

# Sebastian Krantz

Researcher/Job Market Candidate at Kiel Institute and Consultant at World Bank

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## Core Competencies

- Economic Research and Analysis in both Academic and Policy Contexts
- Strong Skills in Econometrics, Time Series, and Machine Learning, and Practical Experience with DSGE, CGE, and Quantitative Spatial Models
- High-Performance Statistical Software Engineering and Full-Stack Web-Application and API Development
- Experience in Macroeconomic Policy, Trade, and Infrastructure Analysis in Africa

## Education

**PhD in Quantitative Economics, Magna cum Laude**, University of Kiel. 2021–2024

**Dissertation:** [Africa's Economic Transformation: A Big Data Perspective](#) (Keywords: Optimal Infrastructure Investments, Regional Integration, Macroeconomic Stabilization)

*Supervisor:* Prof. Tobias Heidland, *Second Reader:* Prof. Christoph Trebesch.

**Master in International Economics (MIE)**, Geneva Graduate Institute (IHEID). 2017–2019

**Focus:** Macroeconomics, Development, Econometrics, Trade. **GPA:** 5.54 of 6

**Dissertation:** [Endogenous R&D and Technology Diffusion in a Multi-Sector RBC Economy](#) (Keywords: DSGE, Endogenous Growth, Business Cycles, Sectoral Shocks)

*Supervisor:* Prof. Cédric Tille, *Second Reader:* Prof. Rahul Mukherjee.

**BA. Liberal Arts and Science, Magna cum Laude**, University College 2014–2017

Roosevelt (UCR) - Liberal Arts & Sciences Honors College of Utrecht University.

**Major:** Economics and Social Science (Economics, Anthropology, IR, Law, History)

**Minor 1:** Mathematics, **Minor 2:** Statistics. **GPA:** 3.87 of 4

**Honors Thesis:** [The Interdependence of Economic Growth, Human Development, and Political Institutions: A General Equilibrium Framework](#)

## Employment

**Junior Researcher at the Kiel Institute for the World Economy** 2021–2024

The [Kiel Institute for the World Economy](#) (IfW) is a leading research institute on global economic affairs. I was a junior researcher in the [Research Center International Development](#) and the [Africa Initiative](#).

### Research

Papers on [macroeconomic stabilization](#), [regional integration](#) (both published), and economic returns to infrastructure/spatially optimal infrastructure investments in Africa. My [first](#) infrastructure paper builds the [Africa Infrastructure Database](#) – the largest open granular database of identified infrastructure assets, businesses, and economic geography in Africa – and uses causal ML to map local economic returns to incremental investments in 14 types of infrastructure (semi-elasticities and counterfactual predictions) at 9.7km resolution. The [second](#) paper (JMP) characterizes economically optimal investments into Africa's road network in partial and general equilibrium – calibrating spatial models to a realistic topography of the continental network incl. road construction costs, cross-border frictions, and economic geography.

## Other Outputs

Developed the [Africa Monitor](#) (a macroeconomic information platform for Africa with R and Python APIs), an open [macroeconomic database](#) and [nowcasting platform](#) for South Africa, consulted GIZ/MoF Benin and the World Bank Africa Chief Economist's Office, and engaged in extensive [software engineering](#).

## Senior Economist (ODI Fellow) in the Macroeconomic Policy Department, Ministry of Finance, Planning and Economic Development, Uganda

2020-2021

### Analytics & Research

[Macroeconometric analysis](#) of planned increase in excise duties on petrol and diesel. Econometric estimation of elasticity parameters for a CGE model to evaluate social policies. Development of a GDP nowcast. COVID-19 tourism sector emergency response paper and [strategy paper](#) investigating the potential of cultural tourism development. Worked with World Bank team to update adjusted macroeconomic indicators for Uganda and developed a model to forecast them. Developed model to perform disaggregated annual revenue forecasting by tax head + short-term (monthly, quarterly) models. Started work to revise the department's main financial programming model. Research papers on the [effects of fiscal spending](#) (SVAR + [fiscal multiplier analysis](#)) and [GVCs and RVCs in the EAC](#).

### IT and Process Innovation

Automated scraping of ~10,000 macroeconomic indicators from national sources + codes for >3000 national indicators. Developed [UGATSDB](#): a mixed frequency time series database with monthly updates. Developed open access [online data portal and R API package](#) for easy data retrieval. The database facilitates analysis and powers a [macroeconomic dashboard](#) that displays the GDP nowcast and leading economic indicators. Automated the department's monthly economic performance report using computable documents linking to UGATSDB. Built a modern department [website](#) integrating these services and making accessible all public (present and historical) department reports.

### Teaching and Capacity Building

Structured R-based [Data Science Training Programme](#) consisting of 6 delivered 2-day intensive courses taught in monthly intervals. Followed actively by 2 department staff which now maintain the website, database, apps, and computable monthly report. 4+ external (UBOS) staff also attended.

## Publications

### Working Papers

- Krantz, S. (2024). Optimal Investments in Africa's Road Network. *Kiel Working Paper and World Bank Policy Research Working Paper*. <https://github.com/SebKrantz/OptimalAfricanRoads>.
- Krantz, S. (2024). Mapping Africa's Infrastructure Potential with Geospatial Big Data and Causal ML. *Kiel Working Paper*, 2276. <https://ssrn.com/abstract=4537867>.

### Under Review

- Krantz, S. (2025). collapse: Advanced and Fast Statistical Computing and Data Transformation in R. *Journal of Statistical Software*. Revise and Resubmit. <https://arxiv.org/abs/2403.05038>.

### Published

- Krantz, S. (2024). Patterns of Global and Regional Integration in the East African Community. *Review of World Economics*, 1-80. <https://link.springer.com/article/10.1007/s10290-024-00558-0>.
- Krantz, S. (2023). Africa's Great Moderation. *Journal of African Economies*, 33(5), 515-537. Oxford University Press. <https://doi.org/10.1093/jae/ejad021>.
- Krantz, S. (2017). The Interdependence of Economic Growth, Human Development and Political Institutions: A General Equilibrium Framework. *Student Undergraduate Research E-journal*, 3.
- Salam, et al. (2018). [Tanzania|Indonesia] Case Study: Rapid Technological Change - Challenges and Opportunities. *Pathways for Prosperity Commission Background Papers*, [7|8]. Oxford, UK.
- Academic dissertations and unpublished research/policy papers see [sebastiankrantz.com/research](https://sebastiankrantz.com/research).

## Software Engineering

I develop high-performance open-source statistical software, focusing on C/C++-based R packages (see also [github.com/SebKrantz](https://github.com/SebKrantz)). I developed packages [collapse](#), [fastverse](#), [dfms](#), [osmclass](#), and API packages [ugatsdb](#), [africamonitor](#) (also in Python), and [samadb](#) (also in Python and Julia). I contributed to [fixest](#), [plm](#), [decompr](#), [dggridR](#), [data.table](#), and [kit](#). [collapse](#) is a large C/C++-based R package (>40k lines) for advanced statistical computing and data transformation. It is benchmarked on [windows](#) and [linux](#) among the **global top 5** fastest solutions for database-like operations, with **2+ million** downloads. My latest project is [OptimalTransportNetworks.jl](#), a Julia library to generate optimal transport networks.

## Consulting

**Office of the Chief Economist, Europe and Central Asia, The World Bank (Remote)** 2025

**Tasks:** Optimal spatial policy, geography, and sorting – assessing infrastructure (mis-)allocation in ECA region.

**CEMAC Infrastructure Sector Assessment Program, The World Bank (Remote)** 2024-25

**Outputs:** Economic modelling of optimal road network investments in the CEMAC region in partial and general equilibrium and evaluation of regional road projects – producing a [short paper](#), spatial dataset, and [presentation](#).

**Office of the Chief Economist, Africa Region, The World Bank (Remote)** 2024-25

**Outputs:** 3 short background papers on “Africa’s Regional and Global Integration” ([GVC and RVC analysis](#), [predictors of integration](#), and [economic returns](#)) for report “Integrating Africa Forward: From Threads to Hubs”.

**Ministry of Economy and Finance and GIZ Benin (Cotonou, Benin)** 2023

Public Finance Reform Program to achieve the SDGs and Strengthen Revenue Mobilization.

**Outputs:** Workshop on government revenue forecasting, outlining process in Germany and presenting in detail forecasting models developed for Uganda. Attended by ~15 staff from the Ministry of Economy and Finance.

## Presentations

2022 – PEGNet Conference (Kampala), German Development Economics (GDE) Conference (Stuttgart), IDOS Conference (Bonn), Federal Ministry of Finance (Berlin), useR’22 (Virtual).

2023 – BBL at Stellenbosch University (Stellenbosch), Bureau for Economic Research (x2) (Stellenbosch), SEM Conference (Milan), GDE Conference (Dresden), IfW WCA Conference (Berlin), MIASA Policy Conference (Accra), Oxford Summer School (Oxford).

2024 – Global Policy Lab (Berkeley), CSAE Conference (Oxford), The World Bank (GOST - Virtual), IfW Research Seminar (Kiel), Japan International Cooperation Agency (Virtual), BMWK (Berlin).

2025 – United Nations Economic Commission for Africa (Virtual), Annual World Bank Conference on Transport Economics (DC), IFPRI Research Seminar (DC), CSAE Conference (Oxford).

## Research Visits and Internships

**Visiting Researcher at Stellenbosch University Economics Department** 2023

Theme: Nowcasting the Economy and Measuring Inequality with Geospatial Data.

**Outputs:** Developed the [South Africa Macroeconomic Database](#) and the [SA Nowcast](#). Both were [presented](#) to a broad audience at [BER](#). Investigated the potential of geospatial big data to map inequality across space and time and compared estimates to the Spatial Tax Panel. [Presented](#) at the department’s BBL seminar.

**Intern in the Chief Economists Office, Oxford Policy Management, Oxford (UK)** 2018

Project: Rapid Technological Change - Challenges and Opportunities.

**Outputs:** Contributed to country-specific [case studies on Indonesia and Tanzania](#) analyzing sectoral pattern of growth, industry structure, and the innovation system using national accounts and enterprise survey data.

**Outputs:** Executed a [study on secondary education](#): Proposal, survey design + enumerator training, data collection on 500 secondary schools across the country, data cleaning, data analysis, write-up of findings. Developed a [web application](#) for semi-automated exploratory analysis and geo-visualization of surveys.

## Computer and Language Skills

### ANALYTICS & PROGRAMMING

- R (Advanced + C-API)
- C/C++ (Intermediate)
- Python (Intermediate)
- SQL (Intermediate)
- STATA (Intermediate)
- Julia (Intermediate)
- Mathematica (Beginner)
- Matlab & Dynare (Beginner)
- GEMPACK (Beginner)
- Linux Server + NGINX (Beginner)

### OFFICE, DATA PRODUCTS, MEDIA

- MS Office & Latex (Intermediate)
- QGIS (Intermediate)
- Shiny Apps (Advanced)
- Plotly Dash Apps (Beginner)
- Simple (HTML & CSS) Websites
- R Packages (Advanced)
- Python Packages (Beginner)
- Julia Packages (Beginner)
- Photo: Lightroom & Photoshop
- Video: iMovie & Premiere Pro

### LANGUAGES

- German (Native)
- English (Fluent)
- French (B1)
- Dutch (A2)
- Spanish (A1)

## Other Skills Trainings

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| <b>BREAD-IGC Virtual PhD Course on Urban Economics.</b> (9 Online Lectures)  | 2024      |
| <b>Political Economy and Development Economics</b> , University of Oxford. (1 Week)  | 2023      |
| <b>Financial Programming and Policies, Macroeconomic Forecasting, and Revenue Forecasting</b> , IMF Institute for Capacity Building. (MOOCs via edX) | 2020-2021 |
| <b>Practical CGE Modeling</b> , CoPS - Victoria University. (2 Week Online Course)   | 2020      |
| <b>The Science and Art of DSGE Modeling</b> , CIMS - University of Surrey.<br><b>Specialization:</b> Emerging Open Economies. (5 Day Boot Camp)      | 2018      |
| <b>Big Data in Macroeconomics and Finance</b> , Kiel Institute for the World Economy (IfW). (6 Day Intensive Summer School)                          | 2018      |
| Studied several MOOCs/books on <b>Data Science, ML, and Algorithms</b>   | 2018-2023 |

## Academic References

- **Prof. Tobias Heidland** (Director of the RC International Development at IfW, Main Supervisor)
- **Prof. Rainer Thiele** (Director of the Kiel Institute Africa Initiative at IfW)
- **Prof. Christoph Trebesch** (Director of the RC International Finance and Macroeconomics at IfW)
- **Prof. Cédric Tille** (Professor of Economics at IHEID [Macroeconomics], Dissertation Supervisor)
- **Prof. Ugo Panizza** (Professor of Economics at IHEID [Econometrics, Macro-Development])

## Professional References

- **Dr. Albert Musisi** (Commissioner of the Macroeconomic Policy Department, Ministry of Finance, Planning and Economic Development of Uganda)
- **Dr. Stevan Lee** (Chief Economist at Oxford Policy Management)
- **Dr. Woubet Kassa** (Economist, Office of the Chief Economist, Africa Region, The World Bank)