

Project proposals

Outside-in *Nudging for a better world* – projects

1. Nudging for responsible and balanced consumption. Supervisors: W. van Dolen, S. Mokarram Dorri, F. Matthison Thompson, C. Thuerridl and M. Vock.

Overconsumption, unhealthy consumption, and unsustainable consumption are threats that affect today's society on many levels. For instance, many non-communicable diseases are believed to be affected by unhealthy consumption patterns. Moreover, massive environmental damage could be prevented by reducing unnecessary consumption, reuse products or switch to products from local sources. This research theme shall explore ways to reduce overconsumption and steer towards more balanced and responsible consumption. How can organizations be nudged and incentivized to promote responsible and balanced consumption? How can individuals be protected from subconscious overconsumption? How does consuming itself (i.e., the process of purchasing products as compared to the actual use of the products) create value for consumers and how does this cause overconsumption? What measures can be developed based on such insights to achieve responsible consumption?

2. AI & wellbeing at work. Supervisors: J. Sosnowska, A. Pircher Verdorfer and C. Boon.

Particularly during the COVID-19 pandemic, work and private life became more intertwined than ever before and it is likely that work from home will stay more popular post-crisis than it was before. A study involving 12,000 employees by Oracle and Workplace Intelligence reported that 2020 was the most stressful year ever for workers across the globe. Moreover, while the crisis added new challenges to wellbeing and mental health at work, old challenges remain unresolved. This research theme shall focus on how individuals and organizations can be nudged to promote wellbeing and mental health at work. How can transgressions be reduced? Can AI and other technology help to detect and manage existing and new mental health challenges (and how?).

3. The effects of government interventions to nudge responsible consumption behavior. Supervisors: N. Bombaij, B. van Ewijk, J. Guyt and U. Konus. In recent years, the Dutch government used several levers to nudge consumers towards more responsible consumption behavior.

In specific, regulation aimed to decrease alcohol over-consumption, and environmental litter of small bottles and cans. To achieve the first objective, the local and national governments respectively used: a tax increase on alcohol (in 2017), as well as a ban on deep price promotions (in 2021), both on a national level, while the second objective resulted in the a deposit on small plastic bottles (in 2021), followed by a deposit on cans (in 2022).

In this project, we assess:

1. How brands and retailers respond to these and similar nudges with other marketing mix variables (e.g., do they lower regular prices upon a ban on deep promotions?)
2. How these regulations differentially impact consumer segments (e.g., does a ban on promotions hurt low-SES households more?)
3. The consequences of these regulations (e.g., do consumers get nudged in the right direction?)

We have access to unique sales data that allows us to measure these effects on both an individual and national level over time. This project will provide policy-makers with a systematic overview of how the government can nudge consumers to more responsible consumption.

Outside-in *Resilient Society and Stability*– projects

4. Incorporating Climate Change into the Government Budget. Supervisor: R. Beetsma.

Climate change is omnipresent in the political debate. Remarkable enough, the consequences of climate change are not systematically incorporated in government budgets, let alone on a comparable cross-country basis. A likely reason is that they are difficult to assess. On the one hand, climate change directly affects trend GDP growth. On the other hand, it produces increasingly frequent and large natural disasters, which will affect public expenditures and GDP.

This project intends to quantify how climate change impacts the public budget. It proceeds in steps. The first step involves modelling the influence of climate change on trend growth as well as estimating the development of the frequency and size of climate-related disasters, so as to project their future development. Based on these, one can simulate processes for future GDP development and climate-related public expenditures. Obviously, there will be considerable uncertainty surrounding the parameters of these processes which will be accounted for in the simulations. The second step is to simulate the development of the public finances using the processes of GDP and spending as inputs. Given the tax policy, this generates paths for the public debt ratio of GDP. These may or may not be explosive. In a third step, the project will explore measures to enhance the fiscal sustainability in the face of climate changes. It will also investigate how the impact of climate-related shocks on the public finances can be mitigated. The latter relates to the management of the public debt portfolio. Traditional trade-offs inherent in the choice of the maturity structure (typically, the trade-off between issuance costs and the risk of running into a roll-over) play a role. However, one can also envisage the development of new instruments with climate-risk contingent pay-offs, as well as specific investments to mitigate the impact of climate-related shocks.

5. Asset Pricing and Labor Risk. Supervisors: E. Eiling and R. Laeven.

One of the key questions in asset pricing is: What drives risk and expected returns in stock markets? An active and growing literature points at linkages with labor markets as a key part of the answer. Indeed, for most investors a significant part of their wealth is determined by their labor income. Investors may dislike low stock returns especially at times when their unemployment risk is high or when their labor income deteriorates. From the firm's perspective, intangible assets including the human capital of their employees, have become an increasingly important part of firm value. Thus, the interplay between labor markets and financial markets plays a crucial role for asset pricing.

Yet, empirically, monthly or quarterly aggregate labor income growth and stock returns appear almost uncorrelated. To uncover the deep linkages, more sophisticated approaches are required. One type of approach considers a more realistic view of human capital and its characteristics, often based on insights from labor economics. Research shows that this matters for asset pricing. Another approach to uncover the deep connections between labor and stock market risk is to consider alternative preferences. Several papers find that combining modern preferences with labor income risk leads to more realistic implications for optimal life cycle consumption and investment policies. The equilibrium asset pricing implications of this literature are however as yet unknown.

This project intends to: (i) develop modern behavioral preference-based equilibrium asset pricing models that can handle the interplay between financial and labor markets and the associated market incompleteness that is inherent in labor markets; (ii) develop corresponding econometric methods to estimate the cross-section and time-series of expected asset returns and labor risk; and (iii) continue to look for more realistic ways to measure and model human capital and its relevant characteristics for asset pricing.

6. Psychological and Economic Drivers of Fairness and Redistribution. Supervisors: J. van der Weele and T. Douenne.

The meritocratic idea that people are entitled to the profits resulting from hard work and ambition is a core organizing principle of liberal democracies. It also provides the dominant justification for capitalist institutions such as the protection of individual property rights and limited levels of income redistribution. Recently however, several leading scholars have criticized both the practice and the ideals of meritocracy – elites have captured the main gateways towards economic opportunity, in particular higher education, undermining the idea of equal opportunity that is at the root of meritocracy. Others have argued that personal income and wealth erode the civic-mindedness of winners, who do not feel they owe society anything, and demoralizes the losers who feel like their position is their own fault. These scholars suggest that the combination of unequal opportunities and personalized attributions of success helps explain the rise in economic inequality and the recent rise in populist politics.

The goal of this PhD project is to combine insights from psychology and economics to study the two-way interactions between the cognitive underpinnings of meritocratic beliefs and economic decisions and outcomes. To this end, the research team consists of researchers with expertise in the fields of macro-economics, behavioral economics, social psychology and neuroscience. We seek high-quality candidates with interest, experience, and expertise in these areas.

7. From Radicalism to Reform: Mapping the Mechanisms of Social Change in Response to Income Inequality. Supervisors: R. Ronay and F. Belschak.

How do people respond when learning about unequal pay? Despite the widely recognized importance of income inequality, there is surprisingly little research on consequences within organizational settings. The work that has been conducted has primarily focused on macro-level effects of income dispersion on firm performance. Building on theories of relative deprivation and tournament compensation, most researchers have argued that disparity increases competition, differentiation, resentment, and deviance. Nonetheless, there is a need to expand the scope of research examining the consequences of (pay) inequality in organizations to include more psycho-social elements such as citizenship, antisocial behavior, envy, retribution, litigation, turnover, and the underlying processes of collective action.

The aim of the proposed project is to understand the “tipping point” in people's responses to income inequality. In other words, under which circumstances are people – victims and/or beneficiaries of income inequality – motivated to engage in (collective) action to minimize inequality. This PhD project aims to investigate the grassroots processes that act as antecedents to social change – “from radicalism to reform”. The overarching question we seek to answer is: *How and when do individual-level responses (affective, attitudinal, and behavioral) to perceived inequalities translate into (support) for collective action, and which actions are chosen under which conditions?* We seek candidates with strong backgrounds in psychology, organizational behavior, micro/behavioral economics.

Outside-in Responsible Digital Transformation– projects

8. Responsible Finnovation: How narratives play a role in the process of (ir)responsible innovations in FinTech Supervisors: M.T. Ramezan Zadeh and H.W. Volberda.

The quest for digital transformation has caused mainly positive attention for digital innovations and innovators. Business contexts incentivize (digital) innovations by creating a legitimacy buffer for innovative companies (Fisher, Kotha, and Lahiri, 2016). This, in turn, might have consequences on how policymakers and regulators deal with promising innovators. While their purpose is positive, their efforts might create or contribute to an environment around innovation and innovators that give a chance to abuse and less optimal outcomes. Examples such as Enron, once known as a highly innovative company, and Wirecard, as a successful FinTech company, call for more long-term attention to digital innovations. This project will examine how the internal and external context of digital innovation projects in the financial industry may facilitate (ir)responsible innovation processes and outcomes. The definition of responsibility has two main elements: responsibility to do no harm and responsibility to do good (we refer to Voegtlin et al. (2021) for an extended discussion about the definition). Examples of irresponsible innovations are:

- Lack of inclusion of minorities in the process of innovation.
- Ignoring minorities' requirements in innovations.
- Gender gap within innovation organizations.
- Overlooking older generations in the design of digital products and services.

Using qualitative and quantitative methods, in this project, we study what contributes to such environments and what motivates players to either abuse the system or create a chance for misconduct in FinTech. We apply socio-cognitive theories that explain narratives, attention, and legitimacy to understand our phenomena of interest.

In our research, narratives are defined as 'simple stories and easily expressed explanations' of innovations that people tend to use in their conversations or are brought up in social media because of their effect on the emotions or concerns of the audience. They are not well-researched stories. They maintain a core contagious element that can mutate over different variants with different economic effects (Shiller, 2017). Literature at the intersection of narratives and innovation highlights the importance of narratives in understanding innovations (Garud, Gehman, and Giuliani, 2014). In other words, we know that articulations of needs, desires, ideas, and experiences create possibilities for innovation (Nambisan and Zahra, 2016). Innovation and (corporate) entrepreneurship literature have mainly focused on entrepreneurs and corporate innovators' agency in shaping their key stakeholders' opinions through storytelling and language about how their innovations will survive and grow. In this research, however, we investigate narratives within innovative organizations and in their environment and how they play a role in the process of (ir)responsible innovations in the financial sector. Examples of potential research questions that a PhD candidate can address in this research are:

- What are the characteristics of narratives that influence innovations? Which characteristics can create a bias to promote (ignore) (ir)responsible aspects of the innovations?
- Under what conditions do narratives mutate within different stakeholder groups inside and outside organizations, and how do some of the mutations about digital innovations become popular?
- How do different conflicting and resonating narratives form the environment for (ir)responsible innovation?
- How do narratives facilitate resource acquisitions and the go-to-market of the innovations (despite unfavorable aspects)? How do innovators and entrepreneurs take advantage of the narratives in their business?

Employing a mixed-method research strategy in this PhD project, we will examine cases of FinTech. Using computer-aided text analysis techniques, our quantitative inquiry will develop time series to explore major narratives about digital financial innovations in popular social media. We will also examine the narratives in the organizations of selected FinTech businesses. We will select cases that have innovation in the product, process, or purpose of their business (Stilgoe et al., 2013). In doing so, we will consider the effect of the contextual and organizational narratives about different technologies, e.g., mobile, Blockchain, and AI.

This research will strive to contribute to the strategic innovation and entrepreneurship fields. While mainstream research provides more general knowledge about digital innovation, this study will mainly focus on the social underpinnings of responsible digital innovation. Our findings will highlight the social mechanisms because of which an innovation-seeking society might neglect and accept unfavorable outcomes of FinTech. Policymakers and (corporate) entrepreneurs in the financial industry are the primary audience of our research findings.

9. Multimodal Conversational Search for Improved Interaction with Citizens. Supervisors: S. Rudinac e.a.

Fuelled by the recent advances in artificial intelligence, conversational search has emerged as an effective means of providing access to large collections of data by facilitating a user-system dialogue that typically involves multiple interaction rounds and allows the system to better understand user information needs through posing relevant questions. As such it is increasingly replacing conventional search and recommendation paradigms. The advancement of conversational search, and conversational agents in general, is probably best illustrated by the increasing number of commercial systems relying on this technology such as Amazon Alexa, Apple Siri, Google Assistant and Microsoft Cortana as well as the panels on the topic organized at the leading academic conferences, such as most recently ECIR'20 and ACM MM'21. While the abovementioned conversational agents already perform reasonably well on simple "factoid queries", they fail to address complex information needs of the users. This research project combines our extensive experience in multimedia information retrieval and interactive multimodal learning (user in the loop learning - active learning and user

relevance feedback) with relevant theories from the business disciplines, marketing and leadership, in development of novel conversational systems. We strongly believe that effective integration of marketing and leadership knowledge, the main novelty of our project, will lead to much better conversational search approaches capable of e.g., better understanding information needs of different types of users (marketing) and communicating the results in a manner that stimulates desirable behaviour (leadership).

We focus on the challenging use cases with a potentially large societal impact contributed by our partners:

- Chief Technology Office (CTO), City of Amsterdam: Building on our successful collaboration with the City of Amsterdam on various projects, including e.g. “Improving response to citizen reports using artificial intelligence”, we will focus on several real-life use cases relying on conversational search technology, such as
 - Further development of “Wij Amsterdam” into an urban platform with all social initiatives
 - Question answering about 550 different services offered by the City of Amsterdam
 - Question answering about the type of municipal healthcare a citizen is entitled to
- Ministry of Health, Welfare and Sport: The ongoing COVID-19 pandemics has once again stressed the need for providing the relevant health-related information to the citizens and presenting it in a way that stimulates desirable behaviour. In this sub-project we will primarily focus on the use case of health-related travel advice.

In order to thoroughly address different challenges associated with the project, which involves analysis of heterogeneous data ranging from text, images and videos to GIS data and open data statistics at different aggregation levels, we are looking for PhD candidates on the following topics:

- PhD 1: Neural information retrieval techniques for multimodal conversational search. The student will be supervised by Stevan Rudinac, Evangelos Kanoulas and Deanne den Hartog and investigate how different leadership theories can be incorporated into multimodal conversational search models for positively influencing behaviour of the users (citizens). In addition, with this project we would like to establish a link with the People Analytics Centre led by Corine Boon.
- PhD 2: Interactive learning for multimodal conversational search. The student will focus on combining multimedia content analysis with interactive visualization and interactive (user in the loop) learning in a system that will be informed by relevant marketing theories on consumer psychology. In addition, this sub-project will investigate the potential of marketing questionnaires as operationalization of well-established domain theories in guiding multimodal representation learning process. The supervisors will be Stevan Rudinac, Marcel Worring and Joris Demmers.

Outside-in Sustainability & Environmental Economics– projects

10. ESG performance measures as risk indicators. Supervisor: J. Bouwens

From an economic standpoint it would suffice if firms were to report their progress through their balance sheets and profit and loss account. Such a position holds as long as these financial statements contain all externalities that impact the state of the firm. The truth is that externalities are reflected to only a limited extent prompting regulators and law makers to issue reporting legislation that require firms to report in so called Environmental, Social and Governance (ESG) numbers on factors that reflect these externalities. While firms have started to report on these numbers it is unclear how well these metric reflect the externalities, whether they are in sync with the financial statements and how they are related to firm value. Some recent studies would suggest that this is the case to a very limited extend. While ESG reports are potentially useful for investors and other stakeholders to establish the risk exposure and its potential future effect on profit, firms that overreport, underreport or do not report at all the environmental risks they are likely to face a lower credit rating and are more likely to suffer a cost in the future.

In this project we seek to examine (explain) whether and if so how variations in ESG reporting are indeed related to future results and under what circumstances they inform or deceive decision makers.

11. Adaptation to climate change; managing dyke heights: determining the optimal level of flood protection with macro-economic and climatic uncertainty. Supervisors: T. van den Bremer and R. van der Ploeg.

Sea level rise is one of the main effects of climate change that low-lying countries such as the Netherlands are facing. Determining the optimal level of protection relies on the outcome of a cost-benefit analysis, in which both costs and benefits lie in the distant future and are highly uncertain, with flooding typically associated with low probabilities but disastrous consequences. The economic literature is beginning to take into account the effect of various uncertainties on the optimal price of mitigation, i.e., on the optimal carbon tax (e.g., van den Bremer & van der Ploeg, 2021, Am. Econ. Rev.). The proposed PhD project will focus on adaptation and will reconsider the framework for determining the optimal level of flood protection in the Netherlands taking a welfare-optimizing approach that takes account of macro-economic and climatic uncertainties, the uncertain consequences of flooding and its uncertain costs. The project will integrate into this framework insights from the macro-finance literature on the equity premium puzzle and the term structure of uncertainty of asset markets and/or GDP as well as climate and flooding over long horizons

12. Climate Economics with Heterogeneous agents. Supervisor: R. van der Ploeg.

Global warming is one of the biggest challenges for human mankind. Economists have traditionally recommend a uniform steadily rising carbon pricing for the global economy. But this ignores distributional issues between countries, between firms, and between households. These issues are important because poorer households are disproportionately hit both by carbon prices and by global warming and firms relying much on fossil fuel are hurt more too. This project aims to use the modern continuous-time approach to macroeconomics heterogeneous agents developed by scholars as Benjamin Moll and others and adapt it to understand issues of climate policy and distribution as well as financial frictions. This project is suited for someone who is interested in modern macroeconomics and climate, and has the ability and interest to numerically solve Hamilton-Jacobi-Bellman equations and Kolmogorov's Forward equations to obtain optimal outcomes and distribution of key variables. This requires tools such as finite difference methods or machine learning.

13. Preventing desertification of drylands. Supervisor: F. Wagener, R. van der Ploeg and F. van Langevelde (Wageningen). Drylands cover around 40% of the Earth's land surface and support roughly 30% of the global human population, especially pastoralists depending on livestock for their subsistence. Dryland ecosystems are, however, highly susceptible to changes in their dynamics owing to frequent dry years (Fensholt et al. 2012) or overgrazing (Van Langevelde et al. 2016). High grazing pressure may trigger alterations in the functioning of drylands, ultimately leading to land degradation and desertification. Recent estimates claim that 75% of the drylands is already degraded, and >90% could become degraded by 2050, notably as a result of the interaction between overgrazing and climate change (Easterling et al. 2000). Alterations in the way dryland ecosystems function can take place abruptly, instead of gradually (Berdugo et al. 2017). Abrupt changes may push drylands from a state with herbaceous vegetation to a degraded state where the system cannot maintain its previous way of functioning by way of a threshold of environmental conditions. To date, these thresholds have been explored by modelling vegetation-soil moisture interactions (Rietkerk et al. 2002). The thresholds are tipping points, triggering positive feedbacks that shift the system to an alternate state and preventing the system to be restored easily (Rietkerk et al. 2002). Tipping points can have severe economic and ecological consequences, particularly in drylands. When a dryland system shifts abruptly from a vegetated state to a degraded state, the livelihoods of the pastoralists are threatened, which can result in increased poverty and food insecurity (Berdugo et al. 2017). The main question in these drylands is how pastoralists can prevent these abrupt shifts by managing local grazing pressure, given the uncertainty in climatic conditions.

Three areas of questions will be examined:

1. Social planning. In the presence of ecological tipping points, the social planning problem will feature 'indifference points' or 'social tipping points': if the system passes these, preventing the system to tip in the degraded steady state is not socially optimal (Mäler et al. 2003). The first research question is to clarify how the socially optimal policies as well as these tipping points depend on regulations, like cooperative restriction of local grazing times, the structure of the product market, and other parameters, as well as on climatic uncertainties.
2. Grazing game. If there are different groups of pastoralists that do not cooperate, these groups will play a dynamic game against each other. The second research question is to investigate the feedback Nash equilibria of this game, and the resulting equilibrium dynamics. This project is the first foray into investigating such equilibria for differential games with higher dimensional state spaces and tipping points (Dockner and Wagener 2014).
3. Grazing coalitions. Tipping points can induce stable partial coalitions, which improve over a Nash equilibrium outcome in the grazing game. The underlying theoretical mechanism has been investigated recently (Wagener and de Zeeuw 2021), and the third research question is to investigate whether the social outcome can be improved through stable partial coalitions for a realistic calibration of the model.

The project models the dynamics of the ecosystems as a two-dimensional system of coupled differential equations that include the positive feedback between vegetation and soil moisture (Rietkerk et al. 2002). Decision variables of the pastoralists are grazing time and the herd size of livestock, which are chosen to maximise their utility from holding livestock as well as from selling its produce. The models are solved using numerical methods for boundary value problems, bifurcation analysis, and partial differential equations.