results of the company are less volatile, to which Derk contributes by creating these sort of predictive models. This will lead to less surprising quarter-end results which will (hopefully) gain the confidence of investors.

### Tips for econometricians

As most of the readers are students, we were also curious whether Derk had some tips for econometrics students when it comes to the job market. "For starters, I think it is important to not try to look for the perfect job in the beginning, but to go on a journey of discovery by trying new jobs or certain tasks within a job", he told us. Furthermore, he thinks that a soft skill program, which improves presenting and the ability to convince someone is very useful, because the communicative skills are necessary for contact between colleagues. He would also recommend students to join our formal activities such as the LED and connect with recruiters. By doing this, students get better insight in a company and can be offered a part-time job next to studying, which is a very good step for gaining some business experience.●

***"It is even possible to follow part-time courses that will contribute to your personal growth. The financial costs will be covered by AEGON, since they value self-improvement as very important."***

# Meet the Board 2.0

**Board of Asset | Econometrics 2022**

## External Affairs

Hi! My name is Ikie Leunissen and in February I joined Floris as one of the External Affairs of Asset | Econometrics for the upcoming year. I am 21 years old and was raised in Hulsberg. In 2016 my parents and I moved to the beautiful hamlet Waterval, which is close to Maastricht. Since 2018, when I started studying Econometrics and Operations Research, I have been living in Tilburg. By now I have almost finished my Bachelor; the only course I still need to pass is (of course) Statistics for Econometrics. Furthermore I am currently following some Economic courses to be able to do the Sustainable Development Master of Economics as well. In my free time, I like to do sports like volleyball, jogging and fitness. On the weekends, you will likely find me in the city center, shopping with friends. I became active at Asset | Econometrics in my second year and the EOR Business Dinner committee was my first committee. Sadly, Covid-19 got in the way and the dinner could not take place. Luckily I was given the opportunity to join this committee again and in October we pulled off an amazing event! Now that I have almost finished my Bachelor, I felt I was not ready to move on to my Master yet. I really wanted to learn soft skills and meet more people. These are the main reasons you are reading this piece of text right now. I am excited to be your External this year and to get to know all of you!

## Internal Affairs

My name is Nienke Keuning and I am the new Internal Affairs of Asset | Econometrics. Ikie and I started in February and are now in full swing as the new additions to the board. I was born in the beautiful city of 's-Hertogenbosch 20 years ago. I lived there most of my life apart from 2010-2013. During that time I lived in Poland with my family. There, I finished my elementary school at the International School of Poznan surrounded by other internationals. I loved living in Poland at a young age and experiencing another type of teaching and life. One and a half years ago I moved to Tilburg because I wanted more of the student experience. At that point I was already studying for over a year. I started my EOR Bachelor in 2019 and I am now a third year student. Asset | Econometrics has been a part of my student life from the start, because I immediately became an active member in the Promotion committee. I also participated in the Active Members Day committee, the Nekst committee and the Connection Day committee. Besides studying I like to play tennis, hang out with friends and most of all, play a lot of board games. A fun fact about me is that I love the movie Clueless and my favorite cantus song is 'Jan Klaassen de Trompetter'. This year I hope to meet a lot of new members at our rooms and events and mostly enjoy my time as 'boardie' to the fullest.





# LED It Be Your Online Day!

**On February 10, 2022 at 12.00 hours all Landelijke Econometristen Dag (or LED for short) participants were waiting behind their home-desks for another online-LED to start. I was one of those students.**

A few months prior to the LED, I received an impressively thick magazine with lots of information about all participating companies. Having soaked up all this information and chosen carefully, I was ready to go. A few weeks before they announced the LED to go online, we did however receive this very well stocked goody box. It got me a bit by surprise. The rest of the goody box satisfied all possible needs for the day as it was loaded with snacks, drinks and merchandise.

The day started with an opening, a welcome and some information about the day. After that, Sander Schimmelpenninck took over. He spoke inspirationally about how he got to the point of quitting his desk job and instead starting a pizza restaurant with a friend. How this worked out and how he proceeded in his career afterwards. He pointed out the difference in study opportunities among students and the importance of finding meaning in your work.

After this talk, the cases started. I had a case with MICompany. In this case, we had to come up with advice for an insurer. It was up to us to decide which hospitals are too expensive. You can imagine that for a hospital with sicker people (due to age or specific illnesses for instance) a relatively higher average cost per patient can be deemed acceptable. We used an OLS regression to find out how different variables in general affect the average cost per patient. With this in combination with patient records we could set benchmarks for the costs of each hospital. Comparing this with the cost they actually made, we could tell which hospitals are too expensive given their patients and treatments. The time we got for the case was short, but it is only to get an idea of their work and they succeed in this perfectly. The most important parts about the case for me were the part where we got to ask questions about the company and of course: the announcement of the winners! Sadly, I must admit it was not my team, but I can proudly report that another group of students from Tilburg did win the case!

After the case, I visited several speed dates. You were assigned to a few companies to have a speed date with, according to your interests. The speed dates were in more intimate groups, together with someone from the company. In a short time you really get a feel for the company. Two companies that really stood out for me were Zenz Technologies and Pipple. Zenz Technologies really clarified what made them different. They deliver not just advice, but focus on delivering a real-time evaluation platform which clients can use themselves. Furthermore the guy was just great. When I asked him about the working environment, his sole reaction was a laugh. Pipple really stood out to me in their ethics. They told us they had just worked on a planning system for social workers, which since rolled out has significantly shrunk the waiting lists for those who need help. That reminded me of Sander Schimmelpenninck's message: "Find joy and importance in what you do".

After all these impressions, we entered the closing session with a comedian from New Zealand, Bob McLaren. This fun session boosted us with renewed energy for the Asset | Econometrics LED afterparty. The afterparty was a nice offline alternative, organized by our study association to discuss the LED and have drinks with fellow students. I would like to experience LED offline sometime, let's hope this is in the cards for next year and I will see you all there. Next year is going to be extra epic either way since the LED 2023 committee consists of students of Asset | Econometrics! ●

**Kiki Hengst**

**Bachelor EOR**

Age: 22

# Do Sports and Physical Activity Improve Your Academic Performance?

written by **Roel Delescen**

**The last few years, sport has become more and more important for people. In this special we will talk about whether there is a relation between sports and school performances and if there is a relation, what this relation actually looks like. In other words, we will check whether there is a relation between someone's mobility and cognitive skills. According to the Dutch Heart Foundation, it is important for young people to do any kind of moderate to intensive body exercise for at least one hour a day. This would not only increase physical health, but also the mental health of that person. Another benefit could be that sports can provide a distraction in times of stress. People who perform a sport are on average more disciplined and motivated than people who do not. A counter argument could be that doing sport takes a lot of time and you have less time to spend on doing your study.**

From different research articles it becomes clear that on average, low level educated people are dealing with higher BMI than students following higher levels of education [1]. Is the reason for this that people who don't do any kind of sport are less successful at school? And could it be that the lack of training of their mobility also reduces the growth of their cognitive abilities and thus their school performances? And to what extent does the amount of sport influence school performances? We will try to answer these questions in this special by looking at the result of two researches.

The first research was done back in 2015. There were 363 students who attended this study. 141 of these students were athletes and the others were non-athletes. This group existed out of girls and boys between the ages of 12-17 years old. The aim of the study was to check whether there was a relation between academic performance and the level of physical activity. This study was done with students from primary and secondary school. To put it in a different way: the goal was to find a significant difference in the academic performance of the athletes with respect to the non-athletes.

In this study, the researchers made use of cross-sectional data between October and December, 2015. The different variables used were the anthropometric evaluation (weight and stature), the percentage of fat of the student, physical activity level classification, where the Physical Activity Questionnaire for Adolescents (QAFA) was used to determine this activity level, the motor performance (flexibility, agility, strength and speed) and the school performance of the student. A logistic regression was used. Statistical-analysis was performed to come up with the results. Kolmogorov-Smirnov tests were used to test the distribution of the data and Mann-Whitney tests to compare median groups. The research also features a Chi-Square test with categorical variables, with posterior logistic regression analysis and variables with $p<0.200$ entering the model. During the test an alpha of five percent was used and a beta of twenty percent. To do these analyses, the SPSS program was used.

The researchers obtained some nice results, which are also visible in table 1 and 2. They found that physically active students are

**Table 1** Mean, standard deviation, effect size, and $p$ value of body composition variables and academic performance of the sample of athletes and non-athletes of CINTRA ($n=363$; athlete 141; non-athlete 222)

| Variables | Sample | Mean ± SD | $p$ | Effect size ($d$) |
|---|---|---|---|---|
| BMI (kg/m$^2$) | Athlete | 21.92 ± 12.05 | 0.001* | 0.26 |
| | Non-athlete | 19.81 ± 3.82 | | |
| Body fat (%) | Athlete | 12.82 ± 5.93 | < 0.001* | 0.62 |
| | Non-athlete | 9.35 ± 5.44 | | |
| Coefficient | Athlete | 1.75 ± 0.78 | 0.626 | − 0.05 |
| | Non-athlete | 1.79 ± 0.79 | | |
| School recovery | Athlete | 3.16 ± 1.36 | 0.293 | − 0.12 |
| | Non-athlete | 3.32 ± 1.39 | | |

*BMI* body mass index, % percentage, *coefficient* (1—below average: note > 7, 2—in the average: grade between 7 and 8, and 3—above the average: grade > 8) and recovery in subjects: (0–4 subjects)

* significant statistical value $p<0.05$

2.15 times more likely to perform better at school than students which are not physically active. Also, students who had the best results at the agility test were 62 percent more likely to achieve better academic performances. This while students with higher strengths in their limbs were 3.82 times more likely to perform better at school. The study verified that the athletes are not having inferior academic performance to non-athletes. So, there were no identified differences in school performance between the 141 athletes and the non-athletes. However, as said before in one of the conclusions, students that are physically active were 2.15 times more likely to achieve a better academic performance than the inactive students [2].

We will look at another study where a meta-analysis was done, where they used data from five electronic databases and the data of 115 eligible studies. The aim of this study was to systematically review and combine via meta-analysis evidence of the association between sport participation and academic performance in children and adolescents. From the data of these studies, it could be concluded that physical activity had a positive influence on academic performance. The reason for this is that physical activity causes an improved cognitive function and brain structure and function.

Sports are seen as a different type of physical exertion relative to just physical activity. Recent experimental studies found that compared to moderate to vigorous physical activity, sport can provide additional cognitive benefits. Two recent systematic reviews even concluded that sports could provide additional cognitive benefits compared to just general physical activity. However, the evidence of this finding has not been reviewed or combined in meta-analysis. The objective of this study was to examine the association between sports participation and academic performance. This was done by reviewing and combining the data of the studies that examined the association between sports participation and academic performance for children and adolescents. To find a result for this, the researchers made some assumptions for the data they would use. The studies they used were required to be as general as possible and would contain data of both children and adolescents. This caused that five were not used during the meta-analysis, out of the 115 studies, so that only 110 studies were used.

During the study, the researchers were aware that there could be a risk of bias of individual studies and a risk of bias within studies, of which they took care. Also for this research, nice conclusions can be drawn. Based on mostly low-quality studies, evidence was found that sport could possibly positively affect academic performance among the children and adolescents. They also concluded that sports participation during school hours was more beneficial for academic performance compared with sports participation during the spare time of children and adolescents.

In the discussion it was said that it is better to use more high-quality studies to check whether there is a significant result between doing sports and not doing sports on the academic performance [3].

From these studies we can conclude that physical activity definitely improves the academic performance of the student. In contrast to this finding, the first study does not conclude that there is a positive relation between being an athlete and better academic performances. Also, in the second study they are not really confident whether sports would increase the cognitive abilities of that person and thus the academic performances. So, based on these studies, I would recommend you to take a walk or do some other kind of physical activity every day to increase your cognitive skills and thus your school performances! ●

**References**

[1]https://joop.bnnvara.nl/nieuws/dik-zijn-is-een-klassenprobleem
[2]https://www.researchgate.net/publication/325826732_Sports_practice_and_factors_associated_with_school_performance_in_grade_and_high_school_comparison_between_athletes_and_non-athletes
[3]https://pubmed.ncbi.nlm.nih.gov/34559728/

**Table 2** Frequency (%), confidence interval (CI), and sample size of variables of teaching characteristics, academic coefficient, sports practice, and physical activity level of elementary and high school students of CINTRA

| Variables | % | 95% CI | N |
|---|---|---|---|
| Sex | | | |
| Male | 74 | 69.6–78.6 | 270 |
| Female | 25.6 | 21.4–30.4 | 93 |
| Levels teaching | | | |
| Seventh | 19.3 | 15.5–23.7 | 70 |
| Eighth | 14.0 | 10.8–18.0 | 51 |
| Ninth | 11.6 | 8.7–15.3 | 42 |
| First high school year | 21.2 | 17.3–25.7 | 77 |
| Second high school year | 20.9 | 17.0–25.5 | 76 |
| Third high school year | 12.9 | 9.9–16.8 | 47 |
| Period | | | |
| Morning | 53.7 | 48.5–58.8 | 195 |
| Afternoon | 46.3 | 41.2–51.5 | 168 |
| Athlete | | | |
| Yes | 38.8 | 33.9–44.0 | 141 |
| No | 61.2 | 56.0–66.1 | 222 |
| Physical activity level | | | |
| Active | 71.6 | 66.7–76.0 | 260 |
| Inactive | 28.4 | 24.0–33.3 | 103 |
| Academic coefficient | | | |
| Below average | 44.6 | 39.6–49.8 | 162 |
| Average | 33.3 | 28.7–38.4 | 121 |
| Above average | 22.0 | 18.1–26.6 | 80 |

1: first year; 2: second year; 3: third year; coefficients: Below average: > 7, on average: starting 7 and < 8, and above the mean: > 8, 7, and < 8 and above the mean: > 8

2015 ($n=363$)

# From Germany to the UK and the US. From Tilburg to …?

written by **Flora Poon** and **Tijn Scholten**

**Tobias Klein started his studies at the University of Mannheim in Germany. At that time, no distinction was made between Bachelor and Master programs, so instead he enrolled in a four year 'diploma degree' program in Economics. In his fourth year the opportunity came up to go on exchange to the University of California in Berkeley. Without a doubt, he accepted the offer and flew to one of the most prestigious universities in the USA. During his stay, he was fascinated by the fact that he got the chance to attend lectures by Nobel prize winners George Akerlof and Dan McFadden. 'McFadden got the Nobel prize for multinomial choice models, and then you learn multinomial choice models from him. That was very motivating'. Apart from his studies, he also found the time to get to know the country and culture by traveling around in a big Mazda MPV that he bought together with four friends.**

After his return to Mannheim, he started in the PhD program in economics. After a few months, he attended his first conference here at Tilburg University. He met Andrew Chesher, who invited him to visit University College London. He did so in the following year. There, he wrote his first research paper, which was later published in the Journal of Econometrics, and attended courses that were given by big names within the field of economics. A few years later, he finished his PhD at the University of Mannheim and started his journey at Tilburg University in 2007.

When he was still a student, Tobias was an elected member of the faculty council and the chairman of the student organization. He recalls the many discussions he had with the faculty members on how to change the curriculum of the program. Next to that, he has fond memories of organizing parties for thousands of students that took place in a big courtyard of the Baroque castle that houses the university. In the remaining time, he liked to do sports such as running.

Since he studied at three different universities, he is able to tell the differences across their education systems and compare it to our current system in Tilburg. What he likes the most about our system is the fact that the student-staff ratio is more balanced. Both Bachelor and Master students get more attention throughout their process of writing their thesis. At other universities, students are supposed to work more independently. In Mannheim for instance, you will often get supervised by PhD students and there are less opportunities to meet up with professors. Our department devotes much more time to the needs of the students.

Tobias Klein has three young children. In his spare time he likes to spend time with his family, cooking, working with his hands (building furniture for example), and traveling. He also enjoys traveling for work. He says that this gives him the opportunity to meet a lot of fellow academics from all over the place. He finds this inspiring, as it gives him new ideas. During the pandemic a lot of these conferences have taken place online, but Tobias thinks that in the future in-person conferences will return as it is a good way to do some networking and meet other people than you are surrounded with in your current working place.

In his research, Tobias Klein specializes in health economics and empirical industrial organization. More specifically, he wants to understand the behavior of patients and how it depends on economic incentives, such as deductibles (eigen risico). He and his co-authors have found out that it depends a lot on how such incentives are presented. At the same time, patients are forward-looking and understand the financial incentives very well. He also works on online markets and advertising. For instance, he is interested in what happens when two social platforms merge and what online markets will look like in the future.

**Tobias Klein**

Since we knew that Tobias Klein is also interested in applied econometrics, we asked him if he does not want to work at a company. He said that he sometimes does projects for some big companies, and that he likes that a lot because he always learns what part of econometrics is relevant in practice. At the same time, he does not see himself working at a company anywhere in the future as he sees himself as an academic. Tobias tries to show his students what kind of jobs or projects they will get if they start at the job market by using his own experiences with those companies, as he thinks that this is quite inspiring for his students.

Klein's future perspective is not quite specified yet, as he thinks that it is quite hard to predict the future. However, he really enjoys working at Tilburg University as he has great colleagues and great projects, which allow him to be productive.●

## Bert & Ernie Questions

**Carnaval or Oktoberfest?**
*"Oktoberfest"*

**Reading or writing?**
*"Both"*

**Beer of wine?**
*"Wine"*

**Frankfuther or Curryworst?**
*"Curryworst"*

**Calculator or calculate by head?**
*"Calculator"*

# Skyscrapers and Volcanoes

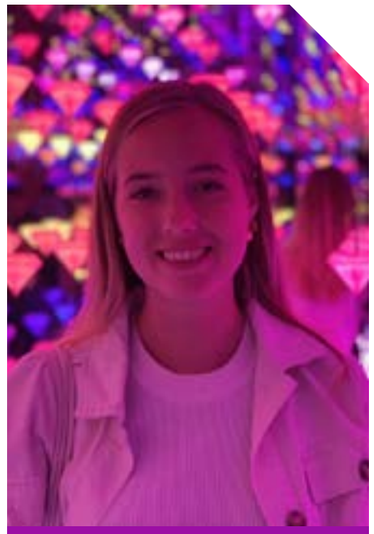
**Since September 2020, I have had the pleasure to be a member of the International Business Tour (IBT) committee. Unfortunately, COVID-19 has had its toll on this committee as well. Last time the trip had to be canceled due to new circumstances and even now, it still has some impact on our plans. Let me shortly explain to you what the committee does and how we have tackled the issues on our path in these special times.**

It may not surprise you but as the name already suggests, we are organizing a business trip overseas. It is approximately a ten day trip in which we will visit a city or country together with 25 members of Asset | Econometrics! To make this year special, we have chosen to visit not one but two countries for the International Business Tour 2022. First, we will stay a couple of days in London to visit some universities and companies. As many of you know, London is the heart of European business, so this is the most ideal location to go visit some big companies. Moreover, we cannot leave London without doing some sightseeing and cultural activities as well. Next, we will fly to Reykjavik in Iceland. The trip is not only for business, so we will do a lot of sightseeing here by cartrips and city tours. We will even go on a daytrip to go see a volcano!

Normally the trip would be organized in the time period of a year and would have taken place last October. However, the uncertainty that comes with COVID-19 made us decide to delay the trip for approximately half a year. This decision enlarged the chances of being able to go on the trip. Moreover, we made the decision to change the location of the trip to Europe due to the uncertainties. Even organizing a trip in Europe has been challenging at times. At first, companies were a bit hesitant to allow visitors on the workfloor. Now that the end of the COVID-19 period is finally in sight and the restrictions are let loose, this no longer seems to be a problem for us. We still have to be cautious of course, since traveling does come with a risk, but I can say that we are fully prepared for it. Despites all these minor setbacks, we are still thrilled to be organizing this trip!

Just like with the other committees, during COVID-19 times it has been a challenge sometimes to organize meetings. There were periods when we could only meet online, which I find way less fun. In order to still feel connected with each other and meet in real life, we have met up in our free time. Luckily, for the last couple of months we were able to hold the meeting offline at the rooms most of the time and we were finally able to do the committee activity after such a long period of time. Together with the International Business Tour committee of 2020, we did (as called in Dutch) a 'Bierfiets'. We also cooked dinner for the lovely board members of Asset | Econometrics.

At this moment we are still busy with the last finishing touches. We are finalizing a detailed schedule and booking all the nice activities in London and Reykjavik as well. Together with Tilburg University we were able to contact the universities and start the negotiations with the companies. The externals have done an amazing job contacting the companies in order to organize the business visits. We are so looking forward to going on this trip with all the members that have subscribed and we are certain that it is going to be unforgettable! A report of the trip, including pictures, will be featured in Nekst next time. From now on, only fun things ahead!



**Jessica Tramper**

**Master BOAR**

Age: 22





# A Week on Skis

**Sunday January 16 we gathered at 17.00 hours. It was the first time we met the entire group with whom we would spend our entire Ski Trip. After a quick checkup on our corona access passes, we went into the bus to start our journey. The drive to Austria consisted of getting to know everyone, followed by a night with a lot of interruptions due to toilet breaks.**

We arrived bright and early on Monday morning. First we visited what would be our residence for the rest of the week: Villa Olga. After a quick explanation about the area it was time to head towards the slopes. We went skiing for the first time this holiday with old friends and people we just met on the bus. Even though the pistes were not in an optimal condition, the weather certainly was! The sky was blue and a bright sun was looking down on us. It was quite an obstacle to get the feeling of skiing back again after a long time, but eventually we got a grip on it. That first evening, worn down by a previous uneasy night and a long day of skiing, we had a nice dinner followed by a lighthearted pub quiz after which we went to bed for a good night of sleep.

Tuesday the plan was to take our skiing adventures towards Hinterglemm. However, a small group, in which I took part, took it upon themselves to do the Saalbach-Hinterglemm 'Skicircus' challenge. This meant 60 kilometers of skiing throughout the entire area, to be completed in a single day. We started as soon as the lifts opened and before lunch we managed to ski over 35 kilometers. A couple hours after our quick lunch we managed to complete the challenge, even though we were getting tired and one of us inevitably made a fall quite unfortunately.

The next day was the day of Kaprun, a skiing area near Saalbach-Hinterglemm on the Kitzsteinhorn glacier. This was the best day weather wise, with great temperatures and sun along with great slope conditions. The day consisted of some relaxed skiing and long breaks in the sun during which we prepared for the legendary Ski Trip cantus, a night made up of singing and drinking. Our bus driver described his first ever cantus night with a big smile on his face as: 'certainly quite the experience' and he was right, it was amazing!

Thursday, we went back to Hinterglemm. The weather had completely turned. Whereas we first had beautiful blue skies and sun, we now had fog, snow and incredibly strong winds. It was quite the challenge to get down the slopes unscaved since the wind was so strong. At moments we experienced such a gust that we could not go down, even if we tried. We soon went to a restaurant for our first 'heiße Schokolade' of the holiday. After our break the weather got somewhat better and we went skiing again in these difficult circumstances, until we felt it was time for the Après-Ski somewhat earlier than other days.

The last day, we went to Zell am See, arguably the most beautiful destination in Saalbach-Hinterglemm. From that day I want to share one particular memory. We are skiing in the woods. We suddenly come back on the piste again and the entire city of Zell am See lies beneath us bathing in the sun. Next to it, the majestic lake the city is known for is shimmering in that amazing light. It was one of the most beautiful things I have ever experienced. After such a great last ski day we went back to our residence to pack our bags and make any last preparations before leaving Villa Olga for good.

**Floris de Groot**

**Bachelor EOR**

Age: 18

# The Backside of the (Shot)Medal

**My name is Jaron Kappers and I studied and lived in Tilburg from 2016-2021 and have been active in Asset | Econometrics this entire period. I guess I am one of those familiar faces that everyone has an opinion about, but hardly anyone really knows well. These two pages give me a nice opportunity to briefly tell you my story.**

Why did I start studying econometrics? High school was very easy for me. I found every subject interesting and, except for the foreign languages, every subject went very easily for me. This made it very difficult to write off certain fields of study. I started babbling out of boredom to such an extent that I even made arrangements that I did not have to attend classes anymore. Teachers even told me not to be proud of my high school accomplishments. The evening before the deadline for the choice of study, I still did not know what I wanted to study. I then clicked through all possible studies in the Netherlands on a website and chose the most difficult one. A story that always does well in the pub, but shows my urge for proof.

As a 17-year-old boy, I came from Apeldoorn to Tilburg. I quickly realized that econometricians, no offense, are not the type of people I used to hang out with. Because of a lot of my free time during high school and my wide circle of friends, I already had two years of 'student life experience'. My first words to my intro-dad were "Well, I just want to party this week. I may be 17, but I can really take it". With my experience of four top weeks as a TOP-mentor, I now know that this is normally the kid you need to keep an eye on. When I was enthusiastically trying to create a group feeling and kept partying longer than my intro dads, my intro dad said to me on the very first day of the TOP-week "You are never going to make it through this study, do you?". A type of doubt that always returns to me. (See Nekst 2016-1 for my experience of the TOP-Week)

Appropriately, I became active in Asset | Econometrics in my first year on the Drinks & Activities committee. I did this mainly to also get to know people from higher year levels, some of whom I am still good friends with. I am a very social guy who likes to show people around, organize things and create a group feeling. That is why, besides being a TOP-mentor multiple times, I have been on the Freshmen committee and Introduction committee in the years that followed. I think that the best part about being active at Asset | Econometrics was the Active Members Weekend. I really enjoy seeing how every type of person is involved in such a weekend and how they try to put everyone's genes aside. I always did my best for this as well, both during TOP- Week and Active Members Weekend. I think that, because most people have only seen me at these or similar moments,

**Jaron Kappers**

**Graduated Master EME & BOAR**

Age: 23

I come across very differently than in my private life and they tend to have a false image of me.

Within econometrics, I observed a disdain for other courses and levels. I have met many people who think that their math knowledge makes them "better" or "more-worthy" than others. I am personally surrounded by people who worked very hard to achieve their dreams at a 'lower' level, while I happily completed one of the more difficult studies without really chasing a dream. During my sophomore year, things went downhill as a result. I had a lot of trouble with my intelligence and in the long run I could not stop thinking (about this). For two years, I slept an average of three hours a night and therefore I suffered from psychosis. I went to three different psychologists and even had to report when I should go into a closed facility. For example, at that time I could not say the words "I am smart" and even nearly blacked out when they tried to do so. For me personally, it is typical that especially non-econometricians caught on to this at that time.

After this period, I started writing my Bachelor's thesis on the "Game and Theoretical Analysis of Toepen". Still nice that you can write a serious thesis with "Dirty Laundry" in it. During this same semester, I also started my own non-profit company. Ever since I was 15 years old I have been volunteering for people in Albania. In the six months of my Bachelor thesis, I was able to do even more for the people there. I sell handmade leather shoes made by formerly unemployed shoemakers under the name JC Kappers. Partly because of the support during the period described above, I decided to name it after my father and my mother as a tribute.

I went on to study two Masters, Econometrics and Mathematical Econometrics (EME) and Business Analytics and Operational Research (BAOR). I found out that my analytical skills in combination with social skills and my urge to prove myself very much fits with consultancy. Partly because of this, I decided to join the Consultancy Tour of Asset | Econometrics. Because of this tour I knew for sure that I wanted to focus more on strategy. I do not like 'hard' programming and certainly not all the tough mathematical formulas of econometrics. That's why I followed all the core courses of both Master programs focused on consultancy and strategy.

During this Master's, I chaired the Econometrics in Practice Day. Through my social circle of acquaintances, I knew the general director of SEO Amsterdam Economics. His presentation during this day made me so enthusiastic that I immediately applied for a graduate internship there. My Master thesis "Ethnicity, search behavior, social network and the Dutch labor market gap for secondary vocational education graduates" was focused on the influence of having an ethnic background on search behavior, search duration, having a job and salaries for 'mbo' graduates. Partly because of this graduate internship, I graduated Cum Laude from Econometrics and Mathematical Economics in late August. Because this internship was during corona, I had to write it almost entirely in my three by three meter student room. Therefore, I decided to leave the house where I lived for five years and lived in the summer period temporarily in the houses of my parents and afterward my sisters, who were on vacation. Because I found the housing market in Tilburg too expensive, I quickly found through my social network an affordable house, back in Apeldoorn.

After spending some time with my family, especially my little nephew Fedde, and friends, I started actively applying for jobs in October. It was very difficult to find suitable vacancies, because I knew that I wanted a job in strategy consulting, but focused on an econometric field. In addition, I wanted to have a team where I really felt a click. The first job interview, including a case, at Accenture was perfect for me. After the interview the interviewer even called me back saying that he really wanted me to work with him and even gave tips for the following rounds. After my temporary job as a data engineer at BAM, I started the first of March as a "Supply Chain & Operations Industry X.0 Analyst". This is a position that is very much focused on the strategy behind supply chain and operations related issues. Within the consultancy I hope to use my drive and ambitions in the right way to continue to grow every day. Furthermore, in February, I became an uncle for the second time of Tobias, so I cannot wait to see another miracle grow up and hopefully one day I can fulfill my biggest dream of having a family myself.

My biggest tip is that applying for a job is something you really have to learn. The first applications you are going to get questions, for which in hindsight you could have come up with much better examples and answers. That is why I am a supporter of Asset | Econometrics job interview training. It would be a shame if you do not get through an application round at your dream job because your preparation is not strong enough. I think I owe a lot to Asset | Econometrics on a professional level. From getting to know older econometricians, almost all of whom I contacted for potential jobs, to LaTeX courses. I think Asset | Econometrics has a lot of opportunities to grow as a social supporter of their members. I did my story because I know that this day there are many more people with mental health problems. I think there are still opportunities here for Asset | Econometrics to provide a platform for people who, unlike me, have their main social circles in the study association.

Are you struggeling with mental health issues? Or do you experience an unsafe feeling at the association? Feel free to contact the confidential email of Asset | Econometrics:
**confidential.asseteconometrics@gmail.**com

# Who Is Your Nekst Date?

written by **Sara Darwinkel** and **Timo van Oorschot**

Corona is a past station and after a really boring single life you decide it is time to go put yourself on the market again! As Tinder is not your thing you decide to go to your favourite café which is…

- Asset Café
- Polly
- Brandpunt
- Boekanier

With your favorite drink in your hand you are enjoying the people around you and singing along to the music. Which drink are you holding?

- Beer
- Wine
- Mixed drinks
- Alcohol free drinks

hahaha lol, try again

Then, suddenly, out of nowhere, a beauty is walking in your direction. Your eyes meet and you are amazed by the colour of its eyes which are a beautiful …

- Brown
- Green
- Blue
- 'No mine are green, brown, blue with a bit of grey'
- Unkown

You are not hesitating, not even for a second, and you go talk to this mystery person. You get to know each other and start talking about the summer vacations you have planned.
Where will you be going?

- Go backpacking
- City trip
- Holiday on the beach
- All-inclusive

Totally surprised you will be doing the same this summer, you are thinking that this might be the real match. But nothing is sure with these alcoholglasses you are wearing right now so maybe it is a better idea to ask this cutie on a date.
What are you gonna do on your date?

- Do something fun (bowling, pooling etc.)
- (Netflix and) Chill on the couch
- Go for a walk on the beach
- Go out for dinner

You keep talking the whole night but finally decide to go home because you have that course the next morning you really don't want to miss because your favorite teacher is teaching it.
What course are you going to?

- Computer programming
- Analisis
- Linear Optimization
- Probability

Even though you were not at your fittest during the lecture because of last night, you are really enthusiastic about your afternoon! Just one problem, your pet made a mess of your apartment and you really first have to clean it…
What pet would you love to own?

- Cat
- Dog
- Goldfish
- F*** animals

How could he?

Okay, you cleaned your whole apartment, prepared yourself and are ready to go on your date! Of course you are …

- On time
- Too early
- Too late (blame it on the pet)
- Home, because you forgot the date

No one can relate :(

You were the first When your date arrives you realise you only remember its last name, so you try to come up with a good nickname for them. You go for…

- *Insert last name*
- Lekkerding
- RikkiTakkiTavi
- Something boring

After talking for some time you discover they turn out to be quite the bad boy/girl. You ask yourself if you are necessarily into this?

- Yes
- No

You decide that nonetheless you are really into them. And they are really into you. They tell you they like how you are such a great Nekst reader. You reply with your favourite characteristic of theirs, which is:

- Clumsy
- Pietje precies
- Smarity
- Choatic

Keep count here!!!

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See the results on the next page

# Which Emoji Did You Get Most?

**Flora A.K.A 'The Motivator'**
Looking for a motivator? Then Flora is your match! Watch out through: snowballs make her aggressive..

**Timo K. A.K.A Omit**
This cutie is perfect, as long as you don't make any grammar mistakes in his company. However, he will make sure you have the best holiday pictures for your instagram!

**Roel A.K.A. Ro-el**
Roel is the confident partner, is really enthusiastic and will always manage to keep you in a good mood. But don't leave him alone around you animals..

**Stijn A.K.A. Clown**
'Always on time for deadlines and never there for a beer. I am never late for meetings and I am always totally sober. YOLO' - Also never uses sarcasm.

**Tamara A.K.A. Newbie**
In Dutch we say that 'love goes through the stomach', something Tamara takes very seriously. Though beware of the well-known 'steek' when you are dragged onto the hockey fields right after your romantic dinner…

**Timo A.K.A. Timo**
Organization and clumsiness don't seem to be the best combination of characteristics, and yet Timo is the perfect example of showing that it is indeed possible. Also a real match for people loving blue/green eyes as he has one of each colour!

**Juliëtte A.K.A. Tillie A.K.A. The Boss**
With this girl you will laugh a lot, but mainly because she will do something clumsy or stupid (such as asking who Merkel is). She is already claimed by one of the board members though, so watch out for that extra money that will be debited from your bank account

**Patrick A.K.A. Pattieboy**
This energetic cutie will be the sweetest boyfriend for you, and is always happy… ALWAYS…

**Meike A.K.A. Indesign feut**
Always there for you with great advice, except for when Feyenoord is playing. Fun Fact: also a good indesign feut.

**Tijn A.K.A. Sir Thinks-a-lot**
Tijn thinks a lot. He 'thinks' his articles are on time and he 'thinks' they are written in English. Just like he 'thinks' he already gave you a present for your birthday… good luck with that :) (he is really sweet as well, luckily).

**Matthijs A.K.A. Kroesen**
This comfy guy has his weird moments sometimes, but he always means well. Do you like to drink your head off, but still pass every exam? Then you are a real match with Matthijs. Note that there is a real chance he will force you to have a Disney marathon. Let's hope he will not fall in love with Rapunzel…

**Sara A.K.A. Saar De Allerbest**
This sweet, enthusiastic, beautiful, ambitious, adventurous, brave, funny and modest girl, will give you a good time. (Whenever she actually IS on time). Do make sure to secretly know French, so you can understand her, when she calls her mum to complain about you in this difficult language.





# Analyzing hourly traffic patterns in Deventer

**Data analysis is a powerful tool to make sense of large amounts of data and is becoming more and more relevant due to the increase in data collection and computing power. For my BAOR master thesis, I have used comparison techniques and cluster analysis to look at traffic movements at different points in time. This analysis was then used to improve an existing traffic prediction model such that it could better perform at times with irregular traffic such as extreme weather events, holidays, and COVID-19 lockdowns.**

## Predicting traffic

When looking for a thesis internship, I did not intend to do one related to traffic science. However, I found an interesting assignment at Dat.mobility, a data-driven mobility consultancy headquartered in Deventer (eastern Netherlands), close to where I grew up. One of their products, a traffic prediction model, was central to my thesis. This model tries to predict in real-time both traffic densities and speeds for a network of main roads in Deventer (including the A1 motorway) for the next thirty minutes. It uses historical data about traffic movements as an input, which have been collected over a longer period of time. In traffic science, these movements are often summarized in a so-called Origin–Destination (OD) matrix. The rows of this square matrix correspond to a set of origins, while its columns correspond to a set of destinations. An element then indicates the number of traffic movements between the origin and destination belonging to its row and column, respectively. An example is shown in figure 1, where there are 12 trips from Deventer to Tilburg.

| | A'dam | Deventer | Tilburg |
|---|---|---|---|
| A'dam | - | 10 | 5 |
| Deventer | 50 | - | 12 |
| Tilburg | 60 | 0 | - |

Figure 1: An example of an Origin–Destination (OD) matrix

For the traffic prediction model, an OD matrix has been created describing typical traffic during every hour of the week ($7 \times 24 = 168$), as traffic differs strongly between, for example, rush hours and Sunday mornings. However, a real-time prediction model should also take into account actual current traffic conditions. Therefore, the model takes as its input the historical OD matrix corresponding to that time of the week, which is then altered by considering real-time data from measurement loops in the road and smart traffic lights. So, if it is unusually busy, this would be reflected in the matrix used as an input.
My thesis assignment was to cluster these 168 hourly OD matrices describing typical traffic. This exercise is equivalent to dividing the week into a number of groups with similar traffic and could help deliver insights about traffic patterns in Deventer. It also eventually led to an improvement of the prediction model itself.

## Comparing OD matrices

Intuitively, a cluster is a group of data points that are "similar" to each other. It is therefore vital to know the pairwise similarity between those data points. Determining the degree of resemblance is easy for points on an $xy$-plane – take their Euclidean distance – but this is not so trivial in the case of OD matrices. One could calculate the Root Mean Square Error (RMSE) between two matrices, and this is the first method I investigated. However, the literature on the subject provides some arguments why this is rather naive. Djukic et al. [3] note that particular elements of OD matrices likely correlate over time: for example, two elements both corresponding to an origin in a residential neighborhood and a destination in an industrial park can be expected to both be higher during a morning rush hour. These correlations are ignored by the pairwise comparison used by RMSE. This disregard of the so-called structural similarity can lead to intuitively similar matrices being considered dissimilar by RMSE; this is, for example, true for matrices that are scalar multiples of each other, which necessarily have the exact same structure.
Several more advanced methods to determine similarity have been developed for OD matrices specifically. The Geographic window based Structural Similarity Index (GSSI) by Behara et al. [1] does not compare single elements like RMSE but instead looks at entire submatrices (a part of a matrix). By taking the correlation between submatrices into account, the structural element of the similarity is captured. To ensure that meaningful correlations are considered, the rows and columns of the OD matrices are first reshuffled to make sure that adjacent elements describe the same type of traffic movement.
Another method that takes structure into account is based on Levenshtein distance. This technique is more commonly used to detect plagiarism. The Levenshtein distance between two strings of text is the minimum number of operations required to change one into the other. Figure 2 shows how the three allowed operations – insertion ($+$), deletion ($-$), and substi-

tution ($\leftrightarrow$) – can be used to change "MIAMI" into "PARIS" in four steps. This principle has been applied to OD matrices by Behara et al. [2]. They have defined the Levenshtein distance between two matrices as the average distance between their rows after their elements have been sorted by popularity. This ensures that OD matrices with a very different structure, i.e. having other types of traffic movements that are popular, have a large Levenshtein distance.

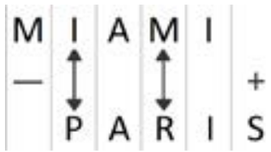


Figure 2: The Levenshtein operations in action

A fourth and last method to find the degree of similarity between OD matrices is to apply Principal Component Analysis (PCA). This is a common data reduction method that uses linear algebra techniques to summarize data points by lower-dimensional vectors. It was found that for the Deventer OD matrices, representing them as two-dimensional vectors retained 96.6% of their variation. To find the similarity between two OD matrices, one can then calculate the Euclidean distance between those two-dimensional representations.

### Clustering algorithms

The historical OD matrices that exist for all hours of the week can be clustered now that measures have been discussed to assess their similarity. Many clustering algorithms have been developed. Therefore, it is important to first assess what properties are desired from a clustering to find the most appropriate algorithm. First of all, we want to employ similarity measures other than the Euclidean distance, already making some methods such as $k$-means impossible to use. Furthermore, compactness is an important property for the application at hand: no points within the same cluster should be very far from each other. It is undesirable to have hours clustered together that are dissimilar; this, however, can occur when using density-based methods.

With this in mind, three clustering algorithms have been selected that are promising. The first, hierarchical clustering, starts off with all observations (or OD matrices) forming their own cluster. These clusters are then iteratively merged until only one cluster remains. One obtains a clustering by finding the most natural place to stop this process. The last two methods both see a cluster as consisting of an exemplar – an observation representing a cluster – and points that are assigned to it. This principle is illustrated in figure 3, where the blue and red dots have been chosen as exemplars. Two of the selected algorithms use this approach: $k$-medoids tries to minimize the total length of the black lines in the figure, while in affinity propagation by Frey and Dueck [4] observations iteratively send messages to each other to signal how appropriate they would be to serve as an exemplar and to signal to which exemplar they could best be assigned.

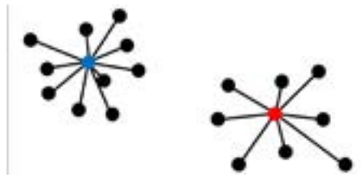

Figure 3: Two clusters, both consisting of an exemplar and points that are assigned to it

### Results and amount of clusters

The described similarity measures and clustering algorithms can be used to create $4 \cdot 3 = 12$ different clusterings. It was particularly difficult to determine which combination is best, as there is no "true" clustering to which the outcomes can be compared. An analysis in which the similarity of hours clustered together was assessed using road measurements concluded that GSSI was best able to group together structurally similar OD matrices. However, it was not possible to determine whether the observed differences were statistically significant, making more research necessary. When looking at the clustering algorithms, the differences in outcomes were much subtler, and all of them seemed about equally appropriate.

The last parameter required to come to a final result is the number of clusters. Some measures exist to find the "true" amount of clusters present in a data set including the silhouette coefficient, but they did not lead to a clear outcome for the Deventer OD matrices. This does not come as a complete surprise, as there is no law in traffic science stating there are exactly $x$ traffic types. Based on the application at hand, it has been decided to pick fifteen clusters. When using fewer than ten, evening rush hours were sometimes put in the same cluster as the rest of the afternoon. And, when choosing slightly more than fifteen clusters, nights were cut up into multiple clusters in a way that makes little intuitive sense.

The resulting clustering of GSSI combined with $k$-medoids and 15 clusters is shown in figure 4. In this diagram, every cluster has been given a distinct color. Every rectangular cell is colored based on which cluster it is part of, where its row corresponds to its hour and its column to its day of the week. The cluster exemplars have a black or white box around them. This clustering seems to make intuitive sense: morning rush hour (yellow) and evening rush hour (purple) clusters exist that occur only on weekdays. There is one large night-time cluster, and the relatively consistent pattern of weekdays is broken up by weekends.

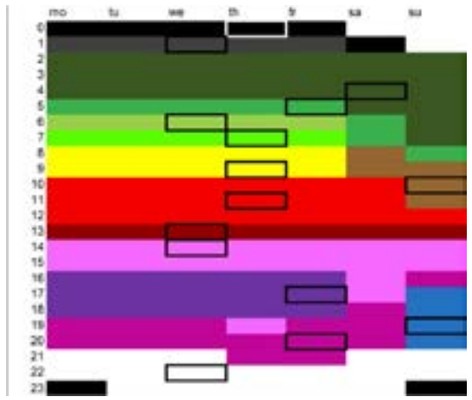


Figure 4: The hours of the week clustered based on a combination of GSSI (similarity measure), $k$-medoids (clustering algorithm), and 15 clusters

### Application to prediction model

The results presented can give insight into traffic patterns and how they are related over time, but we have also looked at a way in which it can improve the traffic prediction model from which the OD matrices were taken. Due to the heavy reliance of this model on historical data, it can perform badly at irregular points in time. For example, when Christmas falls on a Tuesday, the model would expect a morning rush hour, which is unlikely to occur. Intuitively, it would make more sense to use a Sunday morning OD matrix instead. We have developed a two-step approach to improve the traffic prediction model in such situations. Firstly, irregular traffic is detected in real time; to achieve this, measurements from road loops and smart traffic lights are compared to the traffic that would be expected at these points based on the historical OD matrix for that time of the week. If a mismatch is found, traffic is considered irregular, and the second step of the process is triggered. That step is about finding an appropriate alternative OD matrix. The same measurements are then compared to those of the 15 cluster exemplars. This is where the clustering comes in handy, as the alternative needs to be determined quickly; by only comparing to 15 cluster exemplars as opposed to all 168 hours of the week, time is saved while all different types of traffic are still considered. After the second step, the OD matrix of the best-matching cluster exemplar is used as the input for the traffic prediction model.

This procedure has been tested on Deventer traffic data from the period between June 2020 and November 2021. The hours that were identified as irregular make intuitive sense in most cases. A regular week usually has only in between zero and four irregularity triggers, while the lion's share can be found during holidays on weekdays, during rush hours in vacation periods, and during strict COVID-19 lockdowns. In these cases, usually a less busy time period was recommended. Irregular traffic was also found on February 7, 2021 and the days that followed, when a snowstorm hit the Netherlands. During the entirety of this snowstorm, only night-time OD matrices were suggested, acknowledging that many people took the government's advice to not drive. These results show how clustering can improve the prediction model, and their success indicates that the obtained clustering does hold up in practice.

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# The StuFi Numbers

written by **Tijn Scholten** and **Tamara Dert**

**Recently the Dutch government announced that starting in 2023 the basic grant will be back. This system was abolished by the government in 2015, and replaced by the currently well-known loan system, which many students have to use to finance their studies. The average amount of debt built up by those students during their study time is about 33,000 euros. For those students, the government wants to compensate their debts, and this compensation will be about 1,000 euros per student, which does not seem right. This left us questioning, why did the Dutch government introduce the loan system in the first place? What do different political parties think about this system and what do the students think about it?**



## The situation

Firstly, it may be good to understand how the basic grant is constructed and who has the right to receive one. In the basics, every student who started a Bachelor study at a university or a university of applied science was qualified to receive a basic grant for the nominal duration of their studies. This means that every student received a fixed amount of money every month in their first three study years, if you studied at a university. This fixed amount was higher if you did not live at your parental home anymore. However, if you could not manage your finances with only this amount, you could apply for an additional grant. This grant was given to students whose parents could not help to finance their children's studies. The maximum amount you are gifted by the government was dependent on your parents' income, the amount of siblings who were studying and a few other factors were taken into account to calculate the maximum amount you were gifted. For both of these gifts, the only condition that you had to meet was that they were a gift as long as you finished your study within ten years from when you started. Otherwise, this gift would be turned into a loan from the government. If those grants were not enough, there was also the availability to borrow some extra money against a certain interest rate, which had to be paid off within fifteen years after you finished your studies.

So, this is the system the Dutch government wants to return to. However, there was a reason for the initial move to the new loan system. Let us have a look at it. The current system was introduced in 2015 to replace the old one. It made the organisation of the financial situation for students quite straightforward. Everyone who starts studying can borrow money from the Dutch government against a zero interest rate. This has to be paid off within the first 15 to 35 years, depending on the student's choice. The borrower can request, cancel and change the borrowed amount every month. In the current situation about 45% borrows money from the government and many students who are still living at home do not borrow at all. For students living outside of their parental home, this percentage is significantly higher; about two out of three students make use of it.

## Corresponding numbers

It might seem unfair that the generation before us got money gifted whilst our generation got stuck with a (huge) debt. However, we should also have a look at the actual numbers. That way you might find it all more fair than you would assume. During the last period of the basic grant in 2015, students living away from home received €286.15 per month and students living at home €102.77. This seems very nice, but to put it in perspective: the national average rent for a student room in 2015 was €366 per month [2], and just paying for study necessities and university money would cost you around €220 per month in 2015, according to NIBUD [4]. In conclusion: for most students, the basic grant was not sufficient. Therefore they had to take out a loan for extra money from DUO anyways. In the loan system, this loan is against a zero percent interest rate. That way you are sure that loaning (for once) will not cost you money. The loan can be reinvested, given you the possibility to even make profit. The loan in the basic grant system, however, was not a free loan. One had to pay interest over it. Furthermore, it was a permanent loan that had to be paid back within 15 years. The total average costs of studying away from home minus health insurance in 2015, adds up to €1199 a month according to NIBUD. This means these students would have to loan €913 a month if they would have no income next to the basic grant. If they then indeed had finished their studies nominally, they would have a debt of €43,817. In this time they would have received €13,735 basic grant. This lessens their total debt in comparison with the current loan system with 24% if finished nominally in four years. This is a serious difference, but note that an interest of five percent, which is typically the lower bound interest on a loan, compounds to quite a big amount on such a big loan. This phenomenon is very important as it stipulates that when comparing we should not just look at size but also the conditions of the loans.

What if you can not immediately find a good job after studying? What if you can not pay? Those are questions that currently haunt students, giving them stress and anxiety. It is one of the main critics of the loan-system, but loaning in the earlier system was actually a lot riskier. The €43,817 debt with a five percent interest rate had to be paid in 15 years in full, whilst the €57,552 debt with zero percent interest rating is allowed to be paid in a more humane way: you only have to pay, when your current salary allows it over a span of 15 or 35 years. If you cannot pay it easily before the 35 years term, the debt will be disregarded and the money becomes a gift after all [5]. Although it seems like a lot of money right now, we should remember that what we do with this money is an investment in ourselves.

Starting salaries after academic beta studies, like econometrics, are around €2350 a month [6]. This means that if you, for the first year, keep around the same spending level, you could add around €1300 per month to your savings. Which means that just in your first year, you would have €15,500 in your savings account to spend on fun or… partly to pay off your debt. With your education you will probably grow a career, so when you look at the bigger picture, you can pay the loans of either system in time with very high probability, without a lot of additional stress. However, the stressful part lies in the small chance that you do not have a job and can not get one. Then this whole ordeal might be a bit trickier, so which system would you then rather be in: the one with a higher debt but nicer conditions, or the one with a lower debt but less flexibility? There is not necessarily a right answer to this question, but it is good for everyone to realise that going back to the old system is not just winning. The money freed up by no longer giving out the basic grant, could be seen as a premium we all paid for these nicer conditions, and it lightened a bit of the financial pressure our educational institutions are under right now. Whether this was always invested as smartly as possible is a different discussion, but on the following site you can check what your university invested the money in: Follow the Stufi (nos.nl).

It is hard to summarize the whole situation in a few sentences. There are pros and cons to both systems. At first glance, receiving 'free' money might look like a clear winner when it comes to being the most preferable option for students. However, the basic grant is seldom high enough for students to live from, resulting in them having to take out a loan. That loan is not interest-free and can cause serious problems when the student does not realize this. Having a free loan can open beautiful investment opportunities, even when it is only stored in a bank account that pays interest. On the other hand, the money that is saved by having an interest-free loan is in most cases not as high as the basic grant one would have received. Combined with the difficulties a big debt causes when one for example tries to buy a house, it might become clear why many students are in favor of the basic grant system.

Now that the government has announced that the Netherlands will be switching back to the basic grant, students have gone to Amsterdam to protest. It is not just that they are angry because they favored the old system, but because they are angry about how they are the only student generation ever to pay for 'better' education. Will they even notice the effects? Of course, the pandemic that caused all the students to be forced to stay at home did not help with this either.. Lectures were given online and the quality of education was lower than ever. They do receive compensation, but are not happy with the amount. Whether their protests will have an effect is still unknown.
Real calculations and arguments on what is fair have stayed out. We are very interested in what they will come up with in the end.

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# Zero Hunger Lab Leaves no Child Behind When It Comes to Detecting Malnutrition

**Tilburg University's Zero Hunger Lab wants to use data science to contribute to realizing global food security and its implications. With this project we focus on establishing sustainable development goal number 3 of the UN: good health and wellbeing. When preventing malnutrition, diagnosing it correctly is a big step towards this goal which lies in the heart of our research.**

One of the biggest challenges facing humanity in our modern world is hunger and poverty. This is not only affecting adults, but it directly affects the lives of millions of children around the world that suffer from malnutrition. Malnourishment among children is a major health issue: in 2020 more than 200 million children worldwide were undernourished, while 38.3 million children were overweight or obese. Around 45% of deaths among children under five are related to undernourishment and are hence preventable [1]. For NGOs to provide adequate help, it is of the utmost importance to identify those children that are undernourished, and this can only be done if children are accurately measured periodically.

While monitoring a child's growth is common and well established in most Western countries, this is not straightforward in low- and middle-income countries, especially for children living in remote places with no medical facilities nearby. Monitoring a child's growth requires measurements of their height, weight, head circumference and upper- and middle arm circumference, from which one can derive whether a child is malnourished. This is an elaborate and cumbersome medical assessment that requires medical experts and equipment that are generally not available in rural areas. Many families in low- and middle-income countries do not have access to such facilities, which hampers the possibilities for NGOs to find and help those children in need. This is why Welthungerhilfe, an NGO that fights hunger around the world, is developing the Child Growth Monitor. The Child Growth Monitor is a mobile phone app that is able to predict whether a child is malnourished based on an image or a video of the child. It enables employees of organizations such as the World Food Program and Oxfam Novib to rapidly identify malnourishment among children without the need of medical facilities (more on this below).

The Zero Hunger Lab research team, including Prof. dr. Eric Postma and dr. Marleen Balvert, focuses its research on predicting malnourishment from image- and video data which requires the prediction of body measurements from the image or video. This is a task that is currently under active research. The prediction of 3D body shape (and pose) is a challenge. In recent years, deep learning approaches have achieved some success in mapping a 2D view of a human body onto a 3D model of the body. If we are able to predict body parameters such as height, weight and head circumference from images that contain full body scans of children, with an error rate smaller than 1.4 cm then we can conclude that in areas where medical facilities are not available, a mobile phone can be used to measure hundreds of children in a short time. Digitizing data will not only generate real numbers on how many malnourished children we have in the world, but we can also locate them on the map and help organizations like UNICEF, WFP and WHO to act immediately to prevent nearly six million deaths every year.

We have already made a step in exploring AI methods for image-based body measurements for the early detection of malnourishment. Building on the earlier work of Mohammedkhan et al. (2021), we are aiming to further expand our research and address our research questions through data of real children from the wild. We have established a collaboration with hospitals to collect data through their pediatrics department. Zero Hunger Lab as the owner of the data will also be contributing to the domain by providing (anonymized) data. Using this data will make our research results more reliable for the credibility of our work.●

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# ... Ottawa!

**Two months ago I flew to Canada to start my exchange in the capital city Ottawa. Once I stepped out of the plane I immediately got struck by the cold temperatures and I realized that I should have taken the 'January is the coldest month in Ottawa' warnings more seriously. With temperatures of -24 degrees Celsius it took some time to get used to the weather in Ottawa, where you still have to wear masks outside, not because of COVID-19, but to keep out the cold. However, the weather at this time of the year is also one of the things that drew me to this place. All the snow and frozen lakes make this city a true winter wonderland.**

The University of Ottawa is a bilingual university as both French and English are the main languages here, so there are a lot of French speaking students here. Before coming here, I was ready to have some small talks in French, but it did not take me long to realize that I grossly overestimated my high school French skills.

For my exchange I decided to live at the University residence. Looking back at the past few months, I am really glad I made that choice, because I met so many great people here. I mostly met other exchange students, but some Canadians as well. The residence is also close to the city center, which is nice, and it has several common rooms where we often meet up or have a movie night.

In my first month here, there were still a lot of COVID-19 restrictions, like not being able to have in-person classes or sit inside of bars. However, we still desperately wanted to go to a bar, which meant sitting outside on a terrace just to be able to have a few drinks. Luckily the bars opened again in February. This meant no more sitting outside and sharing a heat lamp with six students to keep warm, so this was a big win for us. Now we could finally get a drink inside 'Fathers & Sons' which is the go-to pub for the Ottawa students.

Though it is pretty cold here, the weather allows for some great winter activities. One of the most popular activities here is skating on the Rideau Canal. Almost every day, some exchange students would meet up to skate there. There are also some great skiing areas not too far away, like Mont Tremblant and Camp Fortune. I visited the latter with some friends not long ago.

What I really like about going on exchange is that you meet so many new people from all over the world. You learn about new cultures, make friends, and go on trips with people you only met two weeks ago. Everyone is new to this city and is open to meet new people, visit places, and try new things. For example, I recently visited Quebec City with some friends during the break, and Montreal not long before that.


**Fanne Conijn**

**Bachelor EOR**

Age: 21

Another honorable mention is the dining hall, where you can go for breakfast, lunch, dinner, and as many snacks as you want. It's also a good place to meet with friends. I must admit that this place does make me very lazy as I haven't cooked for myself since I got here, so it will be a bit of a readjustment when I have to cook again when I get back.

I have also tried some Canadian delicacies, like Beaver Tails, maple taffy, and poutine, which tastes way better than it looks. I also tried maple syrup for the first time, which wasn't the most difficult thing to find because Canadians put maple syrup on literally anything.

All in all, the past months have been great and I already feel like time is passing too fast. There are still many trips and activities to plan, and I look forward to making the most of my remaining time here.●

# Melissa's Spectacular Actuarial Adventure

written by **Stijn Craenen** and **Matthijs Kroesen**

**For this edition of Nekst, we interviewed Melissa van Wingerden, a former active member of Asset | Econometrics. During her study she created an interest in pensions, investment, and insurance. Therefore, it is not an illogical consequence that she ended up at Achmea, the biggest insurance company in the Netherlands and parent company of well-known brands like Centraal Beheer, Interpolis and Zilveren Kruis. The company links various specialisms within the organization in the areas of insurance, healthcare, banking services, asset management and pensions. Looking to this last-mentioned area, Achmea advises pension funds and helps people to take deliberate decisions about their life so that they not only have their finances in order today, but also in the future. We interviewed Melissa among others about her thesis and the prize she won with this, her future, her time at Asset | Econometrics, and finally we asked her some funny Bert & Ernie questions.**

We started our interview, after we were welcomed very warmly, with the question of how she came up with the subject of her thesis. After Melissa was a working student at Willis Towers Watson and participated in the Netspar (an institute that researches pensions) Pensions Honors Program, she knew that she was interested in both actuarial science and investments. Together with Anne Balter (her TiU supervisor) and Agnes Joseph (her company supervisor at Achmea) she chose her final problem: How to invest collectively given that participants in a pension fund have different risk attitudes? This is a problem with a certain degree of difficulty, but that is exactly what she wanted. With a difficult subject, it is more likely to have a certain depth, which also results in a higher grade. Melissa did not start with exactly this problem. At first, she did not assume that you can measure the risk attitude perfectly so that there are many uncertainties in this parameter. But in this process, she realized that she preferred the investment theory and its broad implications over the more detailed theory that is required to incorporate uncertainty in parameters. Another reason for choosing this specific problem was that this problem is more in line with practical challenges that the company she wrote her thesis at, Achmea, faces. The need for research in this field has arisen because new pension legislation now makes it mandatory to measure risk attitude and to use this as basis for the collective investment strategy. Furthermore, many studies have already been conducted about measuring the risk attitude but not about the steps after this. This is where Melissa and Achmea saw their chance.

Melissa van Wingerden

As mentioned before, the main topic of Melissa's thesis is about how a pension fund should invest for individuals that have different levels of risk aversion. Furthermore, she also considered that participants can differ in age and initial wealth. She presented three strategies that can be used to implement this.
(1) The first strategy is based on the 'inequality averse collective investment strategy' from Balter, Mahayni and Schweizer. In this method the power utility of the investor is maximized, while the individuals for whom the investor invests have different ages, levels of risk aversion and initial wealth. If the pension fund is very inequality averse, then individuals with a high risk aversion and low initial wealth are given a higher weight in the function of the pension fund that is maximized.
(2) The second strategy is a welfare effect-averse collective investment strategy. It uses a ratio called the welfare effect of a certain individual. This ratio consists of the individual's certainty equivalent when participating in the investment plan of the pension provider divided by the certainty equivalent of the individual when the individual invests optimally on their own. If the investor has a high welfare effect aversion, then more weight - in the utility function that is being maximized – is given to an individual with a risk aversion that is slightly below the average risk aversion of all participants in the fund.
(3) The last strategy is a welfare loss-averse collective investment strategy. In this strategy, if an investor has a high welfare loss aversion, higher weights - in the utility function of the investor - are assigned to individuals who are the most risk averse.

After much research and a lot of difficult math, Melissa's advice for a company is to base their strategy on the wishes of their clients. Afterall, every pension fund is different which means that there is not one optimal solution that is the same for every fund. It is also possible to implement the three strategies all at once by taking an (weighted) average as the 'final' strategy, since the three strategies can coincide at this point. If Melissa could choose a strategy itself, she would choose the welfare effect averse collective investment strategy because it makes a comparison to everyone's optimal investment strategy and the parameter choice of the pension fund seems more robust. Therefore, the second strategy seemed the fairest and most logical to Melissa.

When we asked what Melissa is most proud of looking back on her time at university, she was quick to answer. She looks back with a good feeling on the growth she has experienced and the people she has met – she went from a shy girl to someone who dares to take initiative. This, according to Melissa, has been a gradual process but became particularly evident when she joined Willis Towers Watson and became chairman of several formal committees at Asset | Econometrics. It is more difficult for her to answer the question of what she is most proud of in her Master since there was so much to choose from. She did experience her graduation period as the most enjoyable period of her study time because she was able to apply things she learned in practice and since she was surrounded by many inspiring colleagues.

After this, we congratulated Melissa (somewhat belatedly) with winning the Johan de Witt prize. This is a prize for the best thesis (research) in the field of actuarial science of the Netherlands. Melissa's supervisor at Achmea, Agnes Joseph, criticized her thesis as 'an exceptionally good thesis that deserves this prize' and has submitted the thesis and thus registered her for the competition. After having read the submitted theses, the jury of the Royal Dutch Actuarial Association publicly announced that Melissa won this prize at the annual autumn congress on December 7, 2021. Following this announcement Melissa got the opportunity to present her results to over 350 actuaries who were mostly following this congress from home. Thereafter, she got overwhelmed by all of the positive reactions and interest that the pension sector took in the practical implications of this research. Achmea even offered her and her colleagues the opportunity to work on the practical implications of this research and educate clients on this topic so that they can make informed decisions about this challenge that the pension sector faces.

Photo: Jacques Kok

Now that Melissa has received such a prestigious prize, what are her plans for the future? Although Melissa nailed her Master thesis, she does not want to pursue a PhD. Melissa notices that she adds something to society when working for Achmea. Furthermore, Melissa wants to become a true 'actuary AG,' a title issued by the Royal Dutch Actuarial Association. To earn this 'AAG' title you need to follow an extended Master's in actuarial science. Besides some courses that are similar to the Master QFAS program, this extended Master offers many practical cases that broaden your actuarial knowledge in different fields (such as Health, Pensions and Climate change). Since Melissa has followed a lot of actuarial courses in the Master Quantitative Finance and Actuarial Science (QFAS), she was eligible for several exemptions of courses in the EMAS program. Achmea - where she continued to work after her thesis - has allowed Melissa to follow this program one day a week to become a true 'actuary AG.' Melissa has not yet made any more futures for the future, but we reckon it is a good start!

After a lot of talk about these serious subjects, we arrived at the most important topic. What committees had Melissa done while being active at Asset | Econometrics? It turns out that she had done quite a lot of committees. The Education Committee, Active Members Day, Connection Day, the Quantitative Investment Group (better known as QIG), and the Actuary Day Tilburg are all committees in which Melissa was active. Furthermore, Melissa was also active in the Nekst (Online) Committee, the most beautiful committee of Asset | Econometrics (as you can see, this article was written by two very unbiased reporters)! Also, Melissa has been active at the investment committee of Asset | Accounting & Finance. She liked that people from Asset | Accounting & Finance approach investment decisions quite differently from active members from Asset | Econometrics. Both associations examine stocks and other financial products in a very different way, and you learn skills at one association that you would not have learned at the other association. However, Asset | Econometrics remains the favorite study association of Melissa (once again, this article was written by two very unbiased reporters). She loved organizing the Actuary Day; after this event, Melissa was sure she wanted to become an actuary. The committee that Melissa liked the most was Food for Thought, a committee of the general branch of Asset. At this committee, she interviewed inspiring people like the CEO of a.s.r., the CEO of Randstad and the CEO of Mercer and Marsh NL in a podcast or live format (Recommendation: check these monthly sessions out!). This committee has helped Melissa to overcome some of her shyness and see that every person, even a CEO, is just human after all. She liked asking critical questions, and seeing if she could provoke a controversial statement, like a true journalist!

After this cross-examination, we now have a good overview of Melissa van Wingerden. A diligent person, who achieved a notorious prize by delivering a great Master thesis. Her time studying in Tilburg brought her some personal growth we could all be jealous of: from shy to assertive. We wish her a lot of luck in her future endeavors.

## Bert & Ernie Questions

**Watch Netflix on the couch or have too many drinks when going out?**
*"I would rather have a few too many drinks when going out, but if I have to work the day after I watch Netflix on the couch."*

**Adidas or Nike?**
*"Adidas"*

**'Even Apeldoorn bellen' or 'Leuker kunnen we het niet maken, wel makkelijker'?**
*"Even Apeldoorn bellen"*

**win Olympic gold at the Olympic Games or win a Nobel prize?**
*"Win a Nobel prize"*

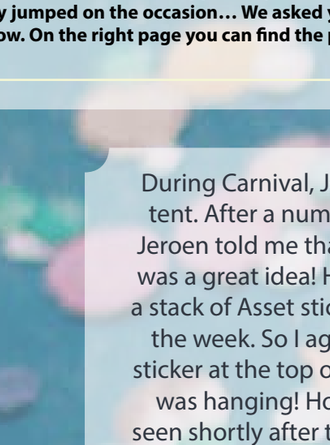
**Stijn or Matthijs?**
*"Matthijs"*

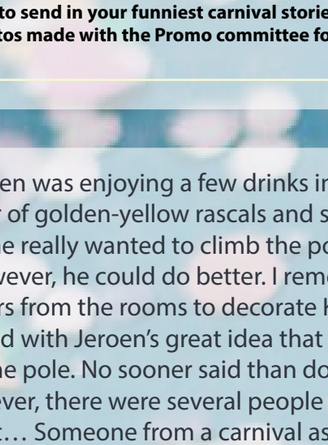
# Let's Talk!

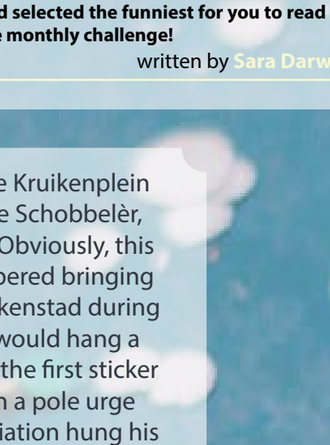
**Let's talk about the six (or more for the real diehards) most beautiful days of the year: Carnival! After two years of waiting we finally could sing along to its music, enjoy the whole city until the early morning and do it all over again the next day! Even though most of the corona-measures disappeared just before this magnificent week, our greatest friend corona was not far. Hand in hand with the Flu they jumped on the occasion… We asked you to send in your funniest carnival stories and selected the funniest for you to read down below. On the right page you can find the photos made with the Promo committee for the monthly challenge!**

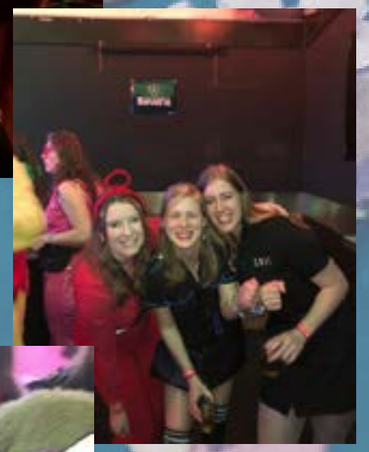
written by **Sara Darwinkel**

During Carnival, Jeroen was enjoying a few drinks in the Kruikenplein tent. After a number of golden-yellow rascals and some Schobbelèr, Jeroen told me that he really wanted to climb the pole. Obviously, this was a great idea! However, he could do better. I remembered bringing a stack of Asset stickers from the rooms to decorate Kruikenstad during the week. So I agreed with Jeroen's great idea that he would hang a sticker at the top of the pole. No sooner said than done, the first sticker was hanging! However, there were several people with a pole urge seen shortly after that… Someone from a carnival association hung his sticker above ours. This was of course unacceptable! Jeroen flew back into the pole to hang a second sticker at the top of it. With the danger of other pole climbers driven off, the swinging and singing went on happily. But since it was the beginning of the Carnival week, Asset's dominance had to be firmly secured. This is how Jeroen got the idea to hang a sticker on the crossbar of the tent. Now it is not an unimportant detail that Jeroen was dressed as a Scot. And Scots wear a kilt. And only a kilt if you know what I mean. God bless everyone who looked up when Jeroen hung the last sticker at the top of the tent. But the mission was successful and Asset was on display at the top of the Kruikenstad tent during the entire carnival!









# Quatsch!

¯_(ツ)_/¯

**Juliëtte**
"De tijd van 1+1 op wijn is voorbij.. Ik had er meer van moeten genieten."

**Michelle**
"Alles in het leven volgt een normaal verdeling, anders hadden ze het niet normaal genoemd!"

**Sara**
"Hoezo ben jij 3 uur lang bij Computer Programming tentamen gebleven? Je had niks geleerd toch?"

**Elise**
"Je kon bij de slides, dus ben maar gaan leren voor de resit."

(op de helft van de cantus, over Trink, Trink, Brüderlien Trink)
**Michelle**
"Welke liedje was dit?"

**Ferdy**
"Hertenbiefstuk, is dat van een hert?"

**Lotte**
"Hij is in Riga."

**Juliëtte**
"Waar ligt dat?"

**Lotte**
"Budapest?"





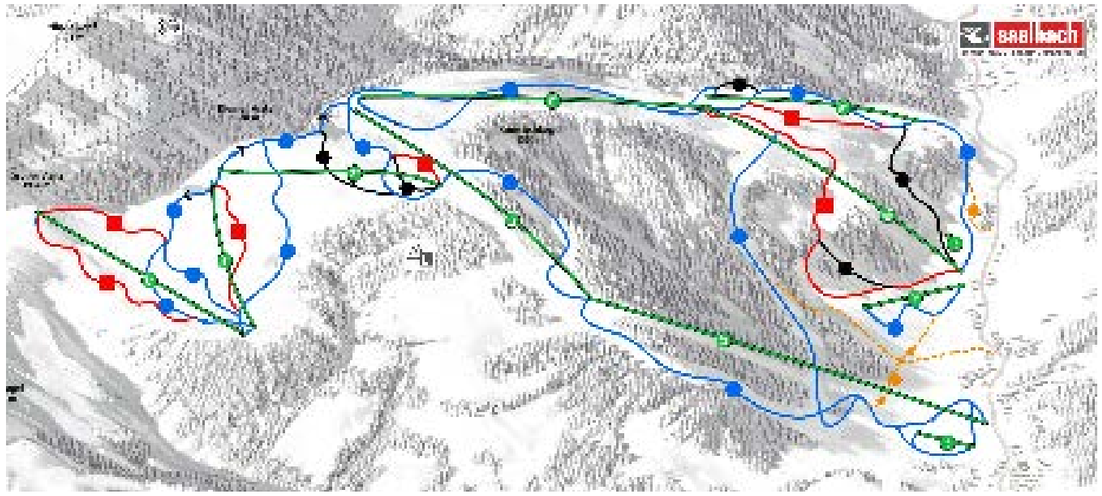
# Puzzle Time

**The ski trip this year was in Saalbach. In a certain area of Saalbach the piste numbers have disappeared from the map. Of five students, it is known what they have skied. With this information you can fill in this map again.**

written by **Timo Klabbers**

The following rules apply:

- Each track with a figure must be numbered. Each figure has a unique number.
- The numbers in the series have the color of the track: blue, red, black, orange.
- Of the lifts it is known which type of lift has been taken. If they took a gondola, this is noted with a G. Chairlifts are noted by an L followed by the number of seats (eg L8). Tow lifts have not been taken. Lifts are written in italic.
- This map is an edited form of the map of Saalbach. Fill it in in this NEKST or download the full-resolution map at Nekst-Online.nl.
- When there is an asterisk * behind the piste number, it means the person only skied a short part of the piste.




| Student 1: | Student 2: | Student 3: | Student 4: | Student 5: |
|---|---|---|---|---|
| *L6* | *L4* | *L4* | *G* | *G* |
| 17 | 24 | *G* | 2 | 1 |
| 8 | 3 | 2 | 21 | 19 |
| *L8* | 12 | 24 | 11 | 4 |
| 6 | 27 | 20 | 10* | 10 |
| 8 | | 3 | 29 | *G* |
| *L8* | | 23 | 12 | 1 |
| 18 | | *G* | | 25 |
| 7* | | 2 | | *L8* |
| *L6* | | 21 | | 5 |
| 16 | | 22 | | 26 |
| 9 | | | | 1 |
| *L6* | | | | |
| 16 | | | | |
| 8 | | | | |

*Can you figure out the puzzle?*
Please enter your solutions at www.Nekst-Online.nl/Puzzle. A goodiebag will be waiting for whoever has sent the best (partial) solutions. Please note that, as before, every recipient of this magazine is eligible to send in their solutions, so members of the department are invited to participate as well. Good luck!

**Laurens te Booij** is the winner of the previous puzzle. He can pick up his prize at the rooms of Asset | Econometrics.
The solution can be found at www.Nekst-Online.nl.

**Extra challenge:**
In the 'Dear members' Wout has hidden three words. Can you guess what words he tried to blend flawlessly into his writing?
Let us know and maybe your name will be mentioned in the next edition of Nekst!

# Asset | Econometrics congratulates...

*Name* **Alex Lostado Skorczynska**
*Title* Value-at-Risk Estimation under Data Scarcity: an Application to the Achmea Portfolio
*MSc* QFAS
*Supervisors* Prof.dr. J.H.J. Einmahl, Prof.dr. B.J.M. Werker

*Name* **Maria Zego**
*Title* I Difference in Differences revisited: the impact of abortion legislation on fertility and marriage
*MSc* EME
*Supervisors* Dr. B.M. Siflinger, Dr. M. Salm

*Name* **Roy Vogels**
*Title* Demand forecasting and inventory management for a high-tech supply chain
*MSc* BAOR
*Supervisors* Dr. C. Dobre, Dr. J.C. Vera Lizcano

*Name* **Alexander Wessel**
*Title* Strategic Safety Stock Placement Optimization at Prodrive Technologies A comparison between Guaranteed-Service Approach and Stochastic-Service Approach
*MSc* BAOR
*Supervisors* Dr. Y. Merzifonluoglu, Dr.ir. M.P.M. Hendriks

*Name* **Wenxin Lin**
*Title* A Reinforcement Learning Approach to Time Slot Management at Online Grocery Retailer Picnic
*MSc* BAOR
*Supervisors* Dr. F.C.A.M. Cruijssen, Dr. F.C.A.M. Cruijssen

*Name* **Nick Weerts**
*Title* Estimating the Causal Impact of Non Pharmaceutical Interventions on Covid-19 Spread within US counties.
*MSc* EME
*Supervisors* Dr. D. Kojevnikov, Dr. B.M. Siflinger

*Name* **Judith Brugman**
*Title* Risk Mitigation Strategies for New Product Introductions at ASML A Scenario-based Decision Framework
*MSc* BAOR
*Supervisors* Dr. Y. Merzifonluoglu, Dr.ir. M.P.M. Hendriks

*Name* **Claire Vink**
*Title* Detection of epistasis
*MSc* BAOR
*Supervisors* Dr. M. Balvert, Dr. J.C. Vera-Lizcano

*Name* **C asper Keijsers**
*Title* Revenue sharing in airline alliances from a game theoretic perspective
*MSc* BAOR
*Supervisors* Prof.dr. P.E.M. Borm, Dr. R.L.P. Hendrickx

*Name* **Lei Song**
*Title* Credit rating with machine learning methods: an application to Achmea Bank data
*MSc* EME
*Supervisors* Dr. O. Boldea, Dr. C.B.T. Walsh

*Name* **Jasper van Zeijst**
*Title* Estimating the default and hazard rate of lease contracts with an application at ABN AMRO Asset Based FinanceNext
*MSc* QFAS
*Supervisors* R. Fu MSc., Dr. N.F.F. Schweizer

*Name* **Sander van Eekelen**
*Title* Hedge-based Valuation of Equity-linked Life Insurances under Mortality and Market Risks
*MSc* QFAS
*Supervisors* Dr.ir. G.W.P. Charlier, Prof.dr. B. Melenberg

*Name* **Stan Morseld**
*Title* Market Microstructure and Algorithmic Execution A post-trade analysis on global futures markets
*MSc* QFAS
*Supervisors* Dr. N.F.F. Schweizer, R. Fu MSc.

*Name* **Max van den Hoven**
*Title* On the Effects of Dataset Size, Resolution, and Transfer Learning on Binary Image Classification Performance: An Experimental Analysis.
*MSc* BAOR
*Supervisors* Dr. J.C. Vera-Lizcano , Dr. M. Balvert

*Name* **Joost Broeders**
*Title* Financial market forecasting using stochastic models
*MSc* QFAS
*Supervisors* R. Fu MSc., Dr. N.F.F. Schweizer

*Name* **Jelle de Wind**
*Title* Solving Multiple Stopping Problems with Neural Networks
*MSc* QFAS
*Supervisors* Dr. N.F.F. Schweizer, Dr. R. van den Akker

*Name* **Monica Velasquez**
*Title* A comparison of Two-factor equilibrium models under negative interest rates
*MSc* EME
*Supervisors* Dr. N.F.F. Schweizer, Dr. S. Sadikoglu

*Name* **Vince Hasse**
*Title* Fundamentals of Classification in the Set Format
*MSc* QFAS
*Supervisors* Prof.dr. B.J.M. Werker, Prof.dr. B. Melenberg

*Name* **Luuk Verstraaten**
*Title* The effect of relative valuations (value spreads) on long-term expected returns for long-short multi-factor strategies
*MSc* QFAS
*Supervisors* Dr. F.C. Drost, Dr. P. Cizek

*Name* **Abdel Zariouh**
*Title* Welfare loss due to inadequate assumptions on risk preferences of pension fund participants with Epstein-Zin recursive utility
*MSc* QFAS
*Supervisors* Prof.dr. T.E. Nijman, Dr. A.G. Balter

*Name* **Suzanne van den Boogaard**
*Title* Sales Forecasting at PACCAR Parts - Evaluating Lasso and Random Forest in both Dynamic and Non-Dynamic Regression
*MSc* BAOR
*Supervisors* Prof.dr.ir. H.A.M. Daniels, Prof.dr. K.J.M. Huisman

*Name* **Roos Herrings**
*Title* Estimating Time Preferences of the Teachers in Duflo, Hanna, and Ryan (AER 2012)
*MSc* EME
*Supervisors* Prof.dr. J.H. Abbring, Prof.dr. T.J. Klein

*Name* **Tom Hanckmann**
*Title* Developing a methodology to design production wheels for the process industry
*MSc* BOAR
*Supervisors* Dr.ir.ing. M.J.P. Peeters, Prof.dr.ir. R. Sotirov

*Name* **Fleur Theulen**
*Title* Solving Large Maximum Covering Location Problems with a GRASP Heuristic Case-study for stroke facility allocation in Vietnams
*MSc* BOAR
*Supervisors* Prof.dr. G. Kant, Dr.ir.ing. M.J.P. Peeters

# ...on obtaining their Master's degree

# Agenda

MON **11** APR
### Constitution Drink
On Monday the Constitution Drink During the drink the successors will tell some funny story about Bram and Constantijn. Come celebrate this lovely moment with us!

WED **13** APR
### Beer Games Drink
On Wednesday, April 13, the Drinks & Activities committee will organize the Beer Games Drink. Make sure to eat well before the night starts, because there will be quite some drinks this evening!

THU **14** APR
### Asset Gala
The yearly Asset Gala will take place this year at De Heuvel Gallery. Put on your prettiest dress or suit up, and enjoy a night of fanciness with your friends! Keep in mind the theme of the night: glitter...

TUE **19** APR
### Monthly Afternoon
All of our members are invited to the Monthly Afternoon! Here you can catch up with your fellow econometricians, have some drinks and snacks together, and play Mario Kart. We will also order pizzas together. More information on this will be communicated later.

THU **21** APR
### Freshmen Activity
On April 21, all first-year econometricians are invited to join our Crazy 88! This activity is perfect to have some fun with your friends or get to know some other fellow freshmen!

FRI **22** APR – SUN **24** APR
### Active Members Weekend
All active members are invited for a legendary weekend! This weekend is meant to thank all active members for their efforts and contributions. The whole weekend will be kept a secret until the very last moment!

TUE **26** APR
### EOR Academy
As an econometrician, you learn a lot of hard mathematical skills, but your soft skills can always be improved. Therefore, DKC will join our EOR Academy on April 26 to give an interesting training to refine your soft skills.

THU **28** APR
### Python Training
On Thursday April 14, we will organize a Python training for all econometrics students interested in learning how to work with this software!

FRI **29** APR – SAT **30** APR
### Batavierenrace
The Batavierenrace is the largest relay race in the world, in which participants run from Nijmegen to Enschede every year. The 50th Batavierenrace will be held on the weekend of April 29 and 30.

MON **2** MAY – TUE **10** MAY
### International Business Trip
May 2 till May 10 a total of 25 members of Asset | Econometrics are going on a trip to London and Reykjavík. While being on this trip they will get to know more about the culture of the two countries as well as the working experience. During this trip the universities of both capitals and a few companies are visited.

THU **12** MAY
### Willis Towers Watson & Oliver Wyman Trip
On Thursday May 12, you get the opportunity to visit the offices of Willis Towers Watson in Eindhoven and Oliver Wyman in Amsterdam. During this day you get to know all about the worldwide operating consultant, broker and solution provider that helps organisation in riskmanagement.

FRI **13** MAY
### Members Day
It is time to treat all our lovely members! On May 13, the Active Members Day committee is organizing an event for all members of Asset | Econometrics in the afternoon. It is still a secret what the activity will be.

MON **16** MAY
### Inhouse Day Northpool
This year's Inhouse Day for the Quantitative Investment Group will be in cooperation with Northpool, a company that trades in short-term energy products. In fact, the basic principle of trading in energy is the same as the principle of trading in shares.

TUE **17** MAY
### Astrics Beer Cantus
During this annual spectacle, we will sing the most beautiful cantus songs and say cheers to our department. It will (as always) be a lot of fun, so do not hesitate to join us!

THU **19** MAY
### Connection Day
During the Connection Day, you have the opportunity to get to know several companies through cases and company presentations. On this day, you can get insight into the daily work of the company employees and show your econometric skills.

*Register and find more information about our events at*
***www.Asset-Econometrics.nl/events***

# NOTHING BEATS **TRADING**

## GRADUATE TRADER

## SUMMER TRADING INTERN

We are looking for talented individuals with excellent mathematical and analytical skills combined with an interest in global financial markets.

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flowtraders.com/careers

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