

# nekst>>

vol. 33 no. 4 | summer 2025



## Familiar Faces

Henk Norde



## Event

Active Members Day



## Committee Profile

Econometricians for Society

## The Nekst Stop

This edition is all about transportation, a theme that lies close to the heart of us econometricians and is the core of so many real-world challenges. From optimizing delivery networks to predicting traffic or improving public infrastructure, transportation is where the theory we study throughout our Bachelor's and Master's truly finds its home. It is an area where Econometrics and Operations Research thrive: using data, structure, and logic to solve problems that keep the whole world moving.

Be sure to take a look at the Special on whether the train may become a viable alternative to flying. And do not miss the Let's talk where we explore the way Econometrics students move themselves. There are some very interesting articles beyond transportation as well. Check out the bonus puzzle made by our very own Henk Norde about a caterpillar on a rope. Also, take a peek at some useful advice about student financials which might come in handy for you.

As this edition of Nekst marks the end of this year, so does it end my time as Editor-in-Chief. I would like to sincerely thank you, the reader, for reading this year's issues. Whether you skimmed a single article or rigorously read every single one, your engagement makes the Nekst worth making.

I am also grateful to the Nekst committee whose creativity, dedication, and teamwork made this issue and the others possible, and to our external contributors and interviewees, thank you for your insights and time.

I hope you enjoyed reading this edition, and the others, as much as we enjoyed creating it.

Happy reading!

Kind regards,

**Hedser van der Wel**  
Editor-in-Chief



# Table of Contents



The Teacher: Johan Graafland

15



Familiar Faces: Henk Norde

19



Parents of the Board: Amy van den Tillaart

7

## COLOPHON

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Company Interview: Booking.com



Event: Active Members Weekend



Special: Zero Hunger Lab



Committee Profile: EfS

## Advertisements

cover Asset | Econometrics  
3 Career Platform Tilburg

## Articles

- 4 Dear Members
- 5 Healthy Habits
- 6 Column: Johan Graafland
- 7 Committee Photo's
- 8 Parents of the Board:  
Amy van den Tillaart
- 10 Special: Speed vs. Sustainability
- 13 Company Interview: Booking.com
- 15 Teacher: Johan Graafland
- 17 Group Photo Summer Activity
- 19 Familiar Faces: Henk Norde
- 20 Event: Active Members Weekend
- 21 Special: Zero Hunger Lab
- 24 Committee Profile:  
Econometricians for Society
- 25 Let's Talk
- 27 Familiar Faces: Answer
- 29 Nekst Advice
- 30 Puzzle
- 31 Graduates
- 33 Quatsch
- 34 Agenda

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# Dear Members,

This year's final edition of the Nekst is all about transport. A fitting topic, as our association has been on the move quite a lot this past year. From trains to boat rides, we have seen many modes of transportation. And although it might be a cliché, it is always a good reminder that it really is not about the destination, it is about enjoying the journey. And as we reflect on the events from the past months, I think it is safe to say that we have!

On our Active Members Weekend, we took the train to Eindhoven, where we played a unique game of Battleship in the city. After exploring the town, the finished puzzle led us to a bus ride to the location, where a weekend full of fun activities followed. We finished the weekend with a trip in a touring car. Final destination: the swimming pool! A few weeks later, we treated our old active members to a boat ride on the canals. We had a bunch of delicious bites and played some rounds of bingo with amazing prizes!

Even our formal events included some modes of transportation. The Connection Day started with interesting company presentations and cases at the LocHal, after which we walked to the Harmonie for a delicious cooking workshop with three companies. For the Trading Inhouse Day, we took the train to Amsterdam, where we played a market-making game and got to shadow traders on a real trading floor! A very unique insight into the exciting world of options.

The final destination of this review is our Econometrics for Society day, where we did an activity with the elderly in a care home. From walking sticks to wheelchairs, walkers or mobility scooters, this day included a wide variety of transportation modes. It was a delight to see the positive reactions from the elderly, and it felt great

for our members to do something back for society. Afterwards, we took our bikes to the Spoorpark, where we enjoyed some pizza and games. Overall, a great day!

As I am writing this, we only have a few events left this academic year. Soon, our candidate board will be announced, and the handover period will start, which signifies the nearing end of my time as the Chairman of Asset | Econometrics. It was a wonderful year, in which I, together with Jeroen, Rein, Wouter, Rebecca, Guus, Dylan, and Amy, went through many motions. We welcomed many new members, moved rooms, explored new activities, and gained many new experiences. Not only did we learn a lot, but we also had a lot of fun while doing it. It was a once-in-a-lifetime experience that I am so glad to have shared with these people. The amount of good memories that we made is something that I will cherish for the rest of my life.

I am proud of the ways that our association moved forward this year. It would not have been possible without our incredibly dedicated members. Time and time again, we were impressed with the involvement of our members, and it did not go unnoticed by other parties either. The Nekst committee is a great example of this. They worked tirelessly to publish four beautiful editions this year. From interviewing to writing to designing, a lot of work goes into every edition. They can be proud of their work!

With this, I end my last Dear Members. Thank you for reading and being part of our journey this year.

On behalf of the board,

**Emma Wieringa**

*Chairman Asset | Econometrics 2024-2025*



# Commuting as an Extra Movement Opportunity

written by **Timo van Oorschot**

**In our fast-paced world, commuting to the university or work might feel very mundane and time-consuming, but what if those travels could become a foundation for health improvement? Active commuting, for example walking, cycling or even using public transport with shorter walks in between, offers great options to make your trips to university or work much healthier. However, the fact that we struggle to create this active commuting habit might be relatable. This article shows some active commuting benefits, while also providing tips to overcome the 'active commuting barrier' when your good intentions of active commuting still do not immediately lead to action.**

Incorporating physical activity into commuting is a very powerful way to improve one's health. Activities like fast-paced walking or cycling do not only maintain a healthy body weight, but also strengthen the cardiovascular system while boosting overall fitness as well. Even the slightest amounts of time could significantly lead to healthy benefits. Several studies have shown, for example, that an 11-minute medium-level exercise could already reduce the risk of heart diseases and cancer by significant margins. Apart from the physical benefits, active commuting also has its positive effects on mental health, which makes sense since regular physical activity has been linked with reduced stress levels, better cognitive functioning, and overall mood improvement. Especially when done in nature, such activities can help as a form of meditation, helping to clear the mind after a rough day. Therefore, the commute on the way back home might not feel as harsh as it seems at first.

Not only does active commuting involve physical benefits, but it also has a cost-effective advantage compared to travelling by car every day, due to decreased expenses on fuel, maintenance or parking. Choosing active transportation methods also contributes to environmental sustainability, in the sense that one does not produce gas emissions or other pollutants by going for a walk or grabbing the bicycle.

Despite these clear benefits, there are still some barriers that keep people from adopting active commuting habits into their lifestyle. The main reason for this is in most cases the distance, as a cycling tour of more than 20 km can be quite ambitious before arriving at your destination. Moreover, most people have to deal with time constraints, not allowing them to use a slower transportation method. However, for closer distances,

the Netherlands is actually the perfect place for implementing these habits into one's lifestyle, as it is the world leader in quality of infrastructure. The abundance of cycling roads and walking infrastructure makes active commuting very accessible and safe. Another positive development is that employers put more focus on investing in their employees' health by providing more facilities for physical activity, like showers or bike racks, or even the possibility to work more flexible hours. These changes could blur the barrier a little and motivate commuters to become more active.

The hardest part of maintaining a healthy habit is mostly the transition, which tends to go too fast as people might try to exhaust themselves by overdoing the amount of physical activity in the first weeks, having a hard time to adhere to these amounts of activity later on. Therefore, when wanting to implement active commuting into the lifestyle, starting with very small changes might make this transition more manageable. Small walks to a bus station can already make a large difference, and these small steps can even significantly improve overall health.

Integrating physical activity into daily routines is not as hard as it might seem. It does not immediately require a gym membership or a specific time frame in which you have to specifically play a sport. By using the commute as an opportunity for movement, a very mundane part of the day can easily be turned into a source of vitality and well-being. So, swapping the car keys for a bicycle or some running shoes can definitely be considered, as this can hugely benefit the body, mind and even the planet.●



# Gender Equality Makes Men Happy

**Gender equality not only serves justice, but also promotes happiness in a country, as the economist and philosopher John Stuart Mill already stated.**

This is confirmed by a very recent study that I published together with Annemiek Schilpzand in the Journal of Happiness Studies. We measure gender (in)equality using the 'Gender Inequality Index' of the UN Development Programme. This index includes, among other things, the share of women in the national parliament, people with secondary education and labor participation. For the Netherlands, gender inequality has fallen from 11 to just 3 (on a scale of 0 to 100) between 1990 and 2017. In the US, inequality has also fallen, but is still much greater than in the Netherlands, namely 29 in 1990 and 21 in 2017. The positive relationship between gender equality and happiness, according to our research, is caused by the fact that gender equality promotes income per capita and leads to more personal freedom. Income and personal freedom in turn promote human happiness.

But, you might think, surely this positive happiness effect only applies to women? No, according to our research it does not: men also become happier when there is more equality between men and women. For the effect of gender equality on income, this is understandable, because men also benefit when the economy grows as a result of more gender equality. That freedom and happiness of men also increase as a result of gender equality is due to the broader culture in a country, where both men and women breathe in. We find that in countries with a strongly masculine culture, in which people attach importance to

masculine values such as performance and competition, happiness is hardly related to gender equality. In countries with a feminine culture, in which equal opportunities and inclusivity are important values, gender equality promotes freedom and therefore happiness much more strongly, both of women and men. We find the same for countries with an individualistic culture, in which people attach importance to individual rights and autonomy.

What do these results mean for countries such as the United States and the Netherlands? Under President Trump, women's emancipation and diversity have been cast in a bad light. This will have a depressing effect on happiness in the US. Because the US has a strongly above-average individualistic culture (while it is slightly below average in terms of feminine culture). This negative happiness effect is further reinforced by the fact that Trump's policy also puts pressure on the freedom of scientists and people in general.

In the Netherlands, gender equality also has a substantial positive effect on happiness, because the Netherlands scores high on both feminine culture and individualism. It is therefore understandable that gender equality in the Netherlands is already relatively high, as shown by the figures from the UN. Because men also ultimately have an interest in gender equality, as our research shows.

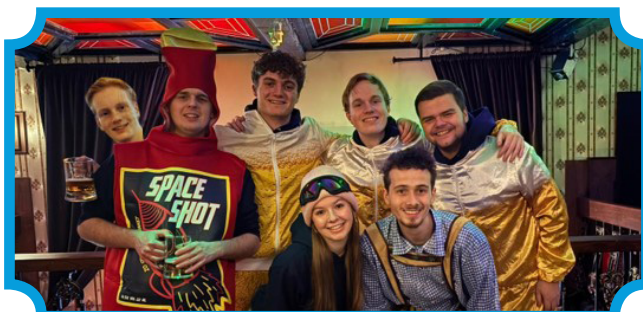
I was therefore somewhat surprised that mainly women participated in the demonstrations on International Women's Day on 8 March. Dear men in the Netherlands, your happiness also depends on your girlfriend (or, later, your daughters) being treated equally! ●

## Johan Graafland

*Prof. dr. Johan Graafland is a Full Professor at Tilburg University, specializing in Economics, Business, and Ethics. His research focuses on the intersection of economics, corporate social responsibility, and moral values. He has published extensively on topics such as sustainability, ethical behavior in business, and the relationship between religion and economic development.*



# The Com



# Committees



# More Than Grades: A Family's View on Growth, Balance, and Ambition

written by **Marvin Priem**

**I**n between exams and thesis meetings we meet with the parents of Amy, Anne-Marie and Pascal. What starts as simple conversation and introductions quickly evolves into an insight in their life as a family. Over the course of an hour, we talk about career, parenthood and how their values now

Anne-Marie and Pascal live in Lieshout, probably best known among students as the birthplace of Bavaria beer. Where both parents are active as volunteers in Lieshout, Anne-Marie volunteers for the local fair. And Pascal is a board member, same as Amy, but then for the carnival and neighbourhood association.

Pascal is CFO of Agradi, a web shop company for horse lovers that ships approximately 700,000 packages a year. While originally starting as an auditor, Pascal has been in different finance and IT related jobs in different sectors throughout his career. He has been in consultancy, entrepreneurship and has even worked abroad in Switzerland and Philippines, but his heart has always remained in Brabant. "That local connection," he says, "makes everything feel more meaningful."

Anne-Marie, meanwhile, works at

Mutsaerts Assurantiën, which was recently acquired by Howden, as a verzuim-coach (sickness and absence coach). She began working there when the company was only locally active. Over the years she has watched it grow, by several mergers with different companies, to a large international company with worldwide presence. Anne-Marie does not feel the international side of the business on a daily basis, she is focused on the Dutch employment law, and thus works mainly with the different offices in the Netherlands.

And somehow, alongside demanding jobs, they are still involved in their community. As said before, they both occupy volunteer positions, they like the sense of community and togetherness this brings. A village may be small, but they can bring out great joy, through kindness, connection and togetherness.

So it may not be that surprising that Amy has gone into her studies, and student life, with the same enthusiasm. "We did not push her," her parents insist, "but from day one, she said: if I ever get the chance to do a board year, I will take it," and so she did.

For them, it is a joy to watch her in this new role, with new responsibilities. It

does not matter what she does, managing events, presenting to companies or juggling committee meeting and coursework, they see her thriving in this position. "She is very goal-oriented," Anne-Marie says. "She does not do things halfway. If she commits, she goes all in."

What we notice most, is how well they know her, not just what she does, but how she is as a person. They describe her as social, honest, focused and above all, real. "She does not say what you want to hear," Pascal says. "She says what she believes. Always with respect, but with clarity."

Although neither parent had the chance to do a board year themselves, they recognize the value of it. "You learn so much more than theory," says Pascal. "You learn how to translate that theory into something practical, something real." They only have good words for the way Asset | Econometrics is run by and for students, and they realize that Amy is building her network, independence and confidence.

When we asked about her brother, Roy, who also studies in Tilburg, they are leaving the path open. "Both have the same mindset, but we do not know yet if he will also do a board year," they say.

Nowadays we often measure success through GPA decimals, but the parents also see the value in balance. They see it as, study is important, but so are friendships, freedom and finding out what you like the most. "It does not all have to be serious," says Anne-Marie. "There is room for a warm dose of fun too."

In just an hour, we saw how Amy has found her place, and behind her, quietly but fully supportive, are her parents. Without needing to steer her, they have created a space for her to find what she likes to do most. ●



# Speed vs. Sustainability: Can the Train Become a Real Alternative for Flying?

written by [Marvin Priem](#)

**A** city trip to Barcelona sounds simple: catch a flight, land a couple of hours later, and you are in the city center before you know it. It is a journey for which few travelers would consider taking the train. And why would they? Flights are cheap: tickets from €46 are widely available. A train journey from Rotterdam to Barcelona, on the other hand, costs at least €133, takes around 11 hours, and often involves multiple transfers. But as climate concerns rise and Europe eyes a more sustainable transport future, the question becomes more urgent: can the train truly compete with the plane?

At first glance, comparing a two-hour flight to an 11-hour train ride seems

absurd. But upon closer examination, the gap begins to narrow. According to Sauter-Servaes (2019), air passengers spend an average of 157 minutes at airports, from check-in to boarding, while train passengers spend just 32 minutes in railway stations. That already gives the train a two-hour head start.

Moreover, airports are usually located far from city centers, requiring additional travel time and cost. In contrast, trains often arrive directly in the heart of the city. This makes rail travel particularly competitive on routes such as Amsterdam–Paris or Amsterdam–Berlin, where the total door-to-door journey time can be nearly identical to that of a flight.

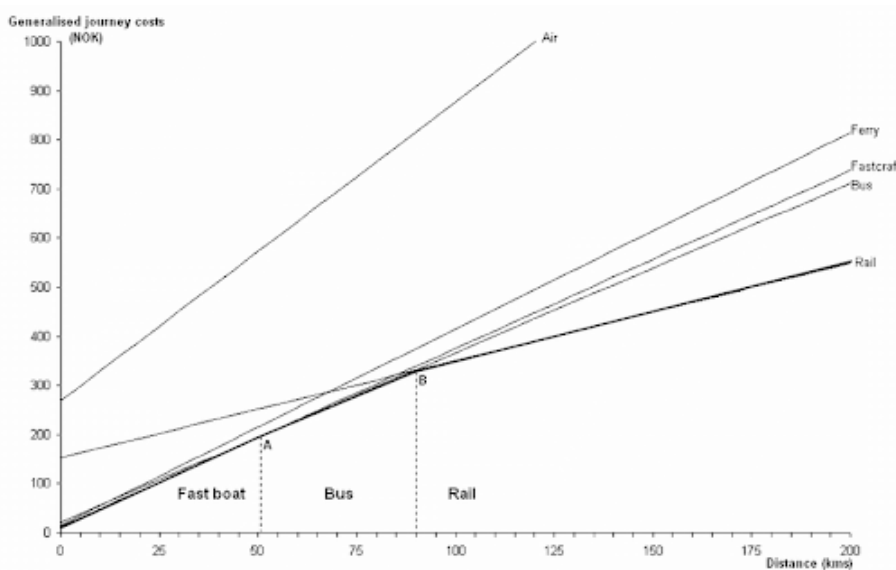
Despite these advantages, train tickets are often more expensive than flights.

In 2023, Greenpeace compared 112 intra-European routes and found that in 71% of cases, flying was cheaper. The train was the more affordable option on just 23 routes. However, this price difference varies by country. For example, rail travel to Germany or Poland may be less expensive, while travel to the UK is generally more costly.

A key factor in this disparity is tax policy. According to CE Delft (2019), flights benefit from VAT and kerosene tax exemptions, which give airlines a significant pricing advantage. If these subsidies were removed, the price of a flight from Amsterdam to Paris could increase by up to 25%.

When comparing transport modes, it is essential to look beyond the ticket price and consider the generalized cost of travel. This includes monetary costs as well as time, comfort, and convenience. Even if a train ticket is more expensive, it may still offer better overall efficiency by reducing time spent on airport procedures and transfers. The ability to board a train downtown and arrive in the city center at your destination adds significant value (Mandel & Rothengatter, 2000). Also, when the additional time catching a flight will take is represented in money value, the train may indeed prove to be the more cost-effective option.

An example of a generalized travel costs for a passenger, represented in Norwegian Krone (Mathisen, 2006)



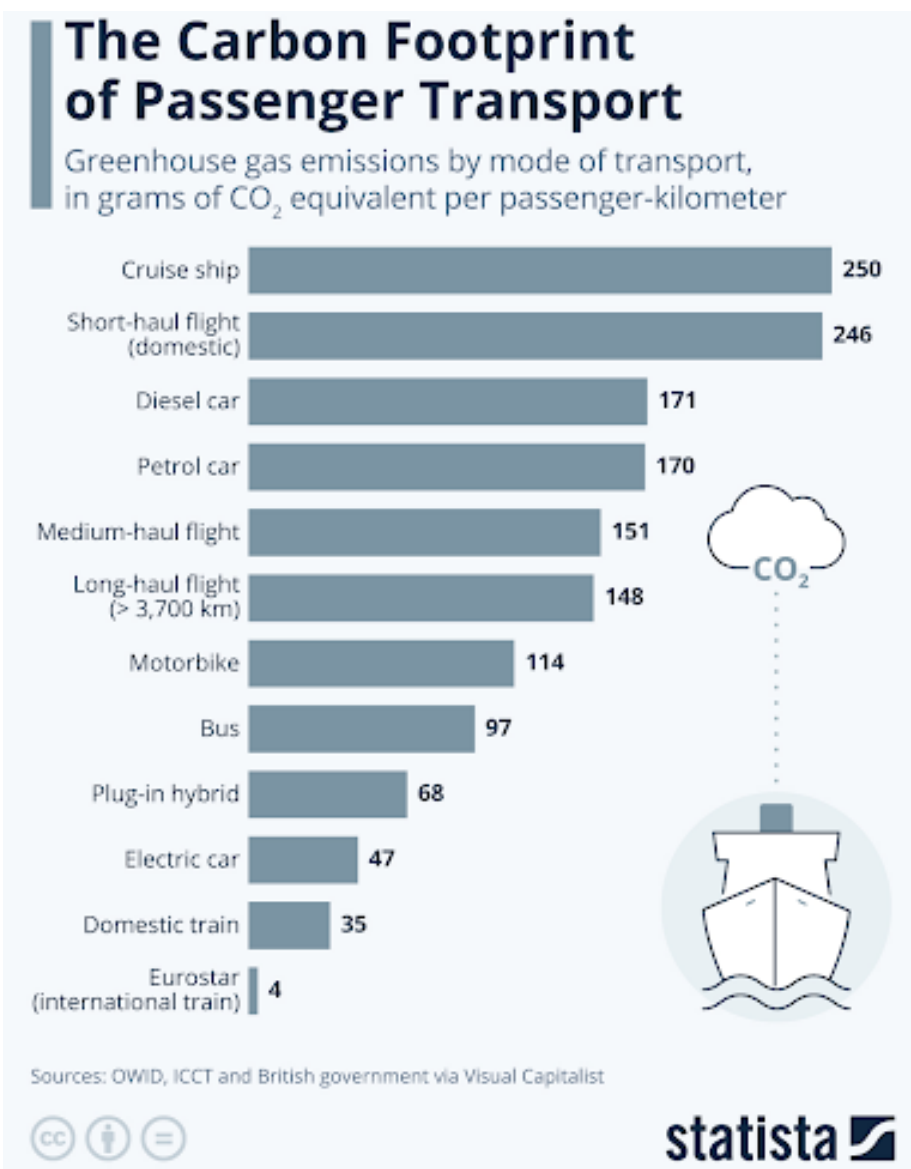
An example of a generalized travel costs for a passenger, represented in Norwegian Krone (Mathisen, 2006)

From an environmental perspective, trains are the clear winner. A short-haul flight emits about 246 grams of CO<sub>2</sub> per passenger kilometer, while a Eurostar train emits just 4 grams (Eurostar, 2021). Planes also generate significant noise pollution, especially around airports. If environmental and noise-related externalities were fully reflected in ticket prices, which is rarely the case for air travel, the cost balance might shift in favor of trains. Currently, only 60 to 80% of the external and infrastructure costs of short flights are reflected in their pricing (CE Delft, 2019).

Despite these environmental and logistical advantages, trains still struggle to compete due to fragmented infrastructure and regulatory inconsistencies. Europe's railway networks remain poorly integrated, with differing rail gauges, power systems, and signaling protocols. Operating international train routes is therefore technically and logistically complex. According to Nature and the European Court of Auditors (2018), Europe's high-speed rail potential is still underutilized, especially across borders.

Initiatives are underway to address these issues. The Trans-European Transport Network (TEN-T) seeks to integrate Europe's rail, port, and air transport systems. As part of the EU Green Deal, the objective is to increase rail use by 50% by 2030. Among several initiatives, the EU aims to implement a centralized European train booking system, similar to what exists for airlines. According to the European Commission (2021), this is a crucial step to make train travel more accessible and convenient.

But can the train truly become a preferred alternative to flying? Under the right conditions, it certainly has potential. A study by the University of Thessaloniki examined the Thessaloniki–Athens route and found that if travel times and prices were comparable, 63% of travel-



Comparison of different modes of transport (Statista, 2024)

ers would choose the train, 8% would probably choose the train, and only 29% would prefer to fly. Key reasons cited included avoiding airport waiting times, lower additional costs, and overall comfort.

Looking ahead, are there innovations that could further shift the balance? One futuristic concept is the Hyperloop, a near-vacuum tube transport system capable of reaching speeds over 1000 km/h. Though still experimental, this mode of transport could drastically reduce travel times, potentially rivaling air travel. However, widespread implementation is unlikely in the near future (Givoni & Banister, 2012).

More tangible examples can be found in countries like Japan and China. Japan's Shinkansen has been operational since 1964 and is renowned for its speed, punctuality, and reliability, with annual passenger numbers exceeding 150 million. Meanwhile, China operates the world's largest high-speed rail network, over 40,000 km as of 2023, with trains reaching speeds up to 350 km/h (Campos & de Rus, 2009). These examples show that with political will and sufficient financial investments, efficient long-distance rail systems are feasible.

For longer journeys, night trains may offer a compelling alternative to flying. These services allow passengers to travel

overnight, effectively removing concerns about travel time. While Europe once had a dense night train network, many routes were discontinued during the rise of low-cost airlines. However, since 2021, a revival has begun. Routes now connect the Netherlands with cities such as Vienna, Berlin, Prague, and Innsbruck.

Nevertheless, night trains face their own hurdles. Transport & Environment (2022) notes that high track access fees, shortages in rolling stock, and the complexity of crossing multiple national networks remain significant barriers. Routes such as Amsterdam–Barcelona are in development, but not yet operational.

At present, flights still seem faster, cheaper, and more convenient. Yet this perception is evolving. When total travel time, comfort, and environmental impact are considered, trains are becoming a serious contender—particularly for short-haul trips under 600 kilometers and overnight journeys between 800 and 1200 kilometers.

Significant barriers remain, especially in terms of cross-border infrastructure and market integration. However, if Europe succeeds in unifying its rail system, supporting sustainable transport, and eliminating market distortions, the train could become the preferred mode of travel for many in the near future. So, the next time you are planning a trip to Barcelona, you may want to give the train a second thought. ●

## References

- Campos, J., & De Rus, G. (2009). Some stylized facts about high-speed rail: A review of HSR experiences around the world. *Transport Policy*, 16(1), 19–28. <https://doi.org/10.1016/j.tranpol.2009.02.008>
- CE Delft (Van Essen, H., Van Wijngaarden, L., & Van Grinsven, A.). (2019). *Taxes in the field of aviation and their impact*. CE Delft. <https://cedelft.eu>
- Europese Commissie. (2021). *Sustain-*



Europe's current high-speed railway network: existing (red) and proposed (yellow) (Mijns cartografie en vormgeving)

- able and smart mobility strategy – Putting European transport on track for the future. *Directoraat-generaal Mobiliteit en Vervoer*. [https://transport.ec.europa.eu/transport-themes/mobility-strategy\\_en](https://transport.ec.europa.eu/transport-themes/mobility-strategy_en)
- Europese Rekenkamer (ECA). (2018). *A European high-speed rail network: Not a reality but an ineffective patchwork* (Special report no. 19/2018). <https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=46398>
- Eurostar Group Ltd. (2021). *Carbon emissions: Travel sustainably*. <https://www.eurostar.com/uk-en/travel-info/travel-planning/sustainable-travel/carbon-footprint>
- Givoni, M., & Banister, D. (2012). Speed: The less important element of the high-speed rail debate. *Journal of Transport Geography*, 22, 306–307. <https://doi.org/10.1016/j.jtrangeo.2012.01.013>
- Greenpeace European Unit (Hofrichter, A., & Witschge, L.). (2023). *Ticket prices on 112 European routes: Study on price comparison between rail and air travel*. <https://www.greenpeace.org/eu-unit/issues/climate-energy/46776/air-travel-study-europe/>
- Mandel, B., & Rothengatter, W. (2000). Generalised costs and transport modelling. *Transport Policy*, 7(1), 31–40. [https://doi.org/10.1016/S0967-070X\(00\)00014-7](https://doi.org/10.1016/S0967-070X(00)00014-7)
- Sauter-Servaes, T. (2019). *Mobility behavior and airport accessibility* [Doctoral dissertation, Technische Universität Berlin]. <https://opus4.kobv.de/opus4-tuberlin/frontdoor/index/index/docId/8853>
- Transport & Environment (Van Velzen, A., & Timmermans, C.). (2022). *Night trains: Back on track?* <https://www.transportenvironment.org/discover/night-trains-back-on-track/>
- Aristoteles University of Thessaloniki (Faculteit Transporttechniek). (2021). *Modal choice behavior on intercity travel: Rail vs. air transport*.

# Packing Data, Not Bags: What It is Like to Work at Booking.com

**O**n a bright Tuesday morning, I step into Booking.com's brand-new office on the Oosterdokskade. The building, opened in 2023, breathes innovation: they have apps for everything, from booking your lunch to reserving a meeting room. But the real showstopper is the atmosphere: greenery everywhere, a lot of daylight, and playful workspaces. We have seen football tables, a boxing area, and even a bouldering wall. Between meetings, you can dive into one of three restaurants for a rotating lunch menu. On the menu this Tuesday for us: a vegetarian shawarma with naan and vegetables, and a bavarois with fruit.



I talk with three employees involved in the Early Careers Program: Gaby, responsible for the program itself, and data scientists Henk-Jan and Ani. They make up one of ten employees from the annual cohort that starts in September. They started in 2023 and are currency in the role of data scientists, after a selection process including online tests, technical cases, and assessment interviews. Over twelve months, they follow a learning trajectory, join collaborative sprints, and build their professional profile, before choosing a permanent role as either data analyst or data scientist. There is a separate program available for software developers.

## From University to Practice

For many, the leap from academic theory to the corporate world is substantial. "At university you learn advanced models," says Henk-Jan, "but here it is about applicability. You must understand in advance what is and is not possible within the company, otherwise you will recommend something unfeasible." Ani adds: "And the most important thing? Explaining what you have done in plain language. Stakeholders, marketing managers, and legal teams do not understand statistical jargon. You act as a bridge between technology and business."

Those soft skills are explicitly developed during the Early Careers Program. In the first three months, graduates attend workshops, are assigned a buddy, and work on a joint onboarding case. Only



after this onboarding case they dive into real projects, always supported by experienced colleagues who patiently answer questions. "I have never heard anyone say 'no' when I asked for help," laughs Henk-Jan.

## Experimentation at Scale

Booking.com is a global platform with millions of users. That provides unique opportunities to truly test hypotheses. Ani describes a YouTube advertising experiment: "We wanted to know if 'view-through-impression' attribution yields more bookings. Since YouTube offers that feature only per account, we ran four comparable markets across two accounts against each other. That way we could isolate the effect."

On Facebook and TikTok, similar tests are run via a Conversion Lift Study in a "clean

room” -a secure environment where Booking.com’s first-party data and platform data are combined without revealing individual users. “Privacy regulations are strict,” explains Ani, “so we work only with aggregated figures. If a group becomes too small, you see nothing.”

### From Button Color to Pet Filters

Although the statistics are sometimes advanced, the results are not always high-tech. A direct-impact example: adding a “traveling with pets?” filter in the app. User research showed travelers often look for this, but the existing UI did not highlight the option. After several A/B tests, the filter ended up prominently on the homepage. A small change, with measurable effects on conversion and customer satisfaction.

Moreover, every analyst is assigned a clearly defined area of the platform to focus on, enabling them to become domain-specific experts.

### Measuring Success

How do you know your work pays off? Henk-Jan often works in four-week sprints. “I block time in my calendar so I am not overloaded with meetings,” he says. “I usually have two to three hours of meetings per day, the rest of the time is spent working on dashboards or recommendations.” Success is judged quantitatively and qualitatively: “We measure uplift (how many extra bookings an ad generates) and ask stakeholders if the dashboard is useful.”

### Tips for Econometrics Students

What advice would you give students aiming for Booking.com? “Technically, econometrics students are in good shape,” says Henk-Jan. “Do learn data engineering: how pipelines work, how to clean and make data available. You hardly do that at university.” Ani emphasizes soft skills: “Practice presentations, learn to collaborate, translation skills are your superpower.”



If you want to compete for the Early Careers Program, watch the careers site in February and prepare for a HackerRank test, a recruiter call, and an assessment day in Amsterdam. With only ten spots per year, competition is fierce, but the reward is a year of learning, networking, and making an impact at one of Europe’s leading tech companies. Another unique aspect of the Early Careers Program is that it is open to both Bachelor’s and Master’s graduates. Particularly appealing for international applicants: Booking.com helps with and covers the cost of your visa.

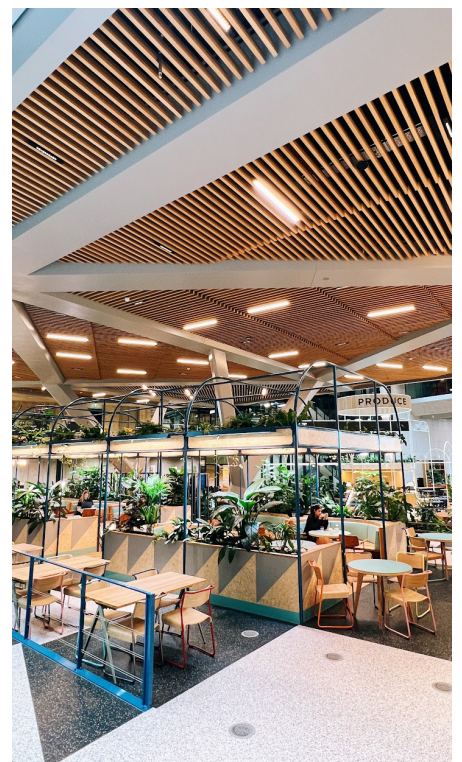
### The Future: GenAI and Beyond

What is on the roadmap for data analysts? Generative AI is undeniably hot: internally it is used to write code and prepare analyses. “It speeds up routine tasks, generating charts, writing code templates, so we have more time for the core: what questions do we ask and how do we translate insights to the business?” says Henk-Jan. At the same time, they warn against blind trust: “GenAI helps, but it does not grasp nuances. You always have to verify yourself.”

Meanwhile, the role of qualitative analysis is growing: chatbot interactions, unstructured data, and new privacy challenges call for creative statistical solutions. “Measuring success is becoming

more complex,” concludes Ani. “But that is what makes the job so dynamic: you work at the intersection of technology, people, and business.”

As I walk outside and look at the Amsterdam skyline, one impression remains: at Booking.com, data analysis is not always about the most fancy models, but about people, colleagues, stakeholders, and travelers. Bridging the gap between numbers and decisions is where the real challenge, but also the greatest satisfaction lies. ●



# Bridging Ethics and Economics

**"Economics cannot do without ethics; any economic advice rests on values," says Professor Johan Graafland, who we all know from our Philosophy of Economics and Economic Ethics course. During the conversation we found out how he combines multiple fields of study into one course, and how he came into this position.**

Johan Graafland now works for 25 years as Professor at Tilburg University, but before this he has seen many different things throughout his career. He started his career at the Centraal Plan Bureau, as a mathematical economist, whilst also studying Theology in his free time. "Next to my job as head of a department I studied in my free time," he says. After this position he got a job at Tilburg University "Thanks to my background in economics and theology and the Christian perspective on economics."

His dual identity as both economist and theologian gave him a unique vantage point. "To my surprise, I was selected to lecture on a profile that combined Christian thought and business ethics. It was an unusual match, but a very fruitful one."

Before transitioning fully into academia, Graafland was asked to apply his ideas in the corporate world. In his first three years at Tilburg University he worked one day a week in corporate life, first at C&A and after at Heijmans. This placed him truly in between the ethics discussed at school and real-world business dilemmas.

His time at C&A had two different purposes, on the one hand it was a learning process for Graafland, where he got to see the internal organs of C&A not only locally but also internationally. But on the other hand, he had to write a report about all that he saw from an ethical

viewpoint. Later he even wrote an academic paper about the report he wrote for C&A.

At Heijmans, he was tasked with assessing the company's code of conduct, and for this he interviewed division directors. "Eleven said everything was fine. But the twelfth admitted that things sometimes went wrong in construction," he recalls. "Not long after, the construction fraud scandal hit the news, and my report was suddenly in the spotlight."

During his time at the companies he did not only learn a lot, but he also provided the companies with valuable insights into their ethics. And with the reports and things he found he later wrote academic papers.

Professor Graafland of course teaches us Philosophy of Economics and Economic Ethics, but at Tilburg University he teaches more courses, and smaller theology lectures. "The big lectures can be quite distant," he admits, "but I love the more personal interaction in thesis supervision. That is where you really get to know the students."

Supporting students with their Master thesis he finds the most exciting, since this brings out the most personal interactions, "When writing a thesis over the course of a couple of months you really get to know your students, which I find a lot of fun," he says.

He likes the way his days at Tilburg University are set up now, the mix between lectures and teaching, and doing research. He tells us about how this mix makes his work more challenging, thus making it more fun for him. At Tilburg University it is expected that you publish at highly noted publishers, which makes his research more demanding. Teaching and lecturing gives them a breath of fresh air in between research.



**Johan  
Graafland**

Graafland always wants to let his economics students understand the ethical dimensions of their work. Most of the advice or reports you will have to give when working, will have a certain ethical loaded background, which in most cases when not thought about you will not realize. "Economists often do not realize how value-laden their advice is. If you are influencing public policy, you are in a value debate, whether you like it or not." Graafland once did a test on whether his course changes the perspective of students. Inspired by Robert Frank's claim that economics students become more self-interested over time, he designed a small questionnaire.

"I asked students about their value orientation at the start of the course and then again after twelve weeks," he explains. "The results showed a noticeable shift



toward more socially-minded answers. It was small, but meaningful.”

Though he never followed up with a full study, the outcome encouraged him. “It showed me that a good ethics course can really influence students’ thinking.” Graafland emphasizes the need to challenge both economists and theologians. “Economists often neglect the moral consequences of their work, while theologians sometimes overlook the economic feasibility of their ideals,” he says. “I try to help both see the other side.” He sees that he can help economics students to be more aware of the ethics side of their study, but he also helps his theology students to be somewhat more economically minded.

Graafland is also not fully supportive of the dominant economic model of Homo Economicus, the rational, self-interested agent. “It is elegant, mathematically clean, and useful for modeling. But behavioral economics has shown us that people are often driven by fairness or emotion, not just utility.

Now nearing retirement, Professor Graafland reflects on a fulfilling career. For decades, he balanced teaching, research, consulting, and volunteer work, all while maintaining a 50-hour work week. “It has

been intense, but I have always found energy in my work.”

Graafland does believe courses on ethics should be taught earlier in the curriculum. “Some students tell me how much they enjoy my class, but they only get it in the third year. That is a shame. The earlier they start thinking about values, the better.”

For him, it is not just about teaching content, it is about broadening perspectives. “Economics students need to understand that their models influence

the real world. And with that influence comes responsibility.”

Professor Johan Graafland has spent his career at the crossing between economics and ethics. Whether this was in lecture halls, corporate settings, or academic journals, his work has always been at this crossing. By challenging students to critically think about morals and ethics, he has shaped many economists who recognise now that the numbers and models they use are never free of values, and that true expertise includes moral reflection.●

## Bert & Ernie Questions

Bert or Ernie	Bert
Teaching or Research	Both
Tilburg or Gouda	Gouda
Wine or Beer	Wine
French Fries or Pancakes	Pancakes
Mental Arithmetic or Calculator	Mental Arithmetic
Economics or Theology	Economics



ASSET



Econometrics



# A Long Journey

written by **Henk Norde**

A caterpillar is sitting at one end of a rope that is 1 meter long. It wants to reach the other end and crawls forward at a speed of 1 centimeter per second. At first glance, this seems like a simple task. However... the rope is elastic. After each second of crawling, the rope stretches instantaneously, increasing its length by 1 meter. So after 1 second, the rope is 2 meters long; after 2 seconds, it's 3 meters long, and so on. You may assume that the caterpillar has zero length, lives forever, and that the rope can stretch infinitely.



The question now is: will the caterpillar ever reach the end of the rope? If you believe the answer is yes, please also indicate how long the caterpillar's journey will take.

## Answer on page 27-28!

# Active Members Weeked

written by **Nick Drost**

**A**MW, or Active Members Weekend, is the annual weekend getaway organized to thank all active members of our beautiful association. As every year, only the committee knows what we will be doing and where, although there are some traditions associated with this weekend. Customary is that each group dresses up in their outfits on Friday morning and has a nice breakfast together to start the weekend off right.



word search we knew quickly that we were to take the train to the city of Eindhoven. Once in Eindhoven, we had to perform multiple tasks at well known spots in the city which all contributed to us finding out we had to take a local bus to Eersel.

At the end of the afternoon, after soaking up the sun on a terrace, we took this bus and had a walk through the picturesque fields of Eersel to ultimately arrive at our home for the weekend. To my pleasure, I found that we had a big field in the back yard to hang out and play some fun games. The weather was great all weekend so we spent a lot of time outside! The first night, after we had gotten settled, we had a nice dinner consisting of fries and snacks after which we had the traditional cantus.

The next morning, we had breakfast together to relive the memories of the first night and gather energy for the

day, which consisted of a rotation of fun games which all counted towards this weekend's point system. We played Mario Kart, minefield and we had a face paint face off, among others. The face painting resulted in some very funny looks. The second night we had delicious burgers and a fun pub quiz which was particularly fun because of the music rounds. At the end of the night we set out for the center of Eersel to mix in with the local population for some clubbing.

Finally, as per usual, after our cleaning duties on Sunday morning, we went back to Tilburg for a chill afternoon of swimming. Of course, the swimming was paired with fries, a snack and some lemonade. This always takes me back to the "kinderfeestjes" from my primary school time, very nostalgic. I had loads of fun and I want to thank the Active Members Weekend committee for their efforts to make this an unforgettable weekend once again. ●

The theme this year was historical time frames, so our group was given the Wigs and Revolutions theme. As a result, we all dressed up in dresses and extravagant wigs, leading to some very funny looks. Mary Antoinette would have been proud of us. Some other group themes were: world wars, knights and Greeks and Romans. After breakfast, everyone gathered on campus to receive the first instructions for finding out this year's location. After solving a



# Fighting Food Waste at the

**ZERO  
HUNGER  
LAB**



**A**t the Zero Hunger Lab, which is part of Tilburg University, we believe that data science can help create a fairer and more sustainable food system. From food supply chains and food aid logistics to predicting hunger in crisis zones, the lab applies mathematical and data-driven methods to real-world challenges. One of the areas we focus on is food waste: a problem that intersects with hunger, sustainability, and the global food economy.

In this article, we highlight two recent research projects within that theme. The first is a PhD project on reducing supermarket food waste using optimization models. The second is a Master's internship focused on developing automated responses to kitchen waste insights at Orbisk, a Dutch company that helps professional kitchens cut their food waste using AI. But first, we would like to provide insight into why this is a world-wide problem.

## Understanding the food waste problem

A staggering amount of food is wasted worldwide. Roughly one third of all food produced for human consumption is never eaten. This adds up to over a billion tonnes of food lost or wasted every year.

While households generate the largest share, a significant portion also comes from commercial settings. Food services such as restaurants and catering facilities are responsible for over a quarter of global food waste, and retail outlets like supermarkets contribute another 12%. In the European Union, total food waste exceeds 59 million tonnes annually, equivalent to about 132 kilograms per person.

This waste has wide-ranging consequences. Environmentally, food waste puts pressure on scarce natural resources like water, land, and energy, and is estimated to account for about 16% of total greenhouse gas emissions from the EU food system. Ethically, it highlights a

deep imbalance: millions of people still lack regular access to nutritious meals, while vast quantities of edible food are discarded. Economically, food waste represents a loss of around €132 billion each year in the EU alone. In response, the European Union and the United Nations have committed to Sustainable Development Goal 12.3, which aims to halve per capita food waste at the retail and consumer levels by 2030 - and to reduce food losses across the entire supply chain.

Food loss and waste occur at every stage of the food supply chain, from production and processing to retail, food services, and households. Causes range from pests, weather, and market conditions in farming, to factors like over-purchas-



ing, confusing date labels, portion sizes, packaging issues, and stock management challenges further down the chain. Often, these issues are compounded by a widespread lack of awareness about the scale and consequences of food waste, which makes addressing the problem even more challenging.

### Reducing supermarket waste through optimization

Supermarkets face persistent challenges in reducing food waste, particularly with perishable products. Spoilage is a significant problem: Fresh items such as fruits, vegetables, dairy products, and meat have limited shelf lives, and unsold inventory often gets thrown away. Price discounts are a common tactic for selling products that are nearing their expiration date. This allows consumers to choose between fresher, full-price items and discounted ones that are closer to their expiration date. While this can help reduce waste and provide value to shoppers, it does not always solve the problem. Alternative approaches, such as "surprise bags" offered through platforms like Too Good To Go, have gained popularity by bundling unsold items at a discount shortly before closing time. While these bags help prevent food from being thrown away, their contents are usually assembled based on availability rather than usability. This means the products may not go well together or may be difficult to turn into a meal. Consequently, this approach risks shifting the food waste problem from retailers to consumers.

At the Zero Hunger Lab, Liana van der Hagen and Joris Wagenaar are exploring ways to reduce food waste in supermarkets. They are developing an optimization model that creates recipe-based food boxes using products nearing their expiration date. The idea is the following: instead of offering discounted items separately, the model bundles expiring products together with a few complementary

ingredients to form complete recipes. This offers consumers a structured and convenient solution, a clear plan for how to use the food they purchase. As a result, the likelihood that all items will be consumed rather than discarded later at home increases.

### Recipes that prioritize expiring products

The model generates these recipe-based boxes by using data from individual supermarkets, including which products are about to expire and what is currently in the store's assortment. A set of recipes forms the basis of these boxes, but interpreting ingredient requirements is not straightforward. Supermarket assortments are diverse, and there is often flexibility in which products can be used for a given ingredient. For instance, a recipe that requires salmon might work well with salmon with and without skin, but not with smoked salmon. Similarly, a recipe with tomatoes might allow for plum or vine tomatoes, but not cherry tomatoes. The suitable substitution of products depends heavily on the recipe and can be very subjective. The model accounts for this by allowing multiple eligible products per ingredient. These products are identified by employing embedding-based text similarity methods to match product names with ingredient descriptions. It then selects combinations that prioritize the use of expiring products while ensuring that the recipes remain complete. Additionally, the model incorporates requirements, such as limiting the quantity of certain ingredients, to prevent excess waste in consumers' homes. It can also ensure that enough expiring products are included, and that non-expiring products are kept to a minimum, to enable supermarkets to offer the recipe at a discounted price.

In practice, implementation could take the form of a recipe suggestion card based on items that are about to expire that day. Rather than relying on product



## Liana van der Hagen

Liana van der Hagen (1996) is a postdoctoral researcher at Zero Hunger Lab, where her research focuses on using optimization to reduce food waste in retail. She studied econometrics at Erasmus University Rotterdam and obtained her PhD at the same university. Before starting her PhD, she briefly worked as an operations research engineer at ORTEC.

discounts or surprise bags that focus on clearing stock without considering meal planning, this approach emphasizes providing thoughtful and practical recipe solutions. Another way to approach this is: instead of starting with a fixed set of recipes, one could identify which meals best utilize products that frequently go unsold. This approach enables supermarkets to offer a selection of popular, tailored recipes while taking inventory patterns into account, helping to better match demand with products that often go unsold and reduce waste.

### Tackling food waste in professional kitchens

A significant amount of food waste occurs in restaurant, hotel, and catering



## Laurens te Booij

Laurens te Booij (2001) is a Master's student in Business Analytics and Operations Research at Tilburg University. He is currently working on his thesis in an internship collaboration between Zero Hunger Lab and Orbisk.

kitchens. These businesses face unique challenges, such as unpredictable demand, large volumes, and tight preparation schedules. Understanding where and why food is discarded is the first step toward reducing this waste. During his Master's internship at the Zero Hunger Lab, Laurens te Booij is exploring this topic in collaboration with Orbisk.

### Measuring food waste patterns

Orbisk addresses food waste through equipping professional kitchens with AI-powered imaging devices. These devices are mounted above a disposal bin and use sensors, a camera, and a scale to automatically record discarded food. As kitchen staff dispose food the device captures an image and logs the items' weight. Followingly, image recognition models are used to accurately annotate the individual ingredients from the image. This results in ingredient-level waste data and allows for the identi-

cation of high-volume waste patterns, which can reveal ingredient-level inefficiencies and give a better understanding on why food is wasted. The patterns are used to design targeted intervention actions that enhance kitchen sustainability. However, currently, the exploration of the data and curation of intervention actions partly requires manual work from Orbisk's Food Waste Coaches (FWCs). For example, a FWC might notice increased croissant waste during breakfast buffet service and suggest reducing croissant buffet replenishment near the end of service. This approach has proved effective and Orbisk is looking to enhance their advice given with the use of generative AI trained on proven reduction actions and targets.

### Automated suggestions for food waste reduction

Laurens' research focuses on automating the insight and action recommendation steps of the process. The goal is to build a data-driven system that takes a client's raw waste data as input, finds patterns, and outputs targeted intervention actions to reduce their waste. These patterns highlight where waste consistently occurs and are ranked based on their potential for reduction. Pre-trained Large Language Models (LLMs) are prompted with a combination of the extracted insights and a client-specific context and tasked with generating tailored intervention actions based on this input.

To evaluate the practical value of the proposed solution, we must rigorously test its output. Particularly because LLMs are known to generate output with a degree of randomness. Assessing the extent of this variability is essential. For instance, does the LLM generate entirely different actions when given the same input, or are the differences just in wording? And, how confident is an LLM in its own output? Additionally, the generated intervention actions should be compared to those historically implemented by Orbisk. For



example, do their distributions overlap, or does the LLM uncover novel strategies? Finally, qualitative feedback comes from expert evaluations by FWCs, who assess the relevance and feasibility of generated actions.

This project not only supports Orbisk's and the Zero Hunger Lab's shared mission to reduce food waste but also aims to demonstrate how AI, and more particularly LLMs, can be used by organizations as decision support tools. ●

Want to know more?



Interested in writing your master thesis at Zero Hunger Lab?

Contact Frans Cruijssen at:  
[frans.cruijssen@tilburguniversity.edu](mailto:frans.cruijssen@tilburguniversity.edu)

# Giving Back to Tilburg

**O**ver the past year, the three most successful activities organized by our study association all came from the same heroic group: the Econometrics for Society committee.

The committee consists of five amazing members and Rebecca. We each have our roles, which we were more or less stuck to. Anne is the chairwoman, our leader and the keeper of calendars. Anna, our promotional officer, makes sure our events are fuller than the overcrowded "domibo's". Elise, the treasurer, keeps a close eye on the budget. Thom is our external, keeping contact with all the organizations. Rebecca coordinates everything and makes sure no one forgets to show up. Lastly there is me, the secretary, typing up the meeting minutes and apparently this article. Lucky you.

Over the past school year, we managed to organize not one, not two, but three incredible events. All the events were focussed on giving back to Tilburg.

Our first event was a bingo, and not just any bingo. We reached out to countless organizations in Tilburg and were blown

away by their generosity. We managed to gather many prizes, from a signed football from Willem II (back then an Eredivisie club) to vouchers for escape rooms, pool sessions, and even pole dancing classes. That last one raised a few eyebrows, but charity knows no boundaries. Thanks to the incredible support, we raised an impressive 552 euros. All proceeds went to Hart van Brabant, a local animal shelter. Shout-out to Nick, our most committed participant, who bought by far the most bingo cards. Meanwhile, Lina cleaned house, winning more rounds than anyone else. We are not saying she practices bingo daily, but she was suspiciously good at this.

Our second event took a slightly more active turn. We helped out at the Voedselbank (food bank), stocking shelves. We brought a motivated team and were so fast, a few supermarkets asked if we were available for part-time shifts. We politely declined, because of having to do a lot of studying (read: sleeping).

And then came the grand finale, the cherry on top: the legendary Fox Hunt at De Wever elderly home. This was a big success. We had a group of students



**Peter de Groot**

**Master BAOR**

Age: 24

dress up as silly characters like the Easter Bunny, ice cream man or Polaroid paparazzi. The elderly residents roamed the grounds with the remaining students, searching for these foxes hiding around the complex. Each time they found one, they received a letter and a treat. Treats were things such as chocolate eggs, flowers, or a picture. If they had all the letters they needed to form a word with it.

After the hunt, we gathered on the terrace for drinks and good vibes in the sun all around. The vibes were even stronger because of an organ player (orgelman) and an ice cream stand arranged by de Wever. We wrapped up the event with a pizza session at the Spopa (slang for Spoorpark).

Looking back, it is no wonder we were awarded Best Committee. Every event was a mix of planning, passion, and just the right amount of chaos. We had a lot of fun and in the end we made a real impact. ●



# Let's Talk!

We asked several students some open-ended questions on their university commute and their (public) transport experiences.

written by **Timo van Oorschot**

## How do you usually get to campus?

"Since I do not live in Tilburg yet, I have to do a three-method commute, cycling to a bus station, taking a bus to the train station and then reaching Tilburg by train."

"Obviously the bike, since it is the only choice you have living in Tilburg aside from taking the bus, but this is mostly slower than biking to university."

## Are you often late due to transport issues?

"Not very often. I always make sure to catch the train that arrives early so that I have enough time left in case of a delay."

"I am, but when I do arrive late, the reason is mostly that I tend to over-estimate my cycling speed rather than transport issues."

## Would you prefer waiting 30 minutes for a 5-minute bus ride or a 30-minute walk to the same destination?

"I am really impatient, so I think I would actually prefer the 30-minute walk so I do not get bored."

"I can totally spend those minutes working on an assignment, so I think I would prefer the wait."

## Have you ever studied while travelling by train?

"No, I have not. My commute contains some transfers from train to train, so the amount of time I have in separate trains is very limited."

"I regularly do, but I am pretty lucky that I only have to travel back home using one train without any transfers."

### Did you once miss the last train back home, having to wait 5 hours in the night for the next one?

"I did take the first morning train once, but that was completely on purpose. We still had to wait for one and a half hours after a night out, which was horrible, but at least it is better than missing the last train in the night."

"Yes I did, but luckily I could stay at a friend's place last minute. Otherwise I would have taken a taxi, but that is quite expensive."

### Have you once lost a bike?

"One, which was in Tilburg and I do not even live there yet. I would recommend not parking it at the central station."

"In Tilburg, two or three already, and on all occasions I lost it after going for a night out."

### What is the weirdest moment you have ever experienced public transport?

"Our train had a defect once in the middle of nowhere, so we got out and had to cross the rails in order to catch a bus to the nearest station."

"I once sat in front of a person calling somebody, saying loudly that he got out of a lawsuit."

### What is your biggest public transport frustration?

"People that call others in a very loud manner. It is not that hard to keep your tone a little more down I believe."

"Definitely the people placing their bags on a seat during the rush hours, who arrogantly look at you when you ask them to make some space for you."

### What would be the optimal transportation for you?

"Teleportation. It would save so much time!"

"I would like to have an electric bicycle as a bicycle is more useful in the city, if they were not stolen every time you park it at a public place."

## Solution of “A Long Journey”

After 1 second the caterpillar has moved 1 centimeter, so it finished  $\frac{1}{100}$ -th fraction of the rope. Then the rope stretches, not affecting the fraction of the rope the caterpillar has finished. During second 2 the caterpillar moves again 1 centimeter, finishing an extra  $\frac{1}{200}$ -th fraction of the rope (which now has a length of 2 meter). Then the rope stretches, again not affecting the fraction of the rope the caterpillar has finished. During second 3 the caterpillar moves again 1 centimeter, finishing an extra  $\frac{1}{300}$ -th fraction of the rope, etcetera. So, the question is whether

$$\frac{1}{100} + \frac{1}{200} + \frac{1}{300} + \dots$$

is larger than 1. To be more precise, the question is whether there is a natural number  $n$  such that

$$\frac{1}{100} + \frac{1}{200} + \frac{1}{300} + \dots + \frac{1}{100n} < 1$$

and

$$\frac{1}{100} + \frac{1}{200} + \dots + \frac{1}{100n} + \frac{1}{100(n+1)} \geq 1.$$

If so, this  $n$  is unique and the caterpillar will reach the end of the rope during second  $n + 1$ . Multiplying everything by 100 the question be-

comes whether

$$1 + \frac{1}{2} + \frac{1}{3} + \dots$$

is larger than 100. To be more precise, the question is whether there is a natural number  $n$  such that

$$1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n} < 100$$

and

$$1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n} + \frac{1}{n+1} \geq 100.$$

Wow, we recognize the harmonic sequence  $1, \frac{1}{2}, \frac{1}{3}, \dots$  here and we remember from Mathematical Analysis 1 that the sum of this sequence is infinite. So, we have a partial answer to the problem: **yes**, the caterpillar will reach the end of the rope. But how long will it take?

Let us do some simple calculations. If you draw the graph of the function  $\frac{1}{x}$  for  $x \in [1, +\infty)$  you quickly see that for every natural number  $n \geq 2$  we have

$$\int_1^{n+1} \frac{1}{x} dx < 1 + \frac{1}{2} + \dots + \frac{1}{n} < 1 + \int_1^n \frac{1}{x} dx,$$

so,

$$\ln(n) < \ln(n+1) < 1 + \frac{1}{2} + \dots + \frac{1}{n} < 1 + \ln(n),$$

so,

$$0 < 1 + \frac{1}{2} + \cdots + \frac{1}{n} - \ln(n) < 1.$$

From this we derive that the  $n$  we are looking for is in between  $e^{99}$  ( $\approx 9.89 \times 10^{42}$ ) and  $e^{100}$  ( $\approx 2.68 \times 10^{43}$ ). We can make the answer a little bit more accurate. It is not difficult to see that the numbers

$$1 + \frac{1}{2} + \cdots + \frac{1}{n} - \ln(n)$$

are decreasing in  $n$  (look again in a smart way at the graph of  $\frac{1}{x}$ ). As these numbers are between 0 and 1 they must have a limit. This limit  $\gamma$  is known as the constant of Euler-Mascheroni and is approximately

$$\gamma \approx 0.57721566$$

This leads to a better approximation of our solution:

$$n \approx e^{100-\gamma} = e^{99.42278434} \approx 1.51 \times 10^{43}.$$

A standard year has 31,536,000 seconds. So, it takes the caterpillar about

$$\frac{1.51 \times 10^{43}}{3.1536 \times 10^7} \approx 4.79 \times 10^{35} \text{ years}$$

to reach the end of the rope.

# Nekst Advice

The fun part of student life is all the unique experiences packed into a few intense years. From wild parties that stretch into sunrise, to meeting new friends through your study, sports team, or association. From living on your own for the first time to figuring out who you really are, these are the moments that make your student years unforgettable.

But let's be honest: it is not all sunshine. Student life also comes with its fair share of challenges. That is why, starting with this edition, I will be sharing some tips to help you tackle common student struggles and make life just a bit easier. This time, we will kick off with a very familiar issue: not having enough money.

The truth is, all those great activities, clothes and nights out tend to come with a price tag. Personally, if I do not keep myself in check, I'd spend my entire month's budget in the first week and by Monday of week two, I would have no idea where it all went. That is why tip number one is: get insight into your spending.

It sounds cliché, but it really does help. Everyone has their own style, so try a few different approaches and see what works for you. You could:

- Create your own Excel spreadsheet, with an overview of your budget in the first tab and more detailed breakdowns in separate tabs.
- Look up free online budget templates, you will find plenty that are student-friendly.

## EXTRA tips

1	Buy your fruit and vegetables at the market, it really is way cheaper there than in the supermarket. And there are no excuses to not go there as almost every day there is a market in Tilburg.
2	Look for a job which is either really well paid, fun, flexible or in line with the study. If it is none of those, maybe it is time to look for something new.
3	When planning for a festival where ticket prices peaked. Investigate if you get free entry when you work one day at the festival. If this is the case you get free entry and earn extra income with a fun day.
4	Personal favorite: always keep an empty crate of beer for when you really run out of money, then you can return it and buy a loaf of bread and a jar of jam.

- Use an app like Dyme, or the budgeting tools in your bank's app.
- If you are feeling ambitious, you can even try dedicated budgeting software.

Whichever method you choose, the key is to find something you will actually stick with. A one-time budget that you forget about a week later won't do you much good.

Once you have a better overview of your spending, you can identify where things go off the rails. Are you ordering out too often? Buying coffee every day? Impulse shopping? Seeing the numbers laid out helps you take control.













Your wallet may be empty, but your student life does not have to be... just budget smart. ●

Club	Budget	Rent	Groceries	Subs.	Transport	...
<b>Income</b>			<b>Spending</b>			
Loan		600	Rent			380
Parents		350	Groceries			500
Healthcare Benefit		150	Clubbing/festival			200
DUO		400	Subscriptions			50
			Transport			100
			Insurance			150
			Sport			30
			Holiday			95
			Asset   Econometrics			5
			Other			90
<b>1500</b>			<b>1600</b>			

# Puzzle Time

written by Stans Sonderkamp

At a particular busterminal the buses do not know where to position themselves. Your job is to tell the buses which square to go to. Here it is important that every bus stop has exactly 1 bus directly next to it and no 2 buses can touch (also not diagonal). The amount of buses in each row and column has to be equal to the number assigned to this row or column. Can you help? If you give all the buses the correct stops, you can find the hidden message.

		2	1	2	2	1	1	1	2
1									
2									
0									
3									
1									
1									
3									
1									

h	m	e	r	c	q	i	p
d	i	g	o	d	t	d	s
t	c	a	s	w	p	r	u
c	a	e	k	c	r	u	o
m	n	e	l	m	t	a	l
t	i	o	p	a	r	o	n
l	o	l	e	b	e	l	t
u	a	e	g	p	i	a	b

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...on obtaining their  
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# Quatsch!



## Quatsch?

Over the past few months, the editorial staff of Nekst received many quotes that relate to the study of Econometrics and to the activities organized by Asset | Econometrics. Hereby, we present to you a selection of some striking and funny quotes! Please send in your quotes at: [www.Asset-Econometrics.nl/more/nekst/Quatsch](http://www.Asset-Econometrics.nl/more/nekst/Quatsch)

**Sanne**

"Ben je blij dat je weer mag praten."

**Siebe**

"Ja maar ik heb eigenlijk niet zoveel te zeggen."

**Siebe**

"Dat is echt de club waar Famke en Louise naar toe gaan"

**Thom**

"Nee het feest was niet glow in de dark. Alleen alles gloeide"

**Ewout**

"Oh die zijn Roomba aan het doen"

**Hedser**

"Bedoel je Zumba"

**Matthijs**

"Ga je ook harder als je harder gaat fietsen."

**Hedser**

"Guus is echt een enigskind, maar dan met een zus"

**Sanne**

"Volendam is toch Zeeland?"

**Laurentien**

"Dat ligt toch in het Oosten?"

**Matthijs**

"Ik ben geen kip ik ben autistisch"



# Agenda

## THU Members Day

18  
SEP

Save the date! The Members Day is the first official event of the year, welcoming all members to kick off the new semester together. More information will follow on what the activity will be, but it will be the perfect start to the year, setting the tone for many more activities to come.



## THU Power BI Training

25  
SEP

During this training, you will learn to build professional dashboards just like a real consultant. This training will cover the fundamentals of PowerBI, including data import, data modeling, and visualization techniques.



## WED R-Studio Training

24  
SEP

During the R - Studio training, participants are introduced to the basics of data analysis and visualization using R. The session combined hands-on exercises with practical tips, making it accessible even for beginners.



## TUE EOR Business Dinner

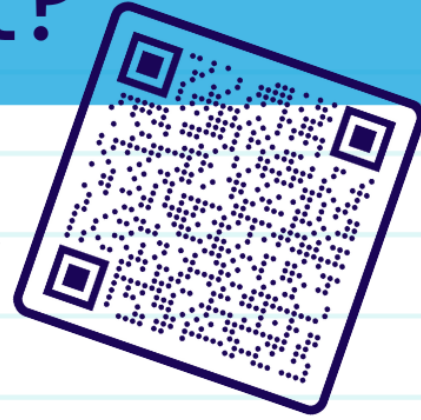
30  
SEP

The EOR Business Dinner is a recruitment dinner for all third-year students and higher. Each company will provide a presentation about themselves, and we will enjoy a three-course dinner. During each course, you will sit at a table with a different company. We conclude the event with a networking drink.

Register and find more information about our events at  
[www.Asset-Econometrics.nl/Students/Events/Info](http://www.Asset-Econometrics.nl/Students/Events/Info)

# In need of some extra study support?

Buy a guideline!



## ASSET Econometrics

- Introduction Analysis and Probability Theory
- Linear Algebra
- Advanced Linear Algebra
- Introduction Mathematical Economics
- Games and Economic Behavior
- Games and Cooperative Behavior
- And many more...

