

# Sebastian Krantz

Senior Consultant at CPCS | Consultant at World Bank | Fellow at Kiel Institute

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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, Spatial Economic & Freight 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 / Kiel Institute. 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:** Macro, Development, Econometrics, Trade. **GPA:** 5.54/6 at 156/120 ECTS

**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:** 3.87/4 at 202.5/180 ECTS

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

## Employment

**Senior Consultant (Analytics) at CPCS – Advisors to Infrastructure Leaders** 2025

CPCS is a global management consulting firm specializing in transport and energy sectors worldwide. I recently joined their International Analytics Unit (IAU). So far, I have done freight modelling work for Thailand's Ministry of Transport assisting their "Integrated Logistics and Intermodal Transport Development Plan", assisted US modelling work, created the [flowr](#) R package for efficient modelling, and written a proposal for a Global Multimodal Freight Model along the lines of ITF/World Bank models inside IAU.

**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](#) (Africa's Great Moderation), EAC [regional integration](#) (both published), and economic returns to infrastructure/optimal infrastructure investments in Africa. My [first](#) infrastructure paper builds the granular [Africa Infrastructure Database](#) and uses causal ML to map local economic returns to incremental investments in 14 types of infrastructure at 9.7km resolution. The [second](#) characterizes economically optimal investments into Africa's road network in partial and general equilibrium – calibrating spatial models to a realistic topography of the continental road network.

## 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 SDGs. Development of a GDP nowcast. COVID-19 tourism sector emergency response paper and [strategy paper](#) on cultural tourism development. Work with World Bank team to update adjusted macroeconomic indicators for Uganda and developed model to forecast them. Developed model to perform disaggregated annual revenue forecasting by tax head + short-term (monthly, quarterly) models. Started revision of department's main financial programming model. Research papers on the [effects of fiscal spending](#) (SVAR + [multiplier analysis](#)) and [GVCs/RVCs in the EAC](#).

### IT and Process Innovation

Automated monthly scraping of ~10,000 macroeconomic indicators from national sources + codes for >3000 national indicators. Developed [UGATSDB](#): a mixed frequency time series database + open [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 publications/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://ssrn.com/abstract=4893771>.

### Under Review

Krantz, S. (2024). Mapping Africa's Infrastructure Potential with Geospatial Big Data and Causal ML. Under review at *World Development*. <https://ssrn.com/abstract=4537867>.

Felbermayr, et al. (2025). On the Geographical Incidence of Trade Wars: Regional Outcomes across Europe and the Role of the Single Market. Under review at *Journal of Economic Geography*.

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

### Published

Krantz, S. (2025). Patterns of Global and Regional Integration in the East African Community. *Review of World Economics*, 161, 151-230. <https://doi.org/10.1007/s10290-024-00558-0>.

Krantz, S. (2024). 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:

### High-Performance Statistical Computing Architecture

- [collapse](#): Advanced and Fast Statistical Computing and Data Transformation in R – one of the largest R packages (>40k lines, 30k of which C/C++), benchmarked on [linux](#) and [windows](#) in **global top 5** fastest solutions for database-like operations (>>Spark). **2.5+ million** downloads.
- [fastverse](#): An Extensible Suite of High-Performance and Low-Dependency Packages for Statistical Computing and Data Manipulation in R – easy discovery, loading, and management.
- Contributed to [kit](#) (Data Manipulation Functions in C) and [data.table](#) (Enhanced Data Frame).

### Time Series and Panel Data Econometrics

- [dfms](#): Dynamic Factor Models for R – efficient C/C++-based estimation supporting missing data.
- Contributed to [fixest](#) (Fast Fixed-Effects Estimation) and [plm](#) (Linear Models for Panel Data).

### Spatial Analysis

- [osmclass](#): Efficiently Classify Open Street Map Features – into functional/analytical categories
- Contributed to [DGGRID/dggridR](#): Discrete Global Grids (for R) – Spatial Analysis Done Right

### Transport Networks and Traffic Assignment

- [OptimalTransportNetworks.jl](#): Optimal Transport Networks in Spatial Equilibrium – in Julia
- [flowr](#): Efficient Network Processing, Route Enumeration, and Traffic Assignment in R

### Trade and Global Value Chain Analysis

- Significantly contributed to [decompr](#): Global Value Chain Decomposition in R
- Developed high-performance code to regionalize ICIO tables – see [Felbermayr et. al. \(2025\)](#)

### Database API Packages

- [ugatsdb](#), [africamonitor](#) (also in Python), and [samadb](#) (also in Python and Julia).

For more info see [sebastiankrantz.com/software](https://sebastiankrantz.com/software), [github.com/SebKrantz](https://github.com/SebKrantz), and [sebkrantz.github.io/Rblog](https://sebkrantz.github.io/Rblog).

I also develop full-stack web-apps mentioned elsewhere – see also [sebastiankrantz.com/data-products](https://sebastiankrantz.com/data-products).

## Consulting

### Digital Vice Presidency, The World Bank (Washington DC)

2025-26

**Tasks:** Analyze large-scale digital infrastructure and hazard data to quantify connectivity gaps and damage risk.

**Outputs so far:** Created the '[Infrastructure Risk Analyzer](#)' – a full-stack web-app for infrastructure risk analysis.

### Global Lead Disruptive Technology, The World Bank (Washington DC)

2025-26

**Tasks:** Create and automate a [Global Infrastructure Database](#) for all LMIC and explore geospatial AI applications.

**Outputs so far:** Developed open data pipeline: 100M+ features in 60+ categories from 10+ sources for 123 LMIC

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

2025

**Outputs:** Policy research paper on [Investments to Overcome Infrastructure Misallocation and Improve Connectivity in the ECA Region](#) + data work for paper on [Aggregate Economic Gains from Road Improvements](#).

<b>Trade Policy Research Group, Kiel Institute for the World Economy (Kiel)</b>	2025
<b>Outputs:</b> Developed <a href="#">regionally extended MRIO tables</a> for the <a href="#">Kiel Institute Trade Policy Evaluation (KITE) model</a> – covering 288 European NUTS2 regions and 47 non-EU countries in 10 NACE sectors for years 2016-2020.	
<b>CEMAC Infrastructure Sector Assessment Program, The World Bank (Remote)</b>	2024-25
<b>Outputs:</b> Economic modelling of optimal road network investments in the CEMAC region in partial and general equilibrium and evaluation of regional road projects – producing a <a href="#">policy research paper</a> ( <a href="#">slides</a> ) + spatial dataset.	
<b>Office of the Chief Economist, Africa Region, The World Bank (Remote)</b>	2024-25
<b>Outputs:</b> 3 short background papers on “Africa’s Regional and Global Integration” ( <a href="#">GVC and RVC analysis</a> , <a href="#">predictors of integration</a> , and <a href="#">economic returns</a> ) for report “Integrating Africa Forward: From Threads to Hubs”.	
<b>Ministry of Economy and Finance and GIZ Benin (Cotonou, Benin)</b>	2023
Public Finance Reform Program to achieve the SDGs and Strengthen Revenue Mobilization.	
<b>Outputs:</b> 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), World Bank Development Data Group (DC), CSAE Conference (Oxford), Statistics Portugal (Virtual), Bank of Portugal (Porto).

## Research Visits and Internships

<b>Visiting Researcher at Stellenbosch University Economics Department</b>	2023
Theme: Nowcasting the Economy and Measuring Inequality with Geospatial Data.	
<b>Outputs:</b> Developed the <a href="#">South Africa Macroeconomic Database</a> and the <a href="#">SA Nowcast</a> . Both were <a href="#">presented</a> to a broad audience at <a href="#">BER</a> . Investigated the potential of geospatial big data to map inequality across space and time and compared estimates to the Spatial Tax Panel. <a href="#">Presented</a> at the department's BBL seminar.	
<b>Intern in the Chief Economists Office, Oxford Policy Management, Oxford (UK)</b>	2018
Project: Rapid Technological Change - Challenges and Opportunities.	
<b>Outputs:</b> Contributed to country-specific <a href="#">case studies on Indonesia and Tanzania</a> analyzing sectoral pattern of growth, industry structure, and the innovation system using national accounts and enterprise survey data.	
<b>Intern in the Research Department, Bangladesh Rural Advancement Committee (BRAC), Kampala (Uganda).</b>	2018
Project: Secondary Education in Uganda - New Evidence.	
<b>Outputs:</b> Executed a <a href="#">study on secondary education</a> : Proposal, survey design + enumerator training, data collection on 500 secondary schools across the country, data cleaning, data analysis, write-up of findings. Developed a <a href="#">web application</a> 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/GAMS (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

<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. <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
Self-studied several MOOCs/books on <b>Data Science, ML, and Algorithms (DSA)</b>	2018-2024

## 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/Kiel Institute)
- **Prof. Christoph Trebesch** (Director of the RC International Finance and Macroeconomics at IfW)
- **Prof. Julian Hinz** (Director of the RC Trade Policy at IfW/Kiel Institute)
- **Dr. Niclas Moneke** (Associate Professor at University of Oxford [Infrastructure Economics])
- **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. Woubet Kassa** (Economist, Office of the Chief Economist, Africa Region, The World Bank)
- **Dr. Theophile Bougna** (Senior Economist, Transport Global Practice, The World Bank)
- **Dr. Stevan Lee** (Chief Economist at Oxford Policy Management)