

Title: A risk management approach toward the assessment of sustainable sovereign debt levels**Supervisor: Dennis Bams** (w.bams@maastrichtuniversity.nl)

Short text: Subsequent to the Global Financial Crisis, many countries have seen their government debt levels increase substantially. From an economic stability perspective it is relevant to assess the sustainability of elevated debt levels. Large holders of sovereign bond portfolios such as pension funds are critically dependent on a proper risk assessment of sovereign bond risk.

IMF and the European Stability Board have developed a risk measuring system, in which specific indicators should remain within specific limits. In an ESM working paper by Gabriele et al, (ESM, 2017) entitled "Debt Stocks Meet Gross Financing Needs: A Flow Perspective into Sustainability", the authors pursue a statistical approach to define relevant explanatory variables for debt (un)sustainability.

The topic of this thesis proposal is to develop an economic foundation to support the assessment of sovereign debt sustainability. In particular, the Merton model uses the concept of a distance-to-default model in the context of company credit risk, making use of balance sheet information. This thesis topic seeks to adopt a Merton model a-like application for countries. In the empirical part of the thesis the model is to be empirically tested for a country of your choice.

Title: Bank performance indicators**Supervisor: Dirk Broeders** (d.broeders@maastrichtuniversity.nl)

Short text: A key indicator for bank performance is Return on Equity. This measure however is flawed as it is highly influenced by a bank's leverage and does not correct for the risk profile of a bank. A focus on RoE creates the wrong incentives for a bank's top executives and provided inadequate information to shareholders. In this study you will assess alternative bank performance indicators such as RORAC, RAROC, RORWA, etc. You can choose for a sample of EU or US banks. How did these indicators evolve over time, during periods of crisis? You can also look into possible relations between these risk adjusted indicators and for instance the stock performance of banks.

References: Admati et al. (2013) Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Socially Expensive, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2349739

Title: Household risk management**Supervisor: Dennis Bams** (w.bams@maastrichtuniversity.nl)

Short text: Households are in different phases of their life exposed to different risk drivers with in potential major financial consequences. You may think for example of the impact of divorce, unemployment, death and disability on mortgage requirements as well as on adequate saving for the retirement period. Households may act in a suboptimal manner regarding important consumption decisions as well as with regards to financial planning decisions.

The aim of this thesis proposal is to apply a risk management framework such as the COSO framework to develop for households. Subsequently, the thesis should include a relevant simulation study for different type of households in different economic circumstances. In particular the simulation should put forward ways in which risk drivers lead to potential undesirable outcomes and suggest what tools households have at their disposal to manage these risks.

Title: The effect of ESG on commodity risk (sustainable finance)**Supervisor: Bram van der Kroft** (b.vanderkroft@maastrichtuniversity.nl)

Short text: This thesis track considers the impact of ESG information the resource consumption of companies. In this track you will consider the impact of ESG on the natural resource consumption of firms and subsequently analyse how this differs for different ESG motives (I will send you my paper on this). You will most likely use an event study to identify shocks in commodity prices or create a fama-french sensitivity model given the industry of the firm. This thesis topic will be somewhat quantitative of nature and truly novel, as I do not know any research that directly relates on this topic (please note that I will be writing an academic article on this myself in the near future). You will need to be able to work with data and perform regression analysis. You might also consider to look at the relation of risk benchmarks to ESG information.

For some further reading, consider reading up about the relations of ESG to financial returns (Flammer, 2013), the investor preference towards carbon emissions (which can be linked to oil prices or electricity prices) (Krueger et al., 2020) and especially the resource-based view of the firm (Wernerfelt, 1984; Hart, 1995)

References:

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal*, 5(2), 171-180. Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of management review*, 20(4), 986-1014. Flammer, C. (2013). Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Academy of Management Journal*, 56(3), 758-781. Krueger, P., Sautner, Z., & Starks, L. T. (2020). The importance of climate risks for institutional investors. *The Review of Financial Studies*, 33(3), 1067-1111.

Title: Can tail risk and systemic risk of financial institutions be jointly reduced?**Supervisor: Stefan Straetmans** (s.straetmans@maastrichtuniversity.nl)

Short text: Systemic risk is at the forefront of regulatory and policy discussions since the banking and financial crisis of 2007-2009. Post-crisis financial regulatory reform also claims to tackle systemic risk by e.g. targeting so-called "SIFI's" (Systemically Important Financial Institutions) by imposing additional capital surcharges. The purpose is to disincentivize financial institutions to being systemically important. Recent research, however, questions whether it is possible to both regulate tail risk of financial institutions and their systemic contribution, see e.g. Beale et al. (2011). More specifically, by diversifying their risks, financial institutions reduce their own probability of failure. However, if many banks decrease their risks in comparable fashion, then the likelihood of multiple failures (systemic risk) may increase. Whereas the Beale et al. (2001) paper mainly provides a theoretical analysis of this apparent trade off (and resulting policy dilemma), the aim of the current research project is to provide more empirical evidence by calculating different proxies of tail risk and systemic risk over time and for many different institutions and by investigating their correlation. Is there indeed a negative correlation visible between popular measures of tail risk and systemic risk over time and across institutions?

References:

- Beale, N, Rand, D.G., Battey, H., Croxson, K, May, R.M., Nowak, M.A., 2011. Individual vs. Systemic risk and the Regulator Dilemma. *Proceedings of the National Academy of Sciences of the United States (PNAS)* 108 (31), 12647-12652.
 - De Jonghe, O., 2010. Back to the basics in banking? A Micro-analysis of Banking System Stability. *Journal of Financial Intermediation*, 19, 387-417.
 - Idier, J., Lame, G., Mésonnier, JS. 2014. How useful is the Marginal Expected Shortfall for the Measurement of Systemic Exposure? A practical assessment. *Journal of Banking and Finance* 47, 134-146.
-

Title: Finite endpoint distributions in economics and finance**Supervisor: Stefan Straetmans** (s.straetmans@maastrichtuniversity.nl)

Short text: The boundedness of economic or financial variables is often open to discussion: is there a lower or upper bound and if so does it increase or decrease over time? For example, since the 1960s and the birth of the 'eco-movement' (even long before the discussions on the climate crisis even started), economists started to question the limits to (long run) growth and productivity given the limited resources of the earth. Are there boundaries to industrial output and productivity (probably yes) but (more importantly), how did these bounds change over time? Another example where boundedness plays a role is efficiency measurement (governmental institutions, banking sector etc). Do these institutions produce their goods and services at the lowest possible costs or are there 'inefficiencies' in the system? The estimation of finite endpoints provides an alternative methodology to measuring these inefficiencies within an institutional context. Yet another application could be in the domain of climate data: do temperature and weather distributions have finite endpoints and if so, does it shift rightward? Establishing this statistically may provide further empirical evidence for climate change.

References:

- Jesson J. Einmahl, John H. J. Einmahl & Laurens de Haan (2019) Limits to Human Life Span Through Extreme Value Theory, *Journal of the American Statistical Association*, 114:527, 1075-1080, DOI: 10.1080/01621459.2018.1537912
 - Daouia, A., Florens, JP, Simar, L. (2010). Frontier estimation and extreme value theory. *Bernoulli*. 16(4), 1039–1063, DOI: 10.3150/10-BEJ256
-

Title: Discrimination in lending: taste-based versus statistical discrimination**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)

Short text: When banks make lending decisions, are they pricing risk ... or basing their decisions on a biased, discriminatory view? And ... how can we distinguish between the two? In this project, you look at discrimination in lending decisions. This project requires an above average interest in banking, and in quantitative methods.

References:

- Ferguson, M. F. and S. R. Peters (1995). What constitutes evidence of discrimination in lending? *The Journal of Finance* 50(2), 739–748.
- Shaffer, S. (1996). Evidence of discrimination in lending: An extension. *The Journal of Finance* 51(4), 1551–1554.
-

Title: Discrimination in lending: an Algorithmic approach**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)

Short text: Fintech has changed the way we make lending decisions. But ... has it lowered discrimination in lending? Can algorithms discriminate? And if so, how do they do it? This project requires an above average interest in banking, and in quantitative methods.

References:

- Bartlett, R., A. Morse, R. Stanton, and N. Wallace (2019). Consumer-lending discrimination in the fintech era. Technical report, National Bureau of Economic Research.
-

Title: Discrimination in lending: Redlining ... or silver lining?**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)

Short text: What is true of the individual, is not necessarily true of the group that individual belongs to. And ... vice versa. But how does that 'simple' wisdom affect lending decisions? In this project, you look at the impact of redlining in banking. This project requires an above average interest in banking, and in quantitative methods.

References:

- Tootell, G. M. (1996). Redlining in Boston: Do mortgage lenders discriminate against neighborhoods? *The Quarterly Journal of Economics* 111(4), 1049– 1079.
-

Title: Finding your banking market

Supervisor: Jaap Bos (j.bos@maastrichtuniversity.nl)

Short text: In many empirical analyses, especially when we are measuring competition, we need to define the market in which firms operate. Are banks active nationally, in a certain city or in a state. In this project, you will research cross-elasticities, and think creatively of empirical methods to delineate markets. Great project for a student who likes microeconomics and banking.

References:

- Bikker, J.A. and J.W.B. Bos (2008). Bank Performance: a theoretical and empirical framework for the analysis of profitability, competition and efficiency, <https://www.routledge.com/Bank-Performance-A-Theoretical-and-Empirical-Framework-for-the-Analysis/Bikker-Bos/p/book/9780415569613>.
-

Title: What can we learn from simulating treatment effects?

Supervisor: Jaap Bos (j.bos@maastrichtuniversity.nl)

Short text: Identifying the causal effect of a certain (policy) change in an empirical (regression) analysis is far from easy. All kinds of problems can appear that make things difficult: endogeneity, omitted variables, multicollinearity, etc. In this project, we want to investigate how we can assess the bias in treatment effects by simulating processes where we know that treatment cannot be properly identified.

References:

- <https://www.mostlyharmlesseconometrics.com>
-

Title: Interventions in Long-Term Decision Making and Pension Communication

Supervisor: Thomas Post (t.post@maastrichtuniversity.nl)

Short text: Starting Date: immediately

Recent evidence shows that the majority of Dutch pension plan participants is poorly informed about their employer-sponsored pensions. This is striking as information on (for example) prospective benefits is personally relevant (it provides the most significant stream of overall pension income) and benefits are expected to change (due to current reforms). Such information is (according to standard theories of economic behavior) necessary to decide on potentially building up additional private savings. Moreover, the ignorance of most pension plan members is even more striking as receiving the information is fairly easy, that is, often just two mouse clicks away. This topic includes researching the relevant theories and testing various ways to manipulate pension communication in order to increase awareness (and potentially action) among pension plan members.

Note, this topic is very broad in terms of research angle, method, and data. Regarding research strategies, focus, and interventions it includes, for example:

- textual manipulation of messages
- website, visuals, and tool design
- communication channel (direct, via employer, ...; online, offline, social media, ...)
- and timing (life events) interventions
- emotional triggers
- design of default options and products
- as well as big data approaches (data and text mining).

Therefore, contact Dr. Thomas Post well in advance before the thesis skill period to discuss and narrow down a concrete topic.

Title: Heuristics and Financial Product Valuation

Supervisor: Thomas Post (t.post@maastrichtuniversity.nl)

Short text: Starting Date: immediately

It is well-known that the average investor or consumer of a financial products uses shortcuts and heuristics to make financial decisions. Often, those heuristics induce

behavior that leads to financial mistakes and individual welfare losses. While many papers have looked at decision-making heuristics and biases already (hyperbolic discounting, overconfidence, trend extrapolation...) the current topic is about valuation heuristics. That is, given a certain financial product, what "back-of-the-envelope" mathematical models do normal people apply when they try to value a financial product (e.g. an annuity) to get an idea about of the product is worth the price. The results of such a study are highly relevant as understanding decision making processes and valuation heuristics is key to design smart interventions to improve consumer financial decision making (and a test of an idea could be part of the thesis).

Literature, especially from the literature on mathematics education, will be provided as a jump off point.

Contact Dr. Thomas Post well in advance before the thesis skill period to discuss and narrow down the concrete topic and research design.

Title: Experience-Based Learning in Finance

Supervisor: Dr. Peiran Jiao (p.jiao@maastrichtuniversity.nl)

Short text: Personal experiences influence subsequent decisions. For instance, people who lived through negative events, such as economic downturns and financial crises, tend to make consumption and/or investment decisions consistent with either elevated risk aversion or pessimistic beliefs about future economic conditions (e.g. Malmendier and Nagel, 2011, Malmendier et al. 2011, Giannetti and Wang, 2016, Knüpfer et al., 2017). In particular, attaching too much weight on the payoff component in experience can lead to biases (Kaustia and Knüpfer, 2008, Choi et al., 2009), even when payoffs are just the result of luck (Anagol et al., 2015). Learning based on personal experiences can be either rational (improving investors' skills and reducing their biases) or irrational (naively repeating previously successful actions). Payoffs from personal experiences can influence subsequent preferences and/or beliefs (Jiao, 2017). This project will rely on a combination of theoretical, empirical and experimental approaches to investigate the effects of personal experiences and experienced payoffs in repeated decision-making under uncertainty with feedback. The hope is to also disentangle the preference- and belief-based channels of these potential effects, and to generate useful implications for marketing and financial decision-making.

References:

- Anagol, S., Balasubramaniam, V., & Ramadorai, T. (2015). The Effects of Experience on Investor Behavior: Evidence from India's IPO Lotteries.
- Choi, J. J., Laibson, D., Madrian, B. C., & Metrick, A. (2009). Reinforcement learning and savings behavior. *The Journal of finance*, 64(6), 2515-2534.
- Giannetti, M., & Wang, T. Y. (2016). Corporate scandals and household stock market participation. *The Journal of Finance*, 71(6), 2591-2636.
- Jiao, P. (2017). Payoff-Based Belief Distortion. Working Paper. Available on SSRN: <https://ssrn.com/abstract=2964289>
- Kaustia, M., & Knüpfer, S. (2008). Do investors overweight personal experience? Evidence from IPO subscriptions. *The Journal of Finance*, 63(6), 2679-2702.
- Knüpfer, S., Rantapuska, E., & Sarvimäki, M. (2017). Formative experiences and portfolio choice: Evidence from the Finnish great depression. *The Journal of Finance*, 72(1), 133-166.
- Malmendier, U., & Nagel, S. (2011). Depression babies: do macroeconomic experiences affect risk taking? *The Quarterly Journal of Economics*, 126(1), 373-416.
- Malmendier, U., Tate, G., & Yan, J. (2011). Overconfidence and early-life experiences: the effect of managerial traits on corporate financial policies. *The Journal of finance*, 66(5), 1687-1733.
-

Title: Emotional reaction to tweets from Arts and Cultural Institutions**Supervisor: Rachel Pownall** (r.pownall@maastrichtuniversity.nl)**Short text:** This topic involves an empirical study into the evaluation of how sentiment influences share prices. In particular looking at periods of economic and financial crises. How do the creative and cultural industries respond to social media?**References:**

Fang, L., & Peress, J. (2009). Media coverage and the cross-section of stock returns. *The Journal of Finance*, 64(5), 2023-2052.

Tetlock, P. C. (2007). Giving content to investor sentiment: The role of media in the stock market. *The Journal of Finance*, 62(3), 1139-1168.

Requirements: Statistical proficiency, using R or Stata.**Title: The Resilience of Socially Responsible Investment under the Outbreak of COVID-19****Supervisor: Bin Dong** (b.dong@maastrichtuniversity.nl)**Short text:** ESG (environmental, social, and governance) factors increasingly attract vast capital and investors' attention. But research in the field of the resilience of socially responsible investment (SRI) is limited. The literature almost focuses on the performance of this non-conventional approach to investment during the financial crisis. Nevertheless, a more systemic approach has been neglected. Times of instability can be originated from an economic system. Meanwhile, it can also stem from a non-economic system, such as wars and health emergencies, which can indirectly affect the economic system. The resilience of SRI should be evaluated under both economic and non-economic context. However, most research on the resilience of SRI is set under a background of the financial crisis, which would ignore the non-financial factors and leads to a vague understanding of SRI investment. This topic aims to compare the resilience between stocks with environmental, social and governance (ESG) integration and conventional (non-ESG) stocks, and to illustrate the role of ESG factors in the performance of stocks under the outbreak of emergency originated from non-financial departments, e.g., health emergency. We investigate the resilience of ESG stocks' performance during the period following the outbreak of COVID-19. Furthermore, over this timeframe, we also examine the rates of performances on environmental, social, and governance dimensions separately. By the comprehensive approach in bear market conditions resulting from an exogenous emergency, we shed light on SRI's resilience (ESG screening) in practice.**References:**

Auer, B. R. & Schuhmacher, F. (2016). Do socially (ir)responsible investments pay? New evidence from international ESG data. *The Quarterly Review of Economics and Finance*, 59 (2016), 51-62.

Galbreath J. (2013). ESG in focus: the Australian evidence. *Journal of Business Ethics* 118(3): 529-541 (2013).

Ortas, E., Moneva, J.M., Burritt, R. et al (2014). Does Sustainability Investment Provide Adaptive Resilience to Ethical Investors? Evidence from Spain. *J Bus Ethics* 124, 297-309.

Erragragui, E.; Hassan, M.K.; Peillex, J.; Khan, A.N.F (2018). Does Ethics Improve Stock Market Resilience in Times of Instability? *Econ. Syst.*, 42, 450-469.

Fiksel, J., (2006). Sustainability and resilience: toward a systems approach.

Sustainability: Science Practice and Policy, 2 (2), 14-21.

Nofsinger, J. R. and Varma, A. (2014) Socially responsible funds and market crises, *Journal of Banking & Finance*, 48, 180-93.

D. Ashraf, N. Mohammad (2014). Matching perception with the reality - performance of Islamic equity investments. *Pac. Basin Finance J.*, 28 (2014), pp. 175-189.

Daniel, K., M. Grinblatt, S. Titman, and R. Wermers. 1997. Measuring mutual fund performance with characteristic-based benchmarks. *Journal of Finance* 52:1035-58.

Chen, H.; P. De; Y. Hu; and B. H. Hwang. "Wisdom of Crowds: The Value of Stock Opinions Transmitted Through Social Media." *Review of Financial Studies* 27 (2014): 1367- 403.

Title: Towards an Automated Valuation Model (AVM) for the Dutch Residential Market**Supervisors:** Nils Kok (n.kok@maastrichtuniversity.nl); Alexander Carlo (a.carlo@maastrichtuniversity.nl); **Stefan Flagner** (s.flagner@maastrichtuniversity.nl)**Short text:** The notion of automated (predictive) valuation has taken a firm hold in the US residential real estate market. From Zillow to Opendoor, the market for automatically generated values, rather than manual assessments of value, allows for faster underwriting and better risk management. But of course, much depends on the quality of data, the extent of contextual data inputs, and the quality of the machine learning model. This thesis topic is for MSc students that have strong statistical skills and familiarity with predictive modeling algorithms (e.g. XGBoost). Some knowledge on GIS applications is useful.**Data Sources:**

- NVM data
- CBS data

References and background reading:

Kok et al. (2017). Big data in real estate? From manual appraisal to automated valuation.

Requirements:

Understanding of machine-learning based predictive models.

Title: Sustainability and the Cost of Commercial Mortgage Debt**Supervisors:** Nils Kok (n.kok@maastrichtuniversity.nl); Alexander Carlo(a.carlo@maastrichtuniversity.nl); **Stefan Flagner** (s.flagner@maastrichtuniversity.nl)**Short text:** There is abundant and convincing evidence that sustainable buildings perform well on a range of economic indicators, like value, rent level, occupancy rate, and risk. Recently, some research has also been performed that investigates the cost of capital to finance these buildings: see below for some references. However, this research is far less abundant, and there is lots of unexplored territory on this issue.

The central idea of this thesis proposal is to investigate this in a better way, using two datasets for the United States commercial real estate market: the RCA commercial real estate lending database to get information about loan pricing and default, and the LEED database to get information about the environmental performance of the buildings that serve as collateral to the mortgage loans. Empirically, the trick is to link these datasets, and to estimate a potential sustainability discount in the loan rates, as well as effects on subsequent loan default. Since the data is already at hand, this is a low-risk thesis. On the other hand, the empirical analysis requires excellent statistical skills.

Data Sources:

- RCA
- USGBC

References and background reading:

Green Buildings in Commercial-Mortgage Backed Securities, Xudong An and Gary Pivo, Real estate Economics, 2020.

Environmental Performance and the Cost of Capital: Evidence from Commercial Mortgages and REIT Bonds, P. Eichholtz, N. Kok, R. Holtermans and E. Yönder, Journal of Banking and Finance, 2019.

REIT Environmental Performance and the Cost of Equity, P. Barron, P. Eichholtz and E. Yönder, in The Routledge REITs Research Handbook 1st Edition, Ed. David Parker, 2018.

Requirements:

Statistical proficiency, using R or Stata.

Title: Explaining International Home Ownership**Supervisors:** Nils Kok (n.kok@maastrichtuniversity.nl); Alexander Carlo(a.carlo@maastrichtuniversity.nl); **Stefan Flagner** (s.flagner@maastrichtuniversity.nl)**Short text:** The housing market is the world's largest asset market, and private home ownership differs strongly across countries. That that has not received much attention in

the academic literature, and it is not clear at all what causes these differences. The literature on home ownership focuses mostly on explaining home ownership differences within countries across households. The general conclusion is that rich households are likely to own their home, while poor households are more likely to rent. On the country level, we do not see this at all: Switzerland and Germany, both rich, have low home ownership, while Greece and Morocco, not so rich, both have very high home ownership. The purpose of this thesis/research project is to do an analysis on the country level, to try and explain this phenomenon.

Theoretically, the likely trade-off that people make when they decide to rent or own their own home is between the risk of renting (inflation risk) and the risk of owning (volatility of house prices). For this thesis, a student needs to look at house price risk for a large sample of countries, using existing data from the Bank for International Settlements, as well as inflation risk for these same countries, using data from the IMF or other sources. These can then be used as explanatory variables to explain home ownership. The main challenge in data collection is to get the home ownership data from national statistics bureaus, but these data are available, so this is mostly a matter of perseverance. Since changes in home ownership are very gradual, the thesis should go as far back in time as possible, probably to the 1970s.

Data Sources:

- BISS Data (Open Data)

References and background reading:

-

Requirements:

Statistical proficiency, using R or Stata.

Title: Moving to Productivity II

Supervisors: Nils Kok (n.kok@maastrichtuniversity.nl); Alexander Carlo

(a.carlo@maastrichtuniversity.nl); Stefan Flagner (s.flagner@maastrichtuniversity.nl)

Short text: Real estate sustainability has mostly been framed in terms of energy efficiency, but has other dimension as well, such as occupant health and productivity. Maastricht University works together with the city of Venlo in a number of studies concerning the relationship between indoor climate and worker productivity. The first of these is entitled "Moving to Productivity", which involved an extensive survey among office workers in Venlo before and after they moved from a conventional office building to a building that was designed for an optimal indoor climate. All these four surveys took place before the Covid-19 crisis.

The idea for this thesis is to do a fifth survey that specifically compares the office work experience – using the data from the previous surveys – with the working-from-home experience. On top of that, we want to investigate sub-questions relating to the decision to come back to the office to work there (between June and September). The fifth survey will be based on the four previous ones, with some new questions added about the work environment as home. The survey infrastructure that we used before can be employed again for this study.

Data Sources:

- Gemeente Venlo

References and background reading:

Palacios et al. (2020). "Moving to productivity: The benefits of healthy buildings." PLOS One.

Requirements:

- Statistical proficiency, using R or Stata.

- Speaking Dutch is very useful.

Title: Explaining Air Quality: A Global Study

Supervisors: Nils Kok (n.kok@maastrichtuniversity.nl); Alexander Carlo

(a.carlo@maastrichtuniversity.nl); Stefan Flagner (s.flagner@maastrichtuniversity.nl)

Short text: Air quality has emerged as a hot topic (literally) not just in emerging economies like India and China, but also in developed nations such as the UK, the Netherlands, and the U.S. The air that we breathe has implications for physical development and cognitive performance, and the body of evidence on this topic is increasing rapidly.

Most studies use satellite data to gain an understanding of local levels of air pollution, but such measures are not necessarily precise or accurate. Alternatively, most countries have local air quality measurement systems, but these are typically spread across large distances.

This thesis aims to use the data gathered by the network of installed sensors provided by PurpleAir, which has an "opt out" policy for each outdoor sensor that they sell to a customer (see the PurpleAir website). With global data on air quality in hand, the question is what determines the cross-sectional variation in air quality, building a model that includes metrics such as local GDP, industry concentration, and urban development.

Data Sources:

- PurpleAir
- Local Census bureaus/agencies

References and background reading:

Air pollution lowers Chinese urbanites' expressed happiness on social media ([link](#))

Real estate valuation and cross-boundary air pollution externalities: evidence from Chinese cities ([link](#))

Self-protection investment exacerbates air pollution exposure inequality in urban China ([link](#))

Requirements:

Statistical proficiency, using R or Stata.

Title: Global investment performance in Infrastructure

Supervisors: Nils Kok (n.kok@maastrichtuniversity.nl); **Alexander Carlo** (a.carlo@maastrichtuniversity.nl)

Short text: Pension funds and other institutional investors all over the world are increasingly investing in real assets, and infrastructure is one of the asset classes they look at. They mostly build up exposure to that asset class through unlisted vehicles, like private funds and funds-of-funds. However, there also is a growing group of listed infrastructure companies that provide an alternative, which may be cheaper and easier to access. Recently, these listed infra companies have banded forces in an organization called GLIO, the Global Listed Infrastructure Organization. GLIO has also begun tracking the stock performance of these companies in an index. However, that index does not have a lot of history, so not much is known about the investment performance of these listed infrastructure companies in the medium to long term.

The purpose of the thesis is to study the performance of listed infrastructure companies over the longer term, for example the last 20 years, using the GLIO index as a basis, and creating an index that goes back further. Also, this thesis should look at the different type of infrastructure companies (energy, water, internet infra, roads, railroads and harbors, ...) and study performance differences. Data is from GLIO and FactSet.

Title: Explaining Indoor Air Quality: A Behavioral Study

Supervisor: Xudong Sun (x.sun@maastrichtuniversity.nl)

Short text: The air that we breathe inside and outside buildings has implications for physical development, cognitive performance, and overall productivity, and the body of evidence on this topic is increasing rapidly. Intuitively, indoor air quality (IAQ) is more likely to be immediately affected by various occupant behaviors such as entering/leaving the room, opening/closing windows, using air conditioning, working on various work types/workloads, and more possible activities we might find in the future. Meanwhile, such behaviors are affected by both indoor and outdoor environment quality. A better understanding of the dynamics between occupant behavior and IAQ could help us develop a holistic view on green building topics.

This thesis aims to examine the relationship between occupant behavior and indoor air quality by combining data analytics and field studies. We use sensor-based data for IAQ measurements, and use a combination of motion sensors and field studies to collect behavioral data. We plan to firstly establish a mapping between certain behaviors and IAQ measurement patterns, then quantify the correlation between them.

References and background reading:

Lin, Beiyu, et al. "Analyzing the relationship between human behavior and indoor air quality." *Journal of Sensor and Actuator Networks* 6.3 (2017): 13.

Hua, Ying, Özgür Göçer, and Kenan Göçer. "Spatial mapping of occupant satisfaction and indoor environment quality in a LEED platinum campus building." *Building and Environment* 79 (2014): 124-137.

Requirements:

1. Statistical proficiency;
 2.
 - a. Experience of field study in the Netherlands preferred, or,
 - b. Programming-based workflow preferred (R, Python, Matlab, or Julia)
-

Title: Open the Black Box: Interpretable Deep Learning Methods for Indoor Environment Quality Studies

Supervisor: Xudong Sun (x.sun@maastrichtuniversity.nl)

Short text: Deep learning has gained promising results in many fields. However, most neural network-based algorithms lack interpretability, which limits most deep learning methods to "applied" methods instead of insights or theories. Recent findings on interpretable convolutional neural networks (CNN) has shed light on the question of what neural networks learn by matching network layers with image patterns.

In this thesis, we will build a series of forecast models for sensor-based indoor air quality (IAQ) measurement data using Temporal Convolutional Networks (TCN), which is a special 1-dimensional form of CNN. In this process, we will test network structures that can be interpreted as patterns, which will be matched with occupant behaviors. A better understanding of the dynamics between occupant behavior and IAQ could help us develop a holistic view on green building topics.

References:

Pantiskas, Leonardos, Kees Verstoep, and Henri Bal. "Interpretable Multivariate Time Series Forecasting with Temporal Attention Convolutional Neural Networks." *2020 IEEE Symposium Series on Computational Intelligence (SSCI)*. IEEE, 2020.

Zhang, Quanshi, Ying Nian Wu, and Song-Chun Zhu. "Interpretable convolutional neural networks." *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*. 2018.

Shih, Shun-Yao, Fan-Keng Sun, and Hung-yi Lee. "Temporal pattern attention for multivariate time series forecasting." *Machine Learning* 108.8 (2019): 1421-1441.

Requirements:

Knowledge in deep learning (especially convolutional neural networks)
Experience in at least one deep learning platform (TensorFlow/Keras preferred)
Programming-based workflow required (Python, or something better), **or**,
Your motivation and capability that makes you learn all above in 2 months.

Title: Evaluating the Effect of Indoor Air Quality on Commercial Office Markets

Supervisor: Xudong Sun (x.sun@maastrichtuniversity.nl)

Short text: Does indoor environment quality (IAQ) affect commercial real estate value?

There is convincing evidence that there is a premium in rental rates and sales price for green office buildings with eco-labeling such as Energy Star or LEED. Meanwhile, studies show that occupant productivity/performance is significantly affected by indoor air quality (IAQ) and other environmental features. Does the premium of green office buildings a result of better occupant productivity, eco-labels, or a combination of the two? This thesis aims to quantitatively evaluate the relationship between IAQ and the market value of office real estate.

References:

Eichholtz, Piet, Nils Kok, and John M. Quigley. "The economics of green building." *Review of Economics and Statistics* 95.1 (2013): 50-63. Self-protection
Fuerst, Franz, and Pat McAllister. "Eco-labeling in commercial office markets: Do LEED and Energy Star offices obtain multiple premiums?." *Ecological Economics* 70.6 (2011): 1220-1230.

Al Horr, Yousef, et al. "Occupant productivity and office indoor environment quality: A review of the literature." *Building and environment* 105 (2016): 369-389.

Thermal and IAQ effects on performance (<https://www.researchgate.net/project/Thermal-and-IAQ-effects-on-performance>)

Requirements:

Knowledge in real estate asset pricing; Statistical proficiency; Experience in data collection and analytics

Title: Ethics and the Financial Sector

Supervisor: Janek Kretschmer (j.kretschmer@maastrichtuniversity.nl)

Short Text: At the very latest since the financial crisis, the morals of financial markets became a highly relevant topic in society. This event stressed the pervasive feature of market interaction to impose costs on uninvolved third parties. Producing and trading goods often creates negative externalities, such as detrimental working conditions for workers, possibly associated with reduced life expectancy, child labor, suffering of animals, or environmental damage.

Thus, the actions and investment decisions of all market participants have an ethical aspect. As decision makers are subject to various biases and cognitive dissonance their behavior largely depends on how they perceive the situation. The main focus therefore is analyzing the choice architecture that individuals in the financial sector face to explain unethical behavior and to find methods to encourage prosocial acts.

Note, this topic is very broad in terms of research view, methods and data. The student will have the opportunity to create an own survey and/or experiment subsequent to a literature review to test their hypotheses.

References

Bartling, B., Weber, R. A., & Yao, L. (2014). Do markets erode social responsibility?. *The Quarterly Journal of Economics*, 130(1), 219-266.

Cohn, A., Fehr, E., & Maréchal, M. A. (2014). Business culture and dishonesty in the banking industry. *Nature*, 516(7529), 86.

Falk, A., & Szech, N. (2013). Morals and markets. *Science*, 340(6133), 707-711.

Prentice, R. A. (2007). Ethical decision making: More needed than good intentions. *Financial Analysts Journal*, 63(6), 17-30.

Riedl, A., & Smeets, P. (2017). Why do investors hold socially responsible mutual funds?. *The Journal of Finance*, 72(6), 2505-2550.

Zingales, L. (2015). Presidential address: Does finance benefit society?. *The Journal of Finance*, 70(4), 1327-1363.

Title: Encouraging Effective Donations

Supervisor: Janek Kretschmer (j.kretschmer@maastrichtuniversity.nl)

Short text: Charitable giving plays a prominent role in society, with donations amounting to more than 87.5 billion euro per year in Europe alone.

While concerns about cost-effectiveness is prevalent in everyday life, such thinking seems to be far less common in the context of altruistic decisions - or more specifically, charitable giving. Nevertheless, the question of charities' cost-effectiveness is addressed by NGOs, such as "GiveWell" or "GivingWhatWeCan", conducting independent and scientific charity evaluation. These organizations have shown that some charities can offer interventions that outperform comparable charities in terms of cost-effectiveness by a factor of up to one thousand. The lack of adequate prioritization and donors' inability to evaluate cost-effectiveness information impedes donations to the most effective causes. On the other hand, a recent study suggests that donors feel happiest when they make a clear impact

with their donation. New methods to overcome behavioral biases in charitable giving can direct more donations to the most effective interventions. Therefore, this research topic has the potential to help high effective charities to raise funding, increase donors' happiness and the well-being of society as a whole.

The student will have the opportunity to create an own survey and/or experiment subsequent to a literature review to test their hypotheses.

References:

- Aknin, L. B., Dunn, E. W., Whillans, A. V., Grant, A. M., & Norton, M. I. (2013). Making a difference matters: Impact unlocks the emotional benefits of prosocial spending. *Journal of Economic Behavior & Organization*, 88, 90-95.
- Baron, J., & Szymanska, E. (2011). Heuristics and biases in charity. *The science of giving: Experimental approaches to the study of charity*, 215-235.
- Berman, J. Z., Barasch, A., Levine, E. E., & Small, D. A. (2018). Impediments to Effective Altruism: The Role of Subjective Preferences in Charitable Giving. *Psychological science*, 29(5), 834-844.
- Caviola, L., Faulmüller, N., Everett, J. A., Savulescu, J., & Kahane, G. (2014). The evaluability bias in charitable giving: Saving administration costs or saving lives?. *Judgment and decision making*, 9(4), 303.
- Gneezy, U., Keenan, E. A., & Gneezy, A. (2014). Avoiding overhead aversion in charity. *Science*, 346(6209), 632-635.
- Karlan, D., & Wood, D. H. (2017). The effect of effectiveness: Donor response to aid effectiveness in a direct mail fundraising experiment. *Journal of behavioral and experimental economics*, 66, 1-8.
- Yörük, B. K. (2016). Charity ratings. *Journal of Economics & Management Strategy*, 25(1), 195-219.
-

Title: Income inequality

Supervisor: Robin Aarts (r.aarts@maastrichtuniversity.nl)

Short text: Reducing inequalities is a requirement for human rights and justice, and is essential for success in other global priority areas, such as environmental sustainability, conflict resolution and migration (UNESCO, 2016). Trends on inequality are not one-way; in recent years, some countries have succeeded in reducing or at least halting rising inequalities, but in some cases these trends are being reversed (Cornia and Martorano, 2012). Income inequality affects many other aspects in life, such as economic growth, nutrition and health, inequalities in voice and power, and the prevalence of conflict and political polarisation. In order to narrow down the research focus, students can choose one specific factor with which they want to link income inequality and analyse how that factor affects or is affected by income inequality. Students could first do a quantitative analysis with regression analyses for a certain geographical area, measuring the effect of income inequality on the factor of their choice or vice versa. They then can go more in depth with a qualitative design, such as a case study of one particular country, to investigate elements that might have an impact on this relation.

Title: Measuring cultural regeneration in Maastricht

Supervisor: Rachel Pownall (r.pownall@maastrichtuniversity.nl)

Short text: This topic involves a local perspective of the city of Maastricht and is supported by the municipality. The city of Maastricht has provided financial stimulus to the cultural industries, which is one of the fastest growing areas of the economy. The thesis student has the possibility to conduct an economic impact study on the influence of the regeneration of the local economy on the number of cultural institutions, as well as media and software companies, which also fall under the definition of the creative industries, employees and on consumer demand.

References: www.made2measure.com

Title: How small businesses are coping financially with the current coronavirus pandemic**Supervisor: Rachel Pownall** (r.pownall@maastrichtuniversity.nl)**Short text:** The current pandemic is having a serious impact on small business. Which schemes are available for different areas of the economy, across different countries, and which businesses are managing to weather the storm of the corona crisis best is worthy of deeper investigation?**References:**

Brady, A, Michalska, J. and R. A. J. Pownall (2020) "Galleries worldwide face 70% income crash due to coronavirus". The Art Newspaper, 27 April 2020.

Gormsen, N. and Kojen, R. (2020) "Coronavirus: Impact on Stock Prices and Growth Expectations". University of Chicago, Becker Friedman Institute for Economics Working Paper No. 2020-22

Requirements: Statistical proficiency, using R or Stata.**Thesis topic: The costs and benefits of Performance Fees for Institutional Investors****Supervisor: Roger Otten** (r.otten@maastrichtuniversity.nl)**Short text:** Most investment funds charge fixed fees (% of Net Asset Value). Some funds charge performance fees on top of that. The idea is align the interests of investors and portfolio managers. Performance fees are however controversial and both regulators and financial media publish about them regularly. Some argue it leads to more risk-taking in order to outperform a certain threshold (benchmark). In this thesis you examine the role of performance fees for institutional investors. Many of these also have Responsible Investing beliefs. How do performance fees solely based on financial performance stack up with for instance achieving societal impact via the SDG's? How to align the interests from a broader stakeholder approach?**References:**

Servaes & Sigurdson (2022), The costs and performance fees of Mutual Funds

Title: (Female) Entrepreneurship in the FinTech era**Supervisor: Pomme Theunissen** (p.theunissen@maastrichtuniversity.nl)**Short text:** This thesis topic builds on the possibilities offered by FinTech and other new digital technologies as a contribution to (female) entrepreneurship research.

To entrepreneurs, access to finance is often the main hurdle that impedes the growth of their business (Block et al., 2018; Cumming et al., 2019). In this thesis topic, the student is requested to investigate the potential opportunities and drawbacks offered by FinTech and other digital technologies in enhancing the access to finance, and the related impact on their business (Bollaert et al., 2021; Kavuri & Milne, 2019).

Digital technologies are recognized as disruptive (von Briel et al., 2018) and are an important source of transformation of the entrepreneurial environment (Bi et al., 2017; Giones & Brem, 2017). They therewith offer a broader set of opportunities particularly salient for start-ups and prospective entrepreneurs (Dholakia & Kshetri, 2004; Kolokas et al., 2020).

The scope of this topic may be aimed at startups and entrepreneurship in general; Alternatively, the topic can focus on female entrepreneurship (Ughetto et al., 2019).

References:

Bi, R., Davison, R. M., & Smyrnios, K. X. (2017). E-business and fast growth SMEs. *Small Business Economics*, 48(3), 559–576.

Block, J. H., Colombo, M. G., Cumming, D. J., & Vismara, S. (2018). New players in entrepreneurial finance and why they are there. *Small Business Economics*, 50(2), 239–250.

Bollaert, H., de Silanes, F. L., & Schwienbacher, A. (2021). Fintech and access to finance. *Journal of Corporate Finance*, 101941.

Cumming, D., Deloof, M., Manigart, S., & Wright, M. (2019). New directions in entrepreneurial finance. *Journal of Banking and Finance*, 100, 252–260.

- Dholakia, R. R., & Kshetri, N. (2004). Factors impacting the adoption of the Internet among SMEs. *Small Business Economics*, 23(4), 311–322.
- Giones, F., & Brem, A. (2017). Digital technology entrepreneurship: A definition and research agenda. *Technology Innovation Management Review*, 7(5).
- Kavuri, A. S., & Milne, A. (2019). FinTech and the future of financial services: What are the research gaps?
- Kolokas, D., Vanacker, T., Veredas, D., & Zahra, S. A. (2020). Venture Capital, Credit, and FinTech Start-Up Formation: A Cross-Country Study. *Entrepreneurship Theory and Practice*.
- Ughetto, E., Rossi, M., Audretsch, D., & Lehmann, E. E. (2019). Female entrepreneurship in the digital era. *Small Business Economics*.
- von Briel, F., Davidsson, P., & Recker, J. (2018). Digital technologies as external enablers of new venture creation in the IT hardware sector. *Entrepreneurship Theory and Practice*, 42(1), 47–69.
-

Title: International evidence on the time varying propensity to pay-out Dividends; Revisiting the lifecycle theory

Supervisor: Carl Vandenboorn (c.vandenboorn@maastrichtuniversity.nl)

Short text: Pay-out policy has changed over time. Determinants of dividend policy other than earnings changes through crisis-periods & bubbles seem to have caused this. This update study re-examines for a pre- and within crisis timeframe the change in propensity to use dividends as a pay-out tool for different industries.

References:

- Banyi, M. L., & Kahle, K. M. (2014). Declining propensity to pay? A re-examination of the lifecycle theory. *Journal of Corporate Finance*, 27, 345-366.
- Brav, Alon, John R. Graham, Campbell R. Harvey, and Roni Michaely, 2005, Payout policy in the 21st century, *Journal of Financial Economics* 77, 483-527.
- DeAngelo, Harry, Linda DeAngelo, and Douglas J. Skinner, 2004, Are dividends disappearing? Dividend concentration and the consolidation of earnings, *Journal of Financial Economics* 72, 425-456.
- DeAngelo, Harry, Linda DeAngelo, and Rene M. Stulz, 2006, Dividend policy and the earned/contributed capital mix: A test of the lifecycle theory, *Journal of Financial Economics* 81, 227-254.
- Denis, D. J., & Osobov, I. (2008). Why do firms pay dividends? International evidence on the determinants of dividend policy. *Journal of Financial economics*, 89(1), 62-82.
- Denis, D. J., & Osobov, I. (2005). Disappearing Dividends, Catering Incentives and Agency Costs: International Evidence. *Catering Incentives and Agency Costs: International Evidence* (July 2005).
- Fama, Eugene F., and Kenneth R. French, 2001, Disappearing dividends: changing firm characteristics or lower propensity to pay? *Journal of Financial Economics* 60, 3-43.
- Floyd, E., Li, N., & Skinner, D. J. (2015). Payout policy through the financial crisis: The growth of repurchases and the resilience of dividends. *Journal of Financial Economics*, 118(2), 299-316.
- Hauser, R. P. (2012). The firm "life-cycle" hypothesis and dividend policy: Tests on propensity to pay, dividend initiation, and dividend growth rates (Doctoral dissertation, Kent State University).
- Ihejirika, P. O., & Nwakanma, P. C. (2012). An empirical analysis of the propensity to pay or not to pay dividends: A test of the life cycle theory with Nigerian data. *Oman Chapter of Arabian Journal of Business and Management Review*, 34(969), 1-14.
- Kuo, J. M., Philip, D., & Zhang, Q. (2013). What drives the disappearing dividends phenomenon?. *Journal of Banking & Finance*, 37(9), 3499-3514.
- Payout Policy Through the Financial Crisis: The Growth of Repurchases and the Resilience of Dividends Eric Floyd, Nan Li and Douglas J. Skinner Chicago Booth Research Paper No. 12-01
-

Title: Media and the Stock Market**Supervisor: Dr. Peiran Jiao** (p.jiao@maastrichtuniversity.nl)

Short text: Many papers suggest that market reactions to news in media can deviate from Bayesian prescriptions. For instance, investors are prone to react to “stale news” which merely repeat previous revelations (Tetlock, 2011), and to focus on “attention-grabbing” stocks in the media rather than considering all available information (Barber and Odean, 2008). More generally, sentiments in news and online searches predict stock returns and trading volumes (Tetlock, 2007), stocks with low coverage have higher returns (Fang and Peress, 2009). Beyond traditional news media, activity in specialist chat rooms (e.g. *RagingBull*) predicts high volatility and trading volume (Antweiler and Frank, 2004), and sentiment indicators extracted from online forums and searches can predict returns (Chen et al., 2014). A growing economic literature also compares online and offline news (Gentzkow, 2011). Open questions remain in this field regarding social media: How is social media content processed? Is it processed differently from traditional online and offline news? Which models best describe the role of information from different sources? This project relies on proprietary data of media content (quantity of coverage and sentiments) to analyse the differential impacts of social and traditional news media on financial markets.

References:

- Antweiler, W., & Frank, M. Z. (2004). Is all that talk just noise? The information content of internet stock message boards. *The Journal of Finance*, 59(3), 1259-1294.
- Barber, B. M., & Odean, T. (2007). All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors. *The Review of Financial Studies*, 21(2), 785-818.
- Chen, H., De, P., Hu, Y., & Hwang, B. H. (2014). Wisdom of crowds: The value of stock opinions transmitted through social media. *The Review of Financial Studies*, 27(5), 1367-1403.
- Fang, L., & Peress, J. (2009). Media coverage and the cross-section of stock returns. *The Journal of Finance*, 64(5), 2023-2052.
- Gentzkow, M., & Shapiro, J. M. (2011). Ideological segregation online and offline. *The Quarterly Journal of Economics*, 126(4), 1799-1839.
- Tetlock, P. C. (2007). Giving content to investor sentiment: The role of media in the stock market. *The Journal of Finance*, 62(3), 1139-1168.
- Tetlock, P. C. (2011). All the news that's fit to reprint: Do investors react to stale information?. *The Review of Financial Studies*, 24(5), 1481-1512.
-

Title: Impact of Covid-19 on Risk-Neutral Distributions**Supervisor: Paulo Rodrigues** (p.rodrigues@maastrichtuniversity.nl)

Short text: The Coronavirus outbreak caused not only severe health problems but also major economic disruptions. Derivative markets allow us to estimate market implied expectations of the size of economic disruptions. One such paper that does this is “Coronavirus: Impact on Stock Prices and Growth Expectations”. In this project you are asked to use the method proposed by Breeden and Litzenberger (1978) to get option implied estimations of risk-neutral distributions of major stock market indices on days before and after the implementations of lockdowns and stimulus packages. Students that want to take this topic are expected to have a basic knowledge of option pricing, be willing to do extensive data work, and be familiar with a programming language like, e.g., Matlab, R, Python.

References:

- Douglas T. Breeden and Robert H. Litzenberger (1978): “Prices of State-Contingent Claims Implicit in Option Prices”. *The Journal of Business* Vol. 51, No. 4, pp. 621-651.
- Niels Joachim Gormsen and Ralph S. J. Koijen (2020): “Coronavirus: Impact on Stock Prices and Growth Expectations”. University of Chicago, Becker Friedman Institute for Economics Working Paper No. 2020-22

Title: Profitable trading strategies using statistical learning algorithms**Supervisor: Peter Schotman** (p.schotman@maastrichtuniversity.nl)

Short text: Once asset pricing and portfolio selection were simple. An optimal portfolio was a combination of the riskfree asset and the market portfolio, and its risk and expected returns were given by the CAPM beta. Nowadays hundreds of profitable trading strategies have been discovered that appear to outperform the market. With the advance of sophisticated statistical learning algorithms the pace of new discoveries increases. Many strategies share common characteristics. Therefore investors have become interested in summarising the multitude of trading strategies in a few factors. Constructing factors has also benefited from learning techniques. Seeking exposure to particular factors is called factor investing.

Many promising trading strategies fail to deliver, however, after being discovered. This could be because many investors implement the strategy, and thereby arbitrage it away, or because the strategy was a statistical illusion from the start. The latter are called false discoveries.

These are three areas for thesis topics: (i) prediction methods for returns, (ii) factor and portfolio construction, (iii) performance evaluation. Each offers many opportunities for a thesis. Both the academic as well as the practitioner literature has abundant suggestions for new techniques and new promising strategies. Possibilities seem endless. For this you need your own creativity. For a finance thesis, the emphasis must be on the finance application, not on mathematical or statistical proofs. How useful are techniques for finance?

Two things are important for a feasible project. First, it must be possible to obtain the necessary data. Through the library the school has access to many databases. In addition the [Ken French Data Library](#) is a rich, freely available, online database on asset returns. Second, working with statistical learning techniques requires some programming skills. Most methods are available as packages in the statistical language R. An alternative is Matlab, which also has many useful packages. When packages are available, you don't need to program the algorithms, but you must be able to use the packages. Relying solely on Excel will not be sufficient.

References:

Below are a few recent examples of academic studies that offer some background:

DeMiguel, V., A. Martín-Utrera, F.J. Nogales and R. Uppal (2018) A Portfolio Perspective on the Multitude of Firm Characteristics, [SSRN working paper 2912819](#).

Gu, S., B. Kelly and D. Xiu (2020) Empirical Asset Pricing via Machine Learning, *Review of Financial Studies* 33, 2223-2273.

Harvey, C. R., (2017) The Scientific Outlook in Financial Economics, *Journal of Finance* 72, 1399-1440.

Hodges, P.H., K.E. Hogan, J.R. Peterson and A. Ang (2017) Factor Timing with Cross-Sectional and Time-Series Predictors, *Journal of Portfolio Management* Fall 2017, 30-43

Title: Tracking portfolios**Supervisor: Peter Schotman** (p.schotman@maastrichtuniversity.nl)

Short text: A recurring question in finance research is which macroeconomic factors represent the systematic risk in stock returns. Macro variables are the ultimate sources of systematic risk. But in finance we often take a shortcut, stating that a well-diversified portfolio contains only systematic risk. But what is this systematic risk? Risks that may be of interest are economic growth, inflation, interest rates and others. We think of stock prices as the present value of future dividends. Since dividends must be related to production and consumption, returns should say something about the real economy. Unfortunately, empirical finance research usually concludes that the correlation between financial returns and macroeconomic risks is very low. One of the problems is that macroeconomic variables are subject to large measurement errors, and often only available at low frequencies such as quarterly. Early work in this area is the classic

study by Chen, Roll and Ross (1986). They look at typical macroeconomic factors such as inflation, term spread, default spread, production growth and similar variables. The focus of this thesis topic is methodologically very different. The idea is to construct tracking portfolios, also called mimicking portfolios. From a time series perspective we look at how well the return on a portfolio of assets can explain the shocks in a macro variable. Which portfolio of stocks is most highly correlated with a particular macro variable? The concept of mimicking portfolios goes back to Huberman, Kandel and Stambaugh (1987). The methodology is very well documented in Lamont (2001). New applications for tracking portfolios have been explored by Lönn and Schotman (2018). What is still missing in this research is a detailed empirical analysis.

Let y_{it} be the excess returns on stock i in period t , and let z_t be shocks to some macro variable. As an approximation of such shocks we use the residuals from regressing the macro variable on a few lags. A tracking portfolio is defined by the regression

$$z_t = w_0 + \sum_i w_i y_{it} + e_{it}$$

The coefficients w_i can be interpreted as portfolio weights. They define the tracking portfolio $Y_t = \sum_i w_i y_{it}$. The risk premium of the factor portfolio is then the risk premium of the macroeconomic factor.

Interesting questions are:

- How much of the variance of the macroeconomic news can be explained by returns?
 - Which systematic return factors capture important macroeconomic risk?
- Systematic return factors are the risk factors identified in much of the empirical finance literature. Examples are the 5 Fama-French factors, momentum, liquidity, and volatility. Many more are listed in Harvey, Liu and Zhu (2016).
- Which macroeconomic factors are priced?
 - Most likely the portfolio weights will vary over time, and different stocks or portfolios of stocks will be important in different periods.

Methodologically this topic involves regressions with potentially many explanatory variables and time varying coefficients. It will require some machine learning techniques to do model selection in order to identify the most relevant financial market information related to macro data.

References:

Chen, N., R. Roll and S. Ross (1986) Economic Forces and the Stock Market, *Journal of Business* 59, 383–403.
 Harvey, C. R., Y. Liu and H. Zhu (2016) ... and the cross-section of expected returns, *Review of Financial Studies* 29, 5-68.
 Huberman, G., S. Kandel and R.F. Stambaugh (1987) Mimicking portfolios and exact arbitrage pricing, *Journal of Finance* 42, 1-9.
 Lamont, O.A., (2001) Economic Tracking Portfolios, *Journal of Econometrics* 105, 161-184.
 Lönn, R. and P.C. Schotman (2022) Empirical asset pricing with many assets and short time series, [SSRN working paper 3278229](https://ssrn.com/abstract=3278229).

Title: Real Estate as an Inflation Hedge

Supervisors: Nils Kok (n.kok@maastrichtuniversity.nl); Alexander Carlo (a.carlo@maastrichtuniversity.nl); Stefan Flagner (s.flagner@maastrichtuniversity.nl)

Short text: The extent to which an asset provides a hedge against inflation is an important consideration for institutional investors with indexed liabilities (i.e. defined-benefit pension funds). There are quite a few studies that investigate how stocks, bonds and real estate can provide such hedge, but most studies took place when inflation rates were still (very) high. Over the past 20 years, inflation rates have been moderate, and some would even say “inflation is dead.” The question is how hedging capabilities of assets have changed over the past decades, and in particular, how that has evolved for

real estate. Because even though inflation may be dead, there are many investors that fear the beast will come alive again, after the current crisis. This thesis topic studies the inflation hedging capabilities of different types of real estate, with a focus on developed economies, including REITs, commercial real estate, and the housing market. Some of the data is readily available, but some of the data will still need to be collected.

Data Sources:

- Housing: BIS, Case Shiller, NCREIF.
- Commercial: NCREI, MSCI/IPD.
- REITs: FTSE EPRA Nareit, GPR.

References and background reading:

- See "Brounen et al. 2014. Inflation Protection from Homeownership: Long-Run Evidence, 1814–2008. Real Estate Economics." for an overview and references to other relevant papers.

Requirements:

- Strong statistical proficiency, using R or Stata.
-

Title: Predictive regressions and extreme signals (Asset pricing)

Supervisor: Stefan Straetmans (s.straetmans@maastrichtuniversity.nl)

Short text: The classic approach in asset pricing towards testing return predictability is to regress (excess) returns on past returns or other publically available information (financial or macroeconomic variables, see e.g. Goyal and Welch (2008) for predictors of stock returns). In this project we would like to investigate return predictability when predictors (i.e. the 'signal') take on extreme values (spikes). For example, in foreign exchange markets Purchasing Power Parity (PPP) and Uncovered Interest Parity (UIP) constitute cornerstones of short-run and long-run exchange rate determination. However, the empirical evidence on both conditions is relatively weak. There is some long-run evidence for relative PPP (regressing nominal bilateral exchange rate changes on inflation differentials for multiyear periods). But absolute and relative PPP are characterized by serious deviations (swings in the real exchange rate) when considering higher frequency data (the short run). Empirical evidence on UIP is also relatively weak: regressing nominal bilateral changes of the spot exchange rate on lagged cross-country interest differentials typically render a negative relation instead of the expected positive relation according to the theory. We would like to investigate the empirical validity of the parity conditions above when the inflation differential or interest differential is large in absolute value (extreme). Goods (interest) arbitrage might be more worthwhile to undertake when these cross country differentials are large.

The same question can be asked about other risky asset classes like stocks, bonds, housing etc. Do extreme swings in fundamentals transfer to returns? And if so, what does it imply for return predictability? Obviously, given that regressions are by definition average relations between dependent and independent variables, one needs to resort to other methodologies. In this project, one could focus on quantile regressions or tail dependence measures like the Marginal Expected Shortfall (MES) which has been widely used to measure systemic risk of financial institutions, see e.g. Brownlees and Engle

References:

- Brownlees, C.T., Engle R. , 2017. SRISK: A Conditional Capital Shortfall Measure of Systemic Risk. *The Review of Financial Studies* 30(1), 48-79.
 - Cumparayot, P., de Vries, Casper G., 2017. Linking Large Currency Swings to Fundamentals' Shocks. Working paper.
 - Hartmann P, Straetmans S, Vries CG de., 2004. Asset market linkages in crisis periods. *Review of Economics and Statistics* 86 (1):313-326.
 - Welch, I., Goyal, A., 2008. A comprehensive look at the empirical performance of Equity Premium Prediction. *The Review of Financial Studies* 21(4), 1455-1508.
-

Title: Macro stress tests and disaster risk**Supervisor: Stefan Straetmans** (s.straetmans@maastrichtuniversity.nl)

Short text: The aim of this project would be to assess the marginal and joint likelihood of sharp downfalls in macro variables. It is well known that financial returns and losses are nonnormally distributed. However, the frequency of sharp falls in macrovariables remains underinvestigated as to date. Very little empirical research has been done on the tail risk and the tail dependence of real variables, partly because the data frequency of these series is much lower. This implies that it is harder to make estimation and inference in the tails. This project aims to fill this gap by assessing the tail risk and the tail dependence (spillovers) of variables like GDP growth, changes in unemployment, inflation or money growth. A scant literature looks into volatility clustering of real variables (see e.g. Engle (1982)) which is a sufficient condition for the heavy tailness of the corresponding variables. Correctly assessing the marginal and joint (spillover) likelihood of extreme downfalls in macro variables may be relevant for e.g. the asset pricing or disaster risk literature, the literature on business cycle synchronisation or for stress testing.

References:

- Janssen, D., de Vries, C.G., 1991. On the frequency of large stock returns: putting booms and busts into perspective. *Review of Economics and Statistics* 73, 19-24.
 - Engle, R.J., 1982. Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of UK Inflation, *Econometrica*, 50 (4), pp. 987-1007.
 - R.J. Barro, 2006. Rare Disasters and Asset Markets in the Twentieth Century. *121(3)*, 823-866.
-

Title: Do inflation expectations respond to sentiment in central bank speeches**Supervisor: Dirk Broeders** (d.broeders@maastrichtuniversity.nl)

Short text: The goal of this thesis is to empirically analyze how inflation expectations responds to speeches by members of the Governing Council and the ECB Board of Directors. Consensus inflation forecast can be used as well as market implied inflation expectations that can be derived from inflation linked bonds. You can also look at inflation linked swaps or inflation linked options although these two are traded only over-the-counter and data might not be easily accessible. The study uses Natural Language Processing (NLP) analysis. The ECB has published all speeches in an easy accessible csv format since the beginning of the ECB:

<https://www.ecb.europa.eu/press/key/html/downloads.en.html>.

References: Warin, T. and W. Sanger (2020), The speeches of the european central bank's presidents: An nlp study, *Global Economy Journal*, 20(2): 1-31.

Title: An empirical assessment of the relationship between the cost of equity and realized equity returns**Supervisor: Dennis Bams** (w.bams@maastrichtuniversity.nl)

Short text: The Dividend Discount model, according to conventional finance theory, relates the present value of a company's equity to the discounted value of future dividend payments. The discount rate, or formally the cost of equity, represents a risk-adjustment of expected future dividends and it makes intuitive sense that the discount rate is positively related to expected future equity returns from a risk-return perspective. In this research topic we are interested in empirically assessing the relationship between the implied cost of equity and realized future returns by following the refined approach of estimating the cost of equity proposed by Hou et. al (2012), based on earlier approaches introduced by Gordon and Gordon (1997) and Gebhardt et. al (2001). Data acquisition will be done using CRSP and Compustat. Main points of interest are the robustness of the Earnings forecasts to slight model adjustments, robustness of the cost of equity estimation to different Dividend Discount model assumptions and finally how the relationship between realized returns and cost of equity can be interpreted for different approaches for estimating the earnings forecasts, Dividend Discount model assumptions and return holding periods. Data acquisition will be done using CRSP and Compustat. Knowledge of Empirical or Mathematical Finance will help but is not a prerequisite.

References:

- Hou, K., Van Dijk, M. A., & Zhang, Y. (2012). The implied cost of capital: A new approach. *Journal of Accounting and Economics*, 53(3), 504-526.
- Gebhardt, W. R., Lee, C. M., & Swaminathan, B. (2001). Toward an implied cost of capital. *Journal of Accounting Research*, 39(1), 135-176.
- Gordon, J. R., & Gordon, M. J. (1997). The finite horizon expected return model. *Financial Analysts Journal*, 53(3), 52-61.
-

Title: Discrimination in lending: taste-based versus statistical discrimination**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)**Short text:** When banks make lending decisions, are they pricing risk ... or basing their decisions on a biased, discriminatory view? And ... how can we distinguish between the two? In this project, you look at discrimination in lending decisions. This project requires an above average interest in banking, and in quantitative methods.**References:**

- Ferguson, M. F. and S. R. Peters (1995). What constitutes evidence of discrimination in lending? *The Journal of Finance* 50(2), 739-748.
 - Shaffer, S. (1996). Evidence of discrimination in lending: An extension. *The Journal of Finance* 51(4), 1551-1554.
-

Title: Discrimination in lending: an Algorithmic approach**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)**Short text:** Fintech has changed the way we make lending decisions. But ... has it lowered discrimination in lending? Can algorithms discriminate? And if so, how do they do it? This project requires an above average interest in banking, and in quantitative methods.**References:**

- Bartlett, R., A. Morse, R. Stanton, and N. Wallace (2019). Consumer-lending discrimination in the fintech era. Technical report, National Bureau of Economic Research.
-

Title: Discrimination in lending: Redlining ... or silver lining?**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)**Short text:** What is true of the individual, is not necessarily true of the group that individual belongs to. And ... vice versa. But how does that 'simple' wisdom affect lending decisions? In this project, you look at the impact of redlining in banking. This project requires an above average interest in banking, and in quantitative methods.**References:**

- Tootell, G. M. (1996). Redlining in Boston: Do mortgage lenders discriminate against neighborhoods? *The Quarterly Journal of Economics* 111(4), 1049- 1079.
-

Title: Finding your banking market**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)**Short text:** In many empirical analyses, especially when we are measuring competition, we need to define the market in which firms operate. Are banks active nationally, in a certain city or in a state. In this project, you will research cross-elasticities, and think creatively of empirical methods to delineate markets. Great project for a student who likes microeconomics and banking.**References:**

- Bikker, J.A. and J.W.B. Bos (2008). Bank Performance: a theoretical and empirical framework for the analysis of profitability, competition and efficiency, <https://www.routledge.com/Bank-Performance-A-Theoretical-and-Empirical-Framework-for-the-Analysis/Bikker-Bos/p/book/9780415569613>.

Title: What can we learn from simulating treatment effects?**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)**Short text:** Identifying the causal effect of a certain (policy) change in an empirical (regression) analysis is far from easy. All kinds of problems can appear that make things difficult: endogeneity, omitted variables, multicollinearity, etc. In this project, we want to investigate how we can assess the bias in treatment effects by simulating processes where we know that treatment cannot be properly identified.**References:**

- <https://www.mostlyharmlesseconometrics.com>
-

Title: Efficient Justice for All**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)**Short text:** As part of a large EU project, we are conducting comparative analyses of the efficiency of courts in the EU. For this thesis, you will contribute to this analysis, by analyzing an existing EU database with the aim of estimating efficiency. The project requires above average affinity with programming.**References:**

- <https://www.cost.eu/actions/CA20131/>
-

Title: Scope for Scope, Product Mix Economies in Banking**Supervisor: Jaap Bos** (j.bos@maastrichtuniversity.nl)**Short text:** Scope Economies are the missing element in most productivity analyses in banking (and in many other sectors). In practice, however, there is plenty of evidence that the importance of scope economies is growing. For this project, you will first compare existing approaches to measuring scope economies in banking and then perform your own analysis on a large data set of US banks.**References:**

- <https://usfl-new.wp.hum.uu.nl/wp-content/uploads/sites/232/2015/09/Boot-The-Future-of-Banking-European-Economy-2017.pdf>
 - <https://www.sciencedirect.com/science/article/pii/S0304393284900412>
-

Title: Is it really not about the money? Belief elicitation in the domain of socially responsible investment**Supervisor: Bin Dong** (b.dong@maastrichtuniversity.nl)**Short text** (explaining the topic or extra information about the topic):

Trillions of dollars are invested in socially responsible businesses. However, the true underlying mechanism for investors' socially responsible investment is yet unknown. Students can investigate investors' beliefs towards an ESG (environmental, social, governance) fund in an incentivized lab experiment or a field experiment or a survey. Novel methods can be designed to formally evaluate their beliefs about the fund's return and risk for, for example, both short-run (1 year) and long-run (3 years), updating of belief in the face of positive and negative return information, and perception of the level of ambiguity. The findings will contribute to the understanding of why investors hold high ESG investments and to the design of relevant policies.

References:

- Agrawal, A. and Hockerts, K. (2021). 'Impact investing: review and research agenda', *Journal of Small Business & Entrepreneurship*, vol. 33(2), pp. 153–181.
- Bauer, R. and Smeets, P. (2015). 'Social identification and investment decisions', *Journal of Economic Behavior & Organization*, vol. 117, pp. 121–134.
- Hong, H. and Kacperczyk, M. (2009). 'The price of sin: The effects of social norms on markets', *Journal of financial economics*, vol. 93(1), pp. 15–36.

Kahneman, D. and Miller, D.T. (1986). 'Norm theory: Comparing reality to its alternatives.', *Psychological review*, vol. 93(2), p. 136.

Ellsberg, D. (1961). 'Risk, ambiguity, and the savage axioms', *The quarterly journal of economics*, pp. 643–669.

Title: What is the impact of climate related disasters on investment decisions? Investment portfolios? (Sustainable Finance)

Supervisor: Flavio De Carolis (f.decarolis@maastrichtuniversity.nl)

Short Text: Nowadays, the impact of climate change is impacting 85% of the world population. Rare disasters related to climate change are increasing in frequency and magnitude and there is an enhanced interest towards their impact on investments decisions. How do companies and managers which are hit by disasters react to these events? To pursue a master thesis in this field you can either approach the topic purely empirically or more qualitatively. If you decide for the former, you can retrieve your data using for instance text analysis (on CEO's speeches, Annual Reports etc.) or GIS software (using satellite images or maps) and complement this with other financial and non-financial data. You are free to decide which method to apply depending on the data you will work with (Panel data, Time series or Cross section data). If you are interested in the topic and want to go for a more qualitative approach, you might investigate your research question for instance leveraging on several Annual reports, CEO's speeches etc.

Sources:

Alok, S. Kumar, N. Wermers, R. 2020 Do Fund Managers Misestimate Climatic Disaster Risk? *The Review of Financial Studies* Vol. 33No. 3March DOI:

<https://doi.org/10.2139/ssrn.3427903>

Title: To which extent do ESG patents impact firms' fundamentals? (Sustainable Finance)

Supervisor: Flavio De Carolis (f.decarolis@maastrichtuniversity.nl)

Short Text: One of the ways we can tackle climate change is through innovation. Many technologies which are currently under development aim at capturing carbon emissions, developing climate friendly fuels or at storing energy which is generated using renewable resources etc. What is the impact of these innovations on asset prices? Are they generating profits? Do they impact asset prices? To pursue a master thesis in this field you can either approach the topic purely empirically or more qualitatively. You are free to decide which method to apply depending on the data you will work with (Panel data, Time series or Cross section data). If you are interested in the topic and want to go for a more qualitative approach, I am glad to hear your proposal.

Sources:

Cohen, L. Gurun, U. Nguyen Quoc, . 2022 ESG-Innovation Disconnect: Evidence from Green Patenting, NBER Working Papers

Title: (Un)equal access to housing wealth

Supervisor: Jonas Wogh (j.wogh@maastrichtuniversity.nl)

Short text: Homeownership is the most important source of wealth accumulation for households. However, a growing body of evidence suggests that different groups of society earn different returns on their real estate, which leads to significant wealth gaps. The reasons for these disparities can be widespread, ranging from differences in bargaining skills over differences in location choice to outright discrimination. In this project, you will investigate inequalities in real estate markets and their significance for wealth accumulation. This topic can be approached from many different angles and you will be given sufficient flexibility in choosing your preferred one.

References:

- Avenancio-Leon, C., & Howard, T. (2019). The assessment gap: Racial inequalities in property taxation. Available at SSRN 3465010.

- Goldsmith-Pinkham, P., & Shue, K. (2020). The gender gap in housing returns (No. w26914). National Bureau of Economic Research.
 - Kermani, A., & Wong, F. (2021). Racial Disparities in Housing Returns (No. w29306). National Bureau of Economic Research.
 - Bhutta, N., & Hizmo, A. (2021). Do minorities pay more for mortgages?. *The Review of Financial Studies*, 34(2), 763-789.
-

Title: House prices – fundamentals or bubble?**Supervisor: Jonas Wogh** (j.wogh@maastrichtuniversity.nl)

Short text: The development of residential real estate prices – especially their rapid increase in some urban markets – has been far up on the political agenda in recent years. It has also evoked bleak memories from the run-up to the global financial crisis, which was preceded by rapidly surging house prices. This raises the important question of whether the current trend reflects another (credit-driven) bubble or whether it is instead driven by economic fundamentals, such as geographic supply constraints or growing labour demand in urban regions.

In this project, you will begin by reviewing the literature on house price fundamentals and their historic importance. Then, you will engage in an empirical analysis of median house prices in different regional (sub-)markets, in order to identify whether unequal trends can be explained by certain economic fundamentals.

References:

- Saiz, A. (2010). The geographic determinants of housing supply. *The Quarterly Journal of Economics*, 125(3), 1253-1296.
 - Chodorow-Reich, G., Guren, A. M., & McQuade, T. J. (2021). The 2000s housing cycle with 2020 hindsight: A neo-kindlebergerian view (No. w29140). National Bureau of Economic Research.
 - Favara, G., & Imbs, J. (2015). Credit supply and the price of housing. *American Economic Review*, 105(3), 958-92.
 - Black, A., Fraser, P., & Hoesli, M. (2006). House prices, fundamentals and bubbles. *Journal of Business Finance & Accounting*, 33(9-10), 1535-1555.
-

Title: Energy Poverty**Supervisor: Linde Kattenberg** (l.kattenberg@maastrichtuniversity.nl)

Short text: Energy prices are currently rising at a fast pace. Although the current shock was unexpected, we know that energy prices will rise in the future due to governmental policy aimed at reducing fossil fuel use. For households, this means that their energy bill can become an ever-larger burden. Especially households living in homes with low energy-efficiency are vulnerable to energy price fluctuations, and 'energy poverty' is becoming a more prominent problem. In this thesis, you will identify households that are living in energy poverty. You can make use of survey results of a representative sample of Dutch households that include questions on living conditions, and on demographic characteristics of the tenants. What are the characteristics of households living in energy poverty and how are they affected by future changes in energy prices? You will also investigate their barriers towards energy efficiency investment, and how these barriers can be lifted in order to make them more resilient to future energy price fluctuations.

Data sources: - Household survey data, for example Housing section of LISS panel.

References:

- Allcott, H., Knittel, C., & Taubinsky, D. (2015). Tagging and targeting of energy efficiency subsidies. *American Economic Review*, 105(5), 187-91.
- Borenstein, S., & Davis, L. W. (2016). The distributional effects of US clean energy tax credits. *Tax Policy and the Economy*, 30(1), 191-234.

Requirements: Statistical proficiency, using R or Stata.

Title: Benchmark shopping behavior for global pension funds in alternative asset

classes (i.e., private equity, hedge funds, real assets, private debt)**Supervisor: Alexander Carlo** (a.carlo@maastrichtuniversity.nl), **Piet Eichholtz, Nils Kok**

Short text: Maastricht University's Finance Department works with CEM, the leading global database regarding pension fund investments. CEM has shared its entire investment database, mapping the investments of about 1,000 pension funds worldwide for the last 30 years. This database is a research treasure, and CEM allows a selected group of students to do research with it under the guidance of Maastricht University professors Eichholtz, Kok, and Ph.D. candidate Alexander Carlo. This topic focuses on whether global pension funds engage in benchmark shopping behavior when reporting the benchmark-adjusted performance of their investments in alternative asset classes. Performance measurement of less-liquid, non-traded assets is challenging, especially at the point of benchmark selection. This implies that managers have much more discretion in the benchmark selection procedure, which opens the door for agency problems. Previous studies by Ludovic Phalippou have documented that private equity buyout funds engage in strategic benchmark selection by selecting and switching between benchmarks to claim outperformance. If you choose this thesis topic, you will study whether this behavior can also be observed for one of the following asset classes: private equity, hedge funds, real assets, and private debt. The first step is to map all the benchmarks of the global pension funds used in the CEM database. Towards this end, we have already extracted the benchmarks for each asset class to ensure you can get started immediately. Finally, you will apply empirical models to analyze determinants of engaging in this benchmark shopping behavior. For example, consider variables like plan type (public vs. private), country of origin, investment cost levels, investment style, pension fund size, etc. Data sources: - CEM data.

References and background reading:

These studies have extensively used the CEM database before:

- Andonov, Eichholtz & Kok (2015, Journal of Financial Markets) and Andonov, Eichholtz & Kok (2013, Journal of Portfolio Management).
- Phalippou, L., An Inconvenient Fact: Private Equity Returns & The Billionaire Factory (2020). University of Oxford, Saïd Business School, Working Paper, Available at SRN: <https://ssrn.com/abstract=3623820>
- Phalippou, L., 2014, Performance of buyout funds revisited?, Review of Finance 18, 189– 218. Requirements: - Statistical proficiency, using R.

Title: Benchmark shopping behavior for global pension fund public equity/fixed income investments**Supervisor: Alexander Carlo** (a.carlo@maastrichtuniversity.nl), **Piet Eichholtz, Nils Kok**

Short text: Maastricht University's Finance Department works with CEM, the leading global database regarding pension fund investments. CEM has shared its entire investment database, mapping the investments of about 1,000 pension funds worldwide for the last 30 years. This database is a research treasure, and CEM allows a selected group of students to do research with it under the guidance of Maastricht University professors Eichholtz, Kok, and Ph.D. candidate Alexander Carlo. This topic focuses on whether global pension funds engage in benchmark shopping behavior when reporting the benchmark-adjusted performance of their investments in traditional asset classes. Performance measurement of less-liquid, non-traded assets is challenging, especially at the point of benchmark selection. This implies that managers have much more discretion in the benchmark selection procedure, which opens the door for agency problems. Previous studies by Ludovic Phalippou have documented that private equity buyout funds engage in strategic benchmark selection by selecting and switching between benchmarks to claim outperformance. However, no studies look at benchmark selection behavior in the traditional asset classes (i.e., stocks and fixed income). If you choose this thesis topic, you will study whether this behavior can also be observed for one of the traditional asset classes. The first step is to map all the benchmarks of the global pension funds used in the CEM database. Towards this end, we have already extracted the benchmarks for each

asset class to ensure you can get started immediately. Finally, you will apply empirical models to analyze determinants of engaging in this benchmark shopping behavior. For example, consider variables like plan type (public vs. private), country of origin, investment cost levels, investment style, pension fund size, etc. Data sources: - CEM data.

References and background reading:

These studies have extensively used the CEM database before:

- Andonov, Eichholtz & Kok (2015, Journal of Financial Markets) and Andonov, Eichholtz & Kok (2013, Journal of Portfolio Management).
- Phalippou, L., An Inconvenient Fact: Private Equity Returns & The Billionaire Factory (2020). University of Oxford, Saïd Business School, Working Paper, Available at SRN: <https://ssrn.com/abstract=3623820>
- Phalippou, L., 2014, Performance of buyout funds revisited?, Review of Finance 18, 189– 218. Requirements: - Statistical proficiency, using R.

Title: Climate risk and commercial real estate market

Supervisor: Dongxiao Niu (dongxiao.niu@maastrichtuniversity.nl)

Short text: Climate risks are rapidly emerging as a factor relevant not just to policymakers, but also to the investment community and financial markets. Due to the immobility of assets, (commercial) real estate markets are especially vulnerable to climate risks. Natural disasters, including hurricanes, floods, storms, and wildfires, pose a significant risk to existing assets and the health of the local economy. With more frequent and severe climate events serving as a tangible reminder, investors are increasingly assessing the effects of climate risk on commercial real estate values. In this thesis, you will identify properties that are located in high-risk areas in terms of climate vulnerability. You can make use of commercial property transaction sample in the Netherlands to examine the pattern of commercial properties' market performance facing climate risks. What would be the change in property values in high-risk area with more frequent climate shocks? What are the major drivers of these changes? What are the characteristics of investors buying and selling commercial properties in high-risk area? You can also investigate the local economic vibrancy after climate shocks, and how these spillover effect can play a role in commercial real estate market evolution.

References:

Addoum, J. M., Eichholtz, P. M. A., Steiner, E., & Yönder, E. (2021). Climate Change and Commercial Real Estate: Evidence from Hurricane Sandy. SSRN Electronic Journal.
Fisher, J. D., & Rutledge, S. R. (2021). The impact of Hurricanes on the value of commercial real estate. Business Economics, 56(3), 129–145.

Title: Climate risk and housing affordability

Supervisor: Dongxiao Niu (dongxiao.niu@maastrichtuniversity.nl)

Short text: The presence of climate risk impacts housing market in a comprehensive way. Home owners and investors start to incorporate various strategies to price and manage climate risks. In this thesis, you will begin by conducting a literature review for climate change and housing market. Then you will identify houses that are located in high-risk areas in terms of climate vulnerability. You can make use of housing transaction sample in the Netherlands to examine the changes of housing price facing climate risks. How does the price of homes facing more climate risks or experiencing more frequent climate shocks compare to similar homes with lower risks? How do the price changes compare for homes of different sizes, energy efficiency, and location attributes? To the extent that housing prices are higher for climate-resilient homes, what would the impact of climate shocks have on the affordability of housing in the Netherlands? You can also investigate how housing prices and affordability differ between regions or submarkets, e.g., urban and rural area, strong and weak market.

References:

Bernstein, A., Gustafson, M. T., & Lewis, R. (2019). Disaster on the horizon: The price

effect of sea level rise. *Journal of Financial Economics*, 134(2), 253–272.

Bosker, M., Garretsen, H., Marlet, G., & van Woerkens, C. (2019). Nether Lands: Evidence on the price and perception of rare natural disasters. *Journal of the European Economic Association*, 17(2), 413-453.

Giglio, S., Maggiori, M., Rao, K., Stroebel, J., & Weber, A. (2021). Climate change and long-run discount rates: Evidence from real estate. *The Review of Financial Studies*, 34(8), 3527–3571.

Title: Does Culture Affect Outcomes in Finance and Banking?

Supervisor: Stefanie Kleimeier (s.kleimeier@maastrichtuniversity.nl)

Short text: Today, societies, markets and companies are faced with globalization through the increasing interdependence between countries, economies and peoples. Regarding the consequences of this globalization process, proponents of convergence theory argue that globalization will lead to homogenization in individual decision-making and to transnational standardization of markets and economies. In contrast, proponents of divergence theory argue that regional differences have their roots in national culture, which has allowed these differences to persist over a long period of time and may continue to exist in the future despite the pressures of globalization. Thus, the theory of divergence predicts that economic, financial or business-related characteristics should continue to vary widely across countries even in a globalized economy, and that cultural characteristics can explain these unique national characteristics.

Guiso et al. (2006) describe the research area of "cultural economics" from the premise that for individuals - through religion or ethnicity - culture is largely a "given" and not easily changed. Culture, in turn, influences economic decision-making. For example: In cultures with high levels of trust, banks may be less likely to require collateral or guarantees from borrowers because they have confidence in the borrower's intention to repay the loan. Cross-border mergers may be more successful if the managers of the different business units are accustomed to the same corporate culture regarding power and hierarchy in management decision-making. Investors may have a strong preference for domestic stock and bond portfolios if they feel culturally very different from the foreign markets in which they might invest.

Reuter (2011) and Karolyi (2016) discuss different approaches to measuring culture and provide an overview of different areas of research. Their studies show that a wide variety of analysis is possible on this topic and that many questions remain unanswered. In a thesis, students can examine the impact of culture at different levels, ranging from (1) manager/investor decision-level analyses, (2) firm-level analyses, to (3) country-level analyses. Here are some examples of cultural studies in finance: Heuchemer et al. (2009) and Sander et al. (2016) are examples of country studies that show how cultural differences between countries affect cross-border banking. Note that the data used in these two studies are now publicly available in Table 6.2 of the BIS Locational Banking Statistics and may well be used by students in their own graduate research. - Costa et al. (2013) is an example of a country-level analysis and illustrates how national culture affects the underpricing of IPOs. An example of a short country-level article that relates national culture to stock market returns at the beginning of COVID-19 pandemic is Ashraf (2021). - Orij (2010), Holderness (2016), and Díez-Esteban et al. (2019) and Choi (2020) are examples of firm-level analyses and illustrate how national culture affects the level of social disclosure, ownership structures, dividend payments, corporate risk-taking, and research and development (R&D) investment, respectively. Note that the aforementioned study by Holderness (2016) was published in a special issue of the *Journal of Corporate Finance* on the link between culture and finance. More related studies can be found in this special issue. It should also be noted that the *Journal of Banking and Finance* has published numerous articles on national culture and financial decision-making of investors, banks and corporations over the past few years. Go to <https://www.sciencedirect.com/journal/journal-of-banking-and-finance> and search "national culture" or simply "culture." For example, articles link national culture to trading

in financial markets (Tan et al, 2019), firms' capital structure (Ghoul et al, 2019), their cost of debt capital (Chui et al, 2016), the maturity of debt capital (Zheng et al, 2012), cash holdings (Chen et al, 2015), or the degree of IPO underpricing (Kanagaretnam et al., 2022).

Please note that during the last couple of years, several SBE students have investigated this topic with specific focus on the effect of cultural differences on the performance of cross-border M&A. Thus, new thesis proposals on this specific sub-topic will not be accepted.

Sources for national-level cultural data:

Hofstede's Cultural Dimensions: <https://geerthofstede.com/research-and-vsm/dimension-data-matrix/> or <http://globe.bus.sfu.ca/>

World Value Survey: www.worldvaluessurvey.org

European Values Study: <https://europeanvaluesstudy.eu/>

European Social Survey: <http://www.europeansocialsurvey.org/>

Sources for cross-border banking data at the national level:

BIS Locational Banking Statistics, Table 6.2:

<https://www.bis.org/statistics/bankstats.htm?m=6%7C31%7C69>

Analytical methods:

In terms of methods and techniques, this track lends itself to empirical quantitative analysis, i.e. analysis of international samples using regression methods using existing data files / databases. The articles cited can serve as examples for structuring empirical analyses. Alternatively, students can select an existing empirical article using a national sample and replicate it for an international sample as part of their thesis research, focusing - in a regression analysis - on the main economic determinant, national culture and the interaction effect between this main economic determinant and national culture. In this way, observed differences between countries can be explained by cultural differences.

Given the impact the COVID-19 pandemic had on societies, economies and firms, it could also be interesting to examine, in an international sample spanning several years, whether the influence of culture on financial decision-making changed during the pandemic compared to before. A regression analysis could focus on national culture, the pandemic period and the interaction effect between the two. The interaction effect will indicate whether and how the effect of culture changed during the pandemic.

Literature:

Ashraf, B. N. (2021). Stock markets' reaction to Covid-19: Moderating role of national culture. *Finance Research Letters*, 41, 101857.

Chang, M., Chang, B., & Dutta, S. (2020). National culture, firm characteristics, and dividend policy. *Emerging Markets Finance and Trade*, 56(1), 149-163.

Chen, Y., Dou, P. Y., Rhee, S. G., Truong, C., & Veeraraghavan, M. (2015). National culture and corporate cash holdings around the world. *Journal of Banking & Finance*, 50, 1-18.

Choi, K. S. (2020). National culture and R&D investments. *The European Journal of Finance*, 26(6), 500-531.

Chui, A. C., Kwok, C. C., & Zhou, G. S. (2016). National culture and the cost of debt. *Journal of Banking & Finance*, 69, 1-19.

Costa, B. A., Crawford, A., & Jakob, K. (2013). Does culture influence IPO underpricing?. *Journal of Multinational Financial Management*, 23(1), 113-123.

Díez-Esteban, J. M., Farinha, J. B., & García-Gómez, C. D. (2019). How does national culture affect corporate risk-taking?. *Eurasian Business Review*, 9(1), 49-68.

El Ghoul, S., Guedhami, O., Kwok, C. C., & Zheng, Y. (2019). Collectivism and the costs of

high leverage. *Journal of Banking & Finance*, 106, 227-245.

Guiso, L., Sapienza, P., & Zingales, L. (2006). Does culture affect economic outcomes?. *Journal of Economic Perspectives*, 20(2), 23-48.

Heuchemer, S., Kleimeier, S., & Sander, H. (2009). The determinants of cross-border lending in the Euro Zone, *Comparative Economic Studies*, 51(4), 467-499.

Holderness, C. G. (2017). Culture and the ownership concentration of public corporations around the world. *Journal of Corporate Finance*, 44, 469-486.

Kanagaretnam, K., Lee, J., Lim, C. Y., & Lobo, G. J. (2022). Trusting the stock market: Further evidence from IPOs around the world. *Journal of Banking & Finance*, 142, 106557.

Karolyi, G. A. (2016). The gravity of culture for finance. *Journal of Corporate Finance* 41, 610-625. Opening Article to Special Issue on Culture and Finance.

Orij, R. (2010). Corporate social disclosures in the context of national cultures and stakeholder theory. *Accounting, Auditing & Accountability Journal*, 23(7), 868-889.

Reuter, C. H. (2011). A survey of 'culture and finance'. *Finance*, 32(1), 75-152.

Sander, H., Kleimeier, S., & Heuchemer, S. (2016). The resurgence of cultural borders during the financial crisis: The changing geography of Eurozone cross-border depositing. *Journal of Financial Stability*, 24, 12-26.

Tan, G., Cheong, C. S., & Zurbrugg, R. (2019). National culture and individual trading behavior. *Journal of Banking & Finance*, 106, 357-370.

Zheng, X., El Ghouli, S., Guedhami, O., & Kwok, C. C. (2012). National culture and corporate debt maturity. *Journal of Banking & Finance*, 36(2), 468-488.

Title: The role of sustainability in financial decision-making

Supervisor: Frederique Bouwman (f.bouwman@maastrichtuniversity.nl)

Short text: Sustainability is becoming more important every day. Even in business, more standards regarding sustainable actions are emerging. There are many rules that must be followed, but many uncertainties remain about how exactly to follow them. Because measuring sustainability and thus monitoring sustainability is very difficult, it is important to gain better insight into sustainable choice behavior.

This thesis track focuses on investor preferences and considerations. This can be either the individual investor or individuals making investment choices within a company. The individual investor is the financier of business activities. Without financing, no business. Therefore, it is of strategic importance for the management of an organization to understand the consideration of the individual investor. That way, it can make a balanced choice in pursuing financial and sustainability goals. In addition, there is freedom within an organization for management to make certain investment choices. Also at this level, it is important to identify how certain sustainability decisions are made, and what the drivers behind these choices are.

In this thesis track, you will explore why people choose sustainability, or why not.

Sustainability can manifest itself in the form of investments, but also in taking the train instead of the car or separating waste. Motivation for sustainable action can be interpreted from different perspectives. Both intrinsic and extrinsic motivation can move people to act sustainably. Extrinsic motivation can involve various forms of compensation. With intrinsic motivation you could consider personal characteristics, experiences, origin and background to have an influence.

An important question is what "price" people are willing to pay for acting sustainably. This price can be financial, social or personal. Does everyone see it as a price, and thus a negative utility, or would the price of acting unsustainably be perceived to be higher?

Methods: Since it is a broad topic, it can be researched in a variety of ways. Among the possibilities are: interviews, surveys, experiments but there are also data sets available online that can be analyzed. So you are free to choose between quantitative or qualitative research, and to what extent you want to proceed statistically and econometrically.

Reference:

Edmans, A., Gosling, T., & Jenter, D. (2022). CEO Compensation: Evidence From the Field (SSRN Scholarly Paper No. 3877391). <https://doi.org/10.2139/ssrn.3877391>

Title: Pricing options through a modified Black-Scholes model**Supervisor: Yixuan Ma** (Yixuan.ma@maastrichtuniversity.nl)

Short text: It is known that the Black-Scholes model can be modified to obtain better approximation of the fair value of financial options. One of these modifications consists in adding a parameter and compute the prices in terms of this parameter. The goal of this project would be to calibrate this parameter from call prices from different stocks in the market.

Reference:

A Modified Black-Scholes-Merton Model for Option Pricing by Paula Morales-Bañuelos, Nelson Muriel, Guillermo Fernández-Anaya

Title: Social differentiation and exclusion caused by gentrification and its influence on residential choice**Supervisor: Haidong Fang** (h.fang@maastrichtuniversity.nl)

Short Text: Gentrification can lead to population migration and displacement. Higher income families move into the neighborhood with lower economic conditions, which makes the neighborhood rise to the area with higher income and better economic conditions due to the improvement, renewal and improvement of housing and other facilities. As a result, the value of houses and land rose, some of the original residents had to move out, and the social level of residents changed. Besides, the poor are still victims of the gentrification. In this new sense, however, the term "victimization" does not mean a rise in rent or eviction. They are suffering from a kind of mental injury, social differentiation and exclusion. And this kind of social differentiation and exclusion will also affect residents' choice of address.

The resulting phenomenon of segregation of dwellings in different strata of society is becoming increasingly apparent. The gentrification of the central city and the marginalization of the living space of ordinary white-collar workers and inter-provincial immigrants have led to the differentiation of urban living space. At the same time, traditional communities have completely disintegrated, urban residents generally lack a sense of belonging and security, and social differentiation and social exclusion have quietly formed.

Title: Economic policy uncertainty and housing price**Supervisor: Haidong Fang** (h.fang@maastrichtuniversity.nl)

Short text: Concerns about policy uncertainty have intensified in the wake of the global financial crisis. Baker(2016) develop a new index of economic policy uncertainty (EPU) based on newspaper coverage frequency. Based on a hedonic model, we try to understand how EPU affect housing prices. The impact of economic policy uncertainty on housing prices is not only reflected in the demand side, but also reflected in the supply side. This means that it will not only affect people's purchase behavior, but also affect the behavior of real estate developers. Therefore, we will study the impact of economic policy uncertainty on house prices from the perspective of supply and demand. The possible impact mechanism is that people have different expectations for the real estate market at different stages. For example, in the developing real estate market, when the economic policy is unstable, people may tend to invest in real estate, because the real estate market at this time may be a relatively stable market. In addition, the uncertainty of economic policy may also squeeze out the company's innovation investment, including increasing the difficulty of loans.

Unique Data: China provincial EPU index. Based on machine learning method, we used 3 million pieces of text data from more than 30 newspapers in China to build the China provincial EPU index. This index can better reflect the uncertainty of China's economic policy.

Title: Central bank capital

Supervisor: Dirk Broeders (d.broeders@maastrichtuniversity.nl)

Short text: In contrast to commercial banks, there are no rules or clear guidelines for central banks' capital adequacy. Although central banks cannot default as long as they have the right to issue legal tender, capital adequacy is important to be a credible, independent monetary authority over a medium-term horizon. In the coming years, central bank capital adequacy will be key because central banks' profits are under pressure following rising interest rates in response to higher inflation. In this thesis you will research the importance of central bank capital in being a credible and independent monetary authority.

References:

- Adler, G., P. Castro and C.E. Tovar (2012), "Does central bank capital matter for monetary policy", IMF Working Paper WP/12/60
 - Ernhagen, T., M. Vesterlund and S. Viotti (2002), "How much equity does a central bank need?", Sveriges Riksbank Economic Review, 2002:2, pp. 5-18.
 - Wessels and Broeders (2022) "On the capitalisation of central banks," De Nederlandsche Bank, Occasional Studies, Volume 20 – 4.
-

Title: Determinants of solar panel adoption

Supervisor: Linde Kattenberg (l.kattenberg@maastrichtuniversity.nl)

Short text: In an effort to reduce the reliance on fossil fuels and the resulting carbon externality, different energy generating technologies play a vital role. Public debate surrounds the question of how policy can be designed to stimulate the adoption of renewable energy technologies by households. One of the most important and widely used technologies is the installation of solar panels. In this thesis, you will use solar panel adoption data and link these to neighborhood characteristics. Your analysis will focus on the determinants of solar panel installation, and on identifying potential spillover effects on other households. The insights of this thesis can be used to draw conclusions on the dynamics of investment in renewable energy technologies. The conclusions can be relevant for the design of future policies aimed at stimulating the adoption of a similar technology, e.g. heatpumps.

Data sources:

Solar adoption data by energy network operators
CBS neighborhood data

References:

- Bollinger, B. and Gillingham, K. (2012). Peer effects in the diffusion of solar photovoltaic panels. *Marketing Science*, 31(6):900–912.
- Crago, C. L. and Chernyakhovskiy, I. (2017). Are policy incentives for solar power effective? evidence from residential installations in the northeast. *Journal of Environmental Economics and Management*, 81:132–151.
- De Groote, O., Pepermans, G., and Verboven, F. (2016). Heterogeneity in the adoption of photovoltaic systems in flanders. *Energy economics*, 59:45–57.

Requirements:

Statistical proficiency, using R or Stata.

Title: Incentivizing home sharing?

Supervisor: Linde Kattenberg (l.kattenberg@maastrichtuniversity.nl)

Short text: The average person in the Netherlands lives on 65 m², compared to e.g. 44 m² in the UK and 46 m² in Germany. Why do the Dutch live in relatively large homes in such a densely populated country? Finding out why this is the case, and how we can encourage people to share their space more can contribute to mitigating four of the most prominent issues in today's society: poverty, energy use, the housing shortage, and loneliness.

In this thesis you will develop a survey to investigate the potential of home sharing. Why would people currently do it, or not? What would it take to make home sharing more attractive?

References:

Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality: a meta-analytic review. *Perspectives on psychological science*, 10(2), 227-237.

Eichholtz, P., L. Kattenberg en N. Kok (2022). Neem prikkels tegen samenwonen weg om het woningtekort te verkleinen. *Economische Statistische Berichten*, 107(4809S), 46-50(2)

Requirements: Statistical proficiency, using R or Stata. Speaking Dutch is very useful.

Title: Taste and investor's risk perception

Supervisor: Xinxin Zhu (x.zhu@maastrichtuniversity.nl)

Short text: Beliefs are not independent from preference. Some psychological evidence indicates that affect heuristic, a bounded rational method of information processing, would cause an individual to perceive less risk and more benefit when facing an uncertainty event (Alhakami and Slovic, 1994; Finucane et al., 2000), which is also supported by a small number of economic studies (Kempf et al., 2014; Merkle, 2022). Growing financial literature has taken taste into account, and discovered that, on the one hand, they believe investors not only value the cash flow but also value non-cash activities, such as brand perception (Billett et al., 2014; Larkin, 2013), social impact (Heeb et al., 2022) and home bias (Graham et al., 2009), and so on; on another hand, taste could influence asset price, (Fama and French, 2007) propose that due to taste, CAPM fail to explain asset return. Under preference-based belief formation and updating, however, one of the most important unanswered questions in the financial field is how taste influences investors' risk perception, a crucial aspect of subjective belief distributions, as well as a fundamental question to understand individual choice behavior.

Reference:

Alhakami, A.S., Slovic, P., 1994. A Psychological Study of the Inverse Relationship Between Perceived Risk and Perceived Benefit. *Risk Analysis* 14, 1085–1096.

Billett, M.T., Jiang, Z., Rego, L.L., 2014. Glamour brands and glamour stocks. *Journal of Economic Behavior & Organization* 107, 744–759.

Fama, E.F., French, K.R., 2007. Disagreement, tastes, and asset prices. *Journal of Financial Economics* 83, 667–689. Finucane, M.L., Alhakami, A., Slovic, P., Johnson, S.M., 2000. The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making* 13, 1–17.

Graham, J.R., Harvey, C.R., Huang, H., 2009. Investor Competence, Trading Frequency, and Home Bias. *Management Science* 55, 1094–1106.

Heeb, F., Kölbl, J.F., Paetzold, F., Zeisberger, S., 2022. Do Investors Care About Impact?

Kempf, A., Merkle, C., Niessen-Ruenzi, A., 2014. Low Risk and High Return – Affective Attitudes and Stock Market Expectations. *European Financial Management* 20, 995–1030.

Larkin, Y., 2013. Brand perception, cash flow stability, and financial policy. *Journal of Financial Economics* 110, 232–253.

Merkle, C., 2022. The Affect Heuristic and Financial Expectations: Risk, Return, and ESG.

Thesis topic: Long-term volatility forecasts

Supervisor: Peter Schotman (p.schotman@maastrichtuniversity.nl)

Short text: Many forecasting models are initially developed for short-term prediction. Taking volatility as an example, the most popular models predict one day ahead. But for many purposes, mostly risk management, we are more interested in longer term forecasts. The same problem occurs with other risk measures, for example Value-at-Risk. With daily data we estimate a model for the probability of a large downfall the next day, but financial regulations often call for risk assessments over a longer horizon.

Two main approaches exist to generate longer-term forecasts when the underlying data are available at a higher frequency. One, the indirect approach, takes the one-day model and derives longer-term forecasts from that model. The alternative is the direct approach, where a new model is developed for each new horizon. Both methods have their pro's and con's. See, for example, Ghysels et al. (2019) or Marcellino et al. (2006).

The thesis can take several perspectives. One approach could be to compare the different models for a few volatility series, updating the results in Ghysels et al. (2019). Another option relates to recent work in Baştürk et al. (2022). They use a Neural Network approach with multiple outputs, one for each forecast horizon, fed by hidden layers with neurons common to all horizons. For a thesis different data and different models can be compared. A third direction for a thesis on this topic is the search for predictive factors that are relevant for multiple horizons. The famous example is the HAR model of Corsi (2009), which takes the volatility of the last day, last week and last month as predictive variables for all forecast horizons.

Data are available for the Oxford-Man Institute and other sources.

This is a reasonably quantitative thesis topic which will require some familiarity with coding in R or related platforms.

References:

- Baştürk, N., P. Schotman, and H. Schyns (2022): "A Neural Network with Shared Dynamics for Multi-Step Prediction of Value-at-Risk and Volatility," SSRN WP 3871096.
- Corsi, F. (2009): "A Simple Approximate Long Memory Model of Realized Volatility," *Journal of Financial Econometrics*, 7, 1–23.
- Ghysels, E., A. Plazzi, R. Valkanov, A. Rubia, and A. Dossani (2019): "Direct Versus Iterated Multiperiod Volatility Forecasts," 11, 173–195.
- Marcellino, M., J. Stock, and M. Watson (2006): "A comparison of direct and iterated multistep AR methods for forecasting macroeconomic time series," *Journal of Econometrics*, 135, 499–526.
-

Thesis topic: Is gold a safe haven?

Supervisor: Dirk Broeders (d.broeders@maastrichtuniversity.nl)

Short text: Gold plays an important role in geopolitics, in financial markets and it is an important element of global monetary reserves for central banks. Gold is perceived to be a hedge for inflation risk and in times of crisis gold is conjectured to perform well as it forms a safe haven. Some claim that gold returns should be positively correlated with Bitcoin return as the latter can be seen as the new gold. Gold is however also a very risky investment as its price fluctuates significantly over time. In this thesis you will explore one or more of the alleged properties of gold.

References:

- Baur, D. and Th. McDermott (2010) Is gold a safe haven? International evidence, *Journal of Banking & Finance* 34(8): 1886-1898.
- Baur, D. and L. Hoang (2021) The Bitcoin gold correlation puzzle, *Journal of Behavioral and Experimental Finance* 32, 100561
- Beckmann, J. and R. Czudaj (2013) Gold as an inflation hedge in a time-varying coefficient framework, *The North American Journal of Economics and Finance*, 24: 208-222
-

Thesis topic: Marketing Excellence

Supervisor: André Tomanó (andre.tomano@maastrichtuniversity.nl)

Short text:

For a long-time, ratings and rankings have been published, used and followed by not just the business world (e.g. ESG or Credit ratings), but also by individuals (e.g. Michelin stars, Amazon ratings). Nevertheless, it is surprising, that such a simple and intuitive indicator is missing for the Marketing Excellence of a firm. A first attempt has been made on both the academic (Homburg et al., 2020) and practitioner side (Burggraeve, 2021). The goal of the thesis is to build upon either one, or both, attempts and develop a Marketing Excellence rating methodology.

References:

- Burggraeve, C. (2021), Marketing IS NOT a Black Hole.
- Homburg, C., Theel, M., Hohenberg, S. (2020), Marketing Excellence: Nature, Measurement, and Investor Valuations, *Journal of Marketing*, 84(4), 1-22.

Thesis topic: Marketing Excellence Index Fund – A Marketing-Finance Approach**Supervisor:** André Tomano (andre.tomano@maastrichtuniversity.nl)**Short text:**

Homburg et al. (2020) describe Marketing Excellence (MXC) as firm activities that shape the organization, market, and environment. They develop a 218 words MXC dictionary to identify firms with MXC in their respective letters to shareholders.

They use this approach to build portfolios to analyse firm value implications. They base their reasoning on the shareholder value concept (Srivastava et al., 1998) and argue that strategic marketing concepts such as MXC can drive firm value, as shareholders can assume that firms with MXC deliver sustainable quality and value to their customer on the long-term. Overall, the MXC portfolio reveals significant abnormal returns of up to 8.58% compared to benchmark portfolios, such as 'marketing capabilities' and 'market orientation' in the period from April 2000 through June 2018.

Similar to an Index Fund or ETF that tracks the MSCI WORLD ESG Index (e.g. iShares MSCI World ESG Screened UCITS, ISIN: ETFIE00BFNM3J75), the idea is to build an Index Fund or ETF based on MXC firms.

In this thesis, the following questions will be tackled:

- 1) Definition of Investment Universe
- 2) Analyses of Competitive Landscape
- 3) Develop Portfolio Construction & Selection Methodology
- 4) Backtest Strategy Performance
- 5) Create Marketing Plan

References:

Homburg, C., Theel, M., Hohenberg, S. (2020), Marketing Excellence: Nature, Measurement, and Investor Valuations, *Journal of Marketing*, 84(4), 1-22.

Srivastava, R., Shervani, T., Fahey, L. (1998), Market-Based Assets and Shareholder Value: A Framework for Analysis, *Journal of Marketing*, 62, 2-18.

Thesis topic: Impact of Shareholder Activism on Sustainability Issues**Supervisor:** Jeroen Derwall (j.derwall@maastrichtuniversity.nl)

Short text: Shareholder activism through shareholder proposals (and voting at AGM's) has a long history in the United States, especially focusing on corporate governance issues such as takeover defenses, board composition and compensation. Although activism on 'social policy' issues has existed since the 70s, it has recently gained substantial momentum (as seen through the numbers of shareholder proposals submitted to firms, the withdrawal rates, and voting outcomes). The impact of these "environmental and social" (ES) proposals on firms' environmental/social behavior and value drivers has been underexplored. This proposal addresses this gap. A question that currently attracts attention is: How do firms perform financially (or behave socially or environmentally) after having been targeted by shareholder proposals / shareholder engagements?

References:

Grewal, Serafein, Yoon (2016). Shareholder activism on sustainability issues. SSRN paper: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2805512

Wei, J. (2020). Environmental, Social and Governance Proposals Shareholder Activism. *Journal of Portfolio Management*. SSRN paper version:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2798943

Bauer, Derwall, Tissen (2021). Corporate Directors Learn from Environmental Shareholder Engagements. SSRN paper:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3981634

Tkac, P. (2006) One Proxy at a Time. Pursuing Social Change through Shareholder Proposals. Federal Reserve Bank of Atlanta Economic Review.

https://fraser.stlouisfed.org/files/docs/publications/frbatlreview/rev_frbatl_2006_v91no3.pdf

Thesis topic: Drivers of Successful Shareholder Activism on Sustainability Issues

Supervisor: Jeroen Derwall (j.derwall@maastrichtuniversity.nl)

Short text: Shareholder activism through shareholder proposals (and voting at AGMs) is a popular means among institutional investors to raise awareness for environmental, social and governance (ESG) issues at firms they hold in their portfolio. Nevertheless, at shareholder meetings ES proposals have historically received less support than traditional corporate governance proposals. More recently, support for ES issues has risen rapidly however. A question that currently attracts attention is: What factors affect the likelihood that ES shareholder engagement is successful, for example in terms of vote support?

References:

- Grewal, Serafein, Yoon (2016). Shareholder activism on sustainability issues. SSRN paper: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2805512
- Wei, J. (2020). Environmental, Social and Governance Proposals Shareholder Activism. Journal of Portfolio Management. SSRN paper version: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2798943
- Bauer, Derwall, Tissen (2021). Corporate Directors Learn from Environmental Shareholder Engagements. SSRN paper: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3981634
- Tkac, P. (2006) One Proxy at a Time. Pursuing Social Change through Shareholder Proposals. Federal Reserve Bank of Atlanta Economic Review. https://fraser.stlouisfed.org/files/docs/publications/frbatlreview/rev_frbatl_2006_v91no3.pdf

Thesis topic: Corporate sustainability performance and insulation from the market for corporate control

Supervisor: Rob Bauer (r.bauer@maastrichtuniversity.nl)

Short text: We can discern at least three lines of argumentation from the academic literature:

- Manager insulation from the market of corporate control might provide a reprieve from the short-term pursuit of shareholder interests and quarterly earnings; more space for long-term decision-making may enable a company to invest more in corporate sustainability (e.g. Eccles et al. 2014, Flammer and Bansal 2017, Flammer et al. 2019).
- For the Dutch context, insulation from the market may be necessary to ensure that companies are able to pursue the corporate interest (vennootschappelijk belang) as opposed to the interests of shareholders (Bastiaan and Hezer 2019, interpreting Boskalis/Fugro). More specifically, there exists an argument in the Netherlands that companies need to be insulated from takeovers so that they have sufficient scope to implement and maintain their sustainability-related efforts (De Kluiver 2017, Steins-Bisschop 2022; source needed: VNO-NCW, VEUO).
- Research suggests that market discipline is necessary to ensure that managers engage in 'real' CSR so that it is not merely a façade which entrenches managerial power without contributing significantly to corporate sustainability performance (Surroca et al. 2020).

Insulation from market for corporate control has two forms: (n.b. Dutch discussions are about beschermingsconstructies and oligarchische regelingen; not the same)

1. Managerial entrenchment: increased power for management (reduction in SH power)
2. Control enhancing mechanisms (CEMs): increased power for controlling shareholders (distortion of power between shareholders)

At least one article has already looked at this question for a large sample of companies, including Dutch companies (Surroca et al. 2020; they make a comparison of performance in liberal market economies and coordinated market economies).

Examples of managerial entrenchment (entrenchment index developed by Bebchuk et al.

2009): staggered board, limits on SH ability to influence bylaws (Bastiaan and Hezer 2019 show that this was the case for 88.9% of Dutch companies), poison pills, golden parachutes, supermajority requirements for mergers & charter amendments.

Example of CEMs (list from Saggese et al. 2016): (i) CEMs for leveraging voting power (e.g. pyramidal structures); (ii) CEMs that can function as devices to lock-in control (e.g. priority shares (Bastiaan and Hezer 2019 show this is around 6% for Dutch listed companies), depository certificates (out of fashion in NL; NCGC takes an active stance against it. See also Timmerman 2018), voting right and ownership ceilings, supermajority provisions, non-voting shares, multiple control chain, multiple voting right, cross shareholding); (iii) CEMs represented by particular legal structures adopted by companies (e.g. partnerships limited by shares); (iv) CEMs related to privatization processes (e.g. golden shares); and (v) CEMs as coordination devices (e.g. shareholders agreements).

In terms of sustainability, the main research question could be: What effect, if any, does insulation from the market for corporate control, in the form of managerial entrenchment or CEMs, have on corporate sustainability performance?

Online folder with literature on the topic (including all the named authors):

<https://surfdrive.surf.nl/files/index.php/s/JHYzaolmjlf1gG7>

Thesis topic: The impact of information on the biodiversity impact of companies on institutional investors

Supervisor: Rob Bauer (r.bauer@maastrichtuniversity.nl)

Short text: The Taskforce on Nature-related Financial Disclosures (TNFD) has developed a set of disclosure recommendations and guidance for organisations to report and act on evolving nature-related dependencies, impacts, risks and opportunities. The recommendations and guidance will enable business and finance to integrate nature into decision making, and ultimately support a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes.

Potential topics:

- How do companies report on biodiversity risk? Do they have clear policies and how do shareholders respond to it?
- How does information on biodiversity impact asset pricing (in various asset categories)
- What is the role of blended finance (see Flammer et al. 2023)?

Reference:

Flammer, Giroux, and Heal (2023), "Biodiversity Finance", SSRN working paper downloadable at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4379451

Thesis topic: Portfolio choice with derivatives

Supervisor: Peter Schotman (p.schotman@maastrichtuniversity.nl)

Short text: Many portfolio problems ask for the optimal trade-off between equity and bonds. Very often it appears optimal to invest more than 100% of wealth in equity financed by a short position in the riskfree asset. The motivation for the leveraged position is a large value for the equity premium, i.e. periods when stocks are expected to do much better than bonds. But a leveraged equity position could lead to negative wealth, if ex-post equity happens to perform very poorly. To prevent negative wealth the investor may buy a deep in-the-money put option. Question is how much to invest in this put, what strike to choose for the put, and ultimately whether it is then still attractive to invest more than 100% in equity.

The problem is known as portfolio insurance and has a long history. With continuous trading, the put option would be redundant, as it can be replicated with a dynamic trading strategy. However, when trading is restricted to discrete times, the put option may be useful. The reason to be interested in this old problem is indeed discrete rebalancing with highly leveraged positions. The Benninga and Blume (1985) reference mostly considers the case of insuring current wealth, but for a current research project on pension plans

with annual rebalancing we are interested in insuring against negative wealth. Quite a bit of additional technical literature is available, but the basic setting should be sufficient for a thesis.

Literature: S. Benninga and M. Blume (1985) On the optimality of portfolio insurance, *Journal of Finance* 40, 1341-1352.

Thesis topic: Building portfolios based on biodiversity news

Supervisor: Flavio De Carolis (f.decarolis@maastrichtuniversity.nl)

Short text: Biodiversity risks are a major concern for asset managers. Companies are exposed to changes in biodiversity regulation and/or physical biodiversity risk. How can asset managers hedge for these risks using biodiversity news? You should start getting acquainted with the literature already available in the field reading the Biodiversity risk and Hedging climate news references from Giglio and Stroebe. The next step would be to decide from where you want to download news and build your biodiversity news index (e.g., Twitter, newspapers, Stocktwits etc.). For this thesis you need very good data analysis skills and out of the box thinking. A good starting point is also to have look at different biodiversity data sources and papers on <http://www.biodiversityrisk.org/>.

Sources:

- Giglio, S., Kuchler, T., Stroebe, J., & Zeng, X. (2023). Biodiversity Risk (No. w31137). National Bureau of Economic Research.
 - Engle, R. F., Giglio, S., Kelly, B., Lee, H., & Stroebe, J. (2020). Hedging climate change news. *The Review of Financial Studies*, 33(3), 1184-1216.
-

Thesis topic: To which extent are Dutch Financial institutions exposed to Hurricanes' and Typhoons?

Supervisors in Maastricht: **Flavio De Carolis** (f.decarolis@maastrichtuniversity.nl), Dirk Broeders. Supervisors at DNB: K. Rang, T.Husby, J.J.Dijk

Short text: Within the framework of this thesis, you will assess the extent to which Dutch financial institutions, such as banks insurances and pension funds are exposed to physical climate risks. In the specific, you will develop a climate risk indicator for hurricanes and typhoons under the guidance of your supervisors. A climate risk indicator has a financial and a climate component. As for the financial part, this is based on the exposure of the financial institution to a specific company. As for the climate component, this is a score assessing how a company is exposed to this risk based on its location and the probability and intensity of the risk occurrence. The analysis foresees, that you identify all companies that are held by the above-mentioned institutions whose investees (The companies in which the financial institutions invested) are based in countries exposed to hurricanes and typhoons risk. You will assess how the financial institutions are exposed to this type of risk now and in the future under alternative climate change scenarios. To be eligible for this thesis you should have outstanding econometric skills and good data science programming knowledge (R, Python or equivalent). You will work also with Orbis data, as such you can already familiarize with the data using the Amadeus access in WRDS, that is available to all UM students. The two references below are a good starting point for any further analysis. The thesis is in close cooperation with your supervisors that will guide you in the data work. The thesis foresees an internship at the statistics department of the Dutch central bank. Please contact Flavio De Carolis by sending your CV and a motivation by email asap, after a first interview in a second step you will also meet your supervisors at DNB.

Sources:

- Le Guenedal, T., Drobinski, P., & Tankov, P. (2021, May). Measuring and pricing cyclone-related physical risk under changing climate. In *Proceedings of Paris December 2021 Finance Meeting EUROFIDAI-ESSEC*.
- Bressan, G., Duranovic, A., Monasterolo, I., & Battiston, S. (2022). Asset-level

climate physical risk assessment is key for adaptation finance. Available at SSRN 4062275.
