

Technical Workshop on Advanced Econometrics including Bayesian and Machine Learning Techniques

VENUE: MERCURE HOTEL AERC, Nairobi, 7 – 18 October 2024 Time: 09:00 – 17:00hrs (GMT+3)

ZOOM LINK

https://aercafrica-org.zoom.us/meeting/register/tZIoc-2hpjspHtFswxBtlwo1L3fiV8lxxib4

Meeting ID: 865 4498 0345 Passcode: 582253

WORKSHOP AGENDA

| TIME | SESSION AND ACTIVITY | |
|---------------------------|---|--|
| | Week I, Day 1: Monday 7 October 2024 | |
| 08.30 - 09.00 | | |
| Welcome & Opening Session | | |
| | Opening Remarks | |
| | Dr. Abbi Kedir, Director of Research, AERC | |
| | Prof. Victor Murinde, Executive Director, AERC | |
| | C | |
| 09.00 - 11.00 | Session 1: Static Panel Data Analysis Introduction to Panel Data Econometrics | |
| 09.00 - 11.00 | | |
| | 1. Panel data description | |
| | -Long panels vs Short panels | |
| | -Balanced panels vs Unbalanced panels | |
| | -Static panels vs Dynamic panels | |
| | 2. How to prepare data in panel form 3. Things to note when preparing penel data | |
| | 3. Things to note when preparing panel data -Data sources, Variable measurement, etc. | |
| | | |
| | -Potential sources of panel data for African researchers Interactive Q & A | |
| 11:00 -11:30 | Health Break | |
| | | |
| 11.30 – 13.00 | Dealing with Static Panel Data Models [Fixed Effects] | |
| | -Specification Issues | |
| | -Estimation Issues | |
| | -Interpretation Issues | |
| | -Class Demonstration | |
| 12.00 11.00 | Interactive Q& A | |
| 13:00 –14:00 | Lunch Break | |
| 14.00 – 15.00 | Dealing with Static Panel Data Models [Random Effects] | |
| | -Specification Issues | |
| | -Estimation Issues | |
| | -Interpretation Issues | |
| | -Diagostics for Static | |
| | Panel Data Models | |
| | -Class Demonstration | |
| | Interactive Q& A | |
| | | |
| 15.00 - 16.00 | Class Exercise: Based on the panel data provided and the relationship being examined, | |



| not | ESSION AND ACTIVITY | |
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| Į pai | rticipants are expected to: | |
| _ | Write and implement codes for estimating both Fixed and Random Effects Static Panel Data | |
| | odels | |
| 2.1 | Present the results accordingly. | |
| 3.1 | Discuss the results | |
| Int | teractive Q& A | |
| 16.00 - 16.30 He | ealth Break | |
| End of Day 1 Par | rticipants to work towards assignments | |
| Day 2: Tuesday 8 October 2024 | | |
| | Session 2: Dynamic Panel Data Analysis [Short Panels] | |
| 09.00 – 11.00 A | Review of Day 1 Lecture | |
| | ealing with Dynamic Panel Data Models [Short Panels - | |
| | fference GMM Estimator] | |
| -S _I | pecification Issues | |
| -Es | stimation Issues | |
| -In | iterpretation Issues | |
| -C1 | lass Demonstration | |
| | reractive Q& A | |
| 11.00 – 11.30 He | ealth Break | |
| 11.30 – 13:00 De | ealing with Dynamic Panel Data Models [Short Panels - System GMM Estimator] | |
| | pecification Issues | |
| | stimation Issues | |
| | aterpretation Issues | |
| | lass Demonstration | |
| | teractive Q& A | |
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| 13.00 – 14.00 Lu | ınch Break | |
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| 14.00 - 15.00 Dia | agnostics for Dynamic | |
| 14.00 - 15.00 Dia Par | agnostics for Dynamic nel Data Models [Short Panels] | |
| 14.00 - 15.00 Dia Par - H | agnostics for Dynamic nel Data Models [Short Panels] ypothesis Testing | |
| 14.00 - 15.00 Dia Par -H | agnostics for Dynamic nel Data Models [Short Panels] ypothesis Testing tterpretation Issues | |
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| 14.00 - 15.00 Dia Pari - H In - Cl and - Cl Int 15.00 - 16.00 Cla pari 1. Yang and 2. Hang and 2. Hang and 2. Hang and 2. Hang and 3. Hang and 4. The End of Day 2 Pari - Pari | agnostics for Dynamic nel Data Models [Short Panels] typothesis Testing terpretation Issues hoosing between Difference d System GMM Estimators lass Demonstration teractive Q& A ass Exercise: Based on the panel data provided and the relationship being examined, rticipants are expected to: Write and implement codes for estimating Dynamic Panel Data Models using both Difference d System GMM Estimators Present the results accordingly. Discuss the results teractive Q& A ealth Break rticipants work on the assignments. Day 3: Wednesday 9 October 2024 | |



| TIME | SESSION AND ACTIVITY |
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| | Mean Group Estimator] |
| | -Specification Issues |
| | -Estimation Issues |
| | -Interpretation Issues |
| | -Class Demonstration |
| | Interactive Q& A |
| 11.00 – 11.30 | Health Break |
| 11.30 – 13.00 | Dealing with Dynamic Panel Data Models [Long Panels - |
| | Pooled Mean Group Estimator] |
| | -Specification Issues |
| | -Estimation Issues |
| | -Interpretation Issues |
| | -Class Demonstration |
| | Interactive Q& A |
| 13.00 – 14.00 | Lunch Break |
| 14.00 – 15.00 | Diagnostics for Dynamic |
| | Panel Data Models [Long Panels] |
| | -Hypothesis Testing |
| | -Interpretation Issues |
| | -Choosing between Mean Group and Pooled Mean Group Estimators -Class Demonstration |
| | |
| 15.00-16.00 | Interactive Q& A Class Exercise: Based on the panel data provided and the relationship being examined, |
| 15.00- 10.00 | |
| | participants are expected to: 1. Write and implement codes for estimating Dynamic Panel Data Models using both Mean |
| | Group and Pooled Mean Group Estimators |
| | 2. Present the results accordingly. |
| | 3. Discuss the results |
| | Interactive Q& A |
| 16.00- 16.30 | Health Break |
| End of Day 3 | Participants work on the assignments. |
| V | Day 4: Thursday 10 October 2024 |
| | Session 4: Dealing with Nonlinearities in Dynamic Panel Data Analysis |
| 9.00 -11.00 | A Review of Day 3 Lecture |
| | Dealing with nonlinearities [asymmetries] in Panel Data analyses [Long Panels - |
| | Mean Group Estimator] |
| | -Specification Issues |
| | -Estimation Issues |
| | -Interpretation Issues |
| | -Class Demonstration |
| 11 00 11 20 | Interactive Q& A |
| 11.00 – 11.30 | Health Break |
| 11.30 – 13.00 | Dealing with nonlinearities [asymmetries] in Panel Data analyses [Long Panels - |
| | Pooled Mean Group Estimator] |
| | -Specification Issues -Estimation Issues |
| | |
| 1 | -Interpretation Issues |



| TIME | SESSION AND ACTIVITY | |
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| | -Class Demonstration | |
| | Interactive Q& A | |
| 13.00 – 14.00 | Lunch Break | |
| 14.00 - 15.00 | Diagnostics for nonlinear [asymmetric] Dynamic Panel Data Models [Long Panels] | |
| | -Hypothesis Testing | |
| | -Interpretation Issues | |
| | -Choosing between Mean Group and Pooled Mean Group Estimators | |
| | -Class Demonstration | |
| | Interactive Q& A | |
| 15.00 – 16.00 | Class Exercise: Based on the panel data provided and the relationship being examined, | |
| | participants are expected to: | |
| | 1. Write and implement codes for estimating nonlinearities [asymmetries] in long panels. | |
| | 2. Present the results accordingly. | |
| | 3. Discuss the results | |
| 16.00-16.30 | Interactive Q& A Health Break | |
| End of Day 4 | | |
| Ellu of Day 4 | Participants work on the assignments. Poy 5: Thursday 11 October 2024 | |
| | Day 5: Thursday 11 October 2024 | |
| | Session 5: Panel Data Threshold Analysis | |
| 09.00 - 11.00 | A Review of Day 4 Lecture | |
| | Dealing with nonlinearities [threshold effects] in Static Panel Data Models | |
| | -Specification Issues | |
| | -Estimation Issues | |
| | -Interpretation Issues | |
| | -Class Demonstration | |
| 11.00 – 11.30 | Interactive Q& A | |
| | Health Break | |
| 11.30 – 13.00 | Dealing with nonlinearities [threshold effects] in Dynamic Panel Data Models] | |
| | -Specification Issues | |
| | -Estimation Issues | |
| | -Interpretation Issues | |
| | -Class Demonstration | |
| 13.00 –14.00 | Interactive Q& A | |
| | Lunch Break | |
| 14.00 – 16.00 | Diagnostics for threshold-based Panel Data Models | |
| | -Hypothesis Testing | |
| | -Interpretation Issues | |
| | -Class Demonstration | |
| | -Class Exercise: | |
| | Based on the panel data provided and the relationship being examined, participants are expected | |
| | to: 1. Write and implement codes for estimating Threshold-based Static and Dynamic Panel Data | |
| | Models | |
| | 2. Present the results accordingly. | |
| | 3. Discuss the results | |
| | Interactive Q& A | |
| 16.00-16.30 | Health Break | |



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| End of Day 5 | Participants work on the assignments. | | |
| WEEK II: | | | |
| | Day 6: Monday 14 October 2024 | | |
| 00.00 44.00 | Session 6: Panel Data Multivariate Analysis | | |
| 09.00 - 11.00 | A Review of Week 1 Lecture | | |
| | Multivariate Modelling with Panel Data I [Panel VAR Analysis]: | | |
| | -Specification Issues -Estimation Issues | | |
| | | | |
| | -Interpretation Issues -Class Demonstration | | |
| | | | |
| 11.00 – 11.30 | Interactive Q& A | | |
| 11.00 - 11.50 | Health Break | | |
| 11.30 - 13:00 | Multivariate Modelling with Panel Data II [Panel Causality Analysis]: | | |
| | -Specification Issues | | |
| | -Estimation Issues | | |
| | -Interpretation Issues | | |
| | -Class Demonstration | | |
| | Interactive Q& A | | |
| 13.00 – 14.00 | Lunch Break | | |
| 14.00 – 16.00 | Diagnostics for Multivariate Panel Data Models: | | |
| | -Hypothesis Testing | | |
| | -Interpretation Issues | | |
| | -Class Demonstration | | |
| | -Class Exercise: | | |
| | Based on the panel data provided and the relationship being examined, participants are expected | | |
| | to: | | |
| | 1. Write and implement codes for analyzing Panel VAR and Panel Causality | | |
| | 2. Present the results accordingly. | | |
| | 3. Discuss the results | | |
| | Interactive Q& A | | |
| 16.00-16.30 | Health Break | | |
| End of Day 6 | Participants work on the assignments. | | |
| | Day 7: Tuesday 15 October 2024 | | |
| | Session 7: MIDAS Modelling | | |
| 09.00 -11.00 | A Review of Day 6 Lecture | | |
| | Dealing with Mixed-Data Frequencies in Time Series Modelling and Forecasting [Low-High | | |
| | Frequency mix] | | |
| | -Specification Issues | | |
| | -Estimation Issues | | |
| | -Interpretation Issues | | |
| | Interactive Q& A | | |
| 11.00 – 11.30 | Health Break | | |
| 11.30 – 13.00 | Dealing with Mixed-Data Frequencies in Time Series Modelling and Forecasting [High-Low | | |
| | Frequency mix] | | |
| | -Specification Issues | | |
| | -Estimation Issues | | |



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| | -Interpretation Issues |
| | Interactive Q& A |
| 13.00 – 14.00 | Lunch Break |
| 14.00 – 16.00 | Diagnostics for MIDAS-based models: -Hypothesis Testing |
| | -Interpretation Issues |
| | -Class Demonstration |
| | -Class Exercise: |
| | Based on the data provided and the relationship being examined, participants are expected to: |
| | 1. Write and implement codes for estimating a MIDAS model with a low-high frequency mix. |
| | 2. Write and implement codes for estimating a MIDAS model with a high-low frequency mix. |
| | 3. Present the results accordingly. |
| | 4. Discuss the results |
| 1600 1600 | Interactive Q& A |
| 16.00 – 16.30 | Health Break |
| End of Day 7 | Participants work on the assignments. |
| Day 8: Wednesday 16 October 2024 | |
| | Session 8: Modelling with Bayesian Techniques |
| 09.00 -11.00 | A Review of Day 8 Lecture |
| | Modelling with Bayesian Methods: Bayesian Econometrics vs. Classical Econometrics |
| | Bayesian Linear Regressions: |
| | -Specification Issues |
| | -Estimation Issues |
| | -Interpretation Issues |
| | -Class Demonstration Interactive Q& A |
| 11.00 – 11.30 | |
| | Health Break |
| 11.30 – 13.00 | Bayesian Multivariate Analysis: |
| | -Specification Issues -Estimation Issues |
| | |
| | -Interpretation Issues -Class Demonstration |
| | Interactive Q& A |
| 13.00 – 14.00 | Lunch Break |
| 14.00 – 16.00 | Diagnostics for Bayesian analysis: |
| | -Hypothesis Testing |
| | -Interpretation Issues |
| | -Class Demonstration |
| | -Recent Developments in Bayesian Analysis |
| | -Class Exercise: |
| | Based on the data provided and the relationship being examined, participants are expected to: |
| | 1. Write and implement codes for estimating Bayesian linear regressions and Bayesian |
| | multivariate models. |
| | 2. Present the results accordingly. |
| | 3. Discuss the results |
| | Interactive Q&A |



| TIME | SESSION AND ACTIVITY |
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| 16.00 -16.30 | Health Break |
| End of Day 8 | Participants work on the assignments. |
| Day 9: Thursday 17, October 2024 | |
| Session 9: Predictability Analysis with Machine Learning Techniques | |
| 9.00 - 11.00 | A Review of Day 7 Lecture A Review of Machine Learning [ML] Techniques – Supervised, Unsupervised and Reinforcement Linear Models and GLS; lasso; elastic-net; nearest-neighbor; Neural Network; trees; boosting; Random Forest; bagging; Support Vehicle Machine; Kernel Regression; piecewise regression; Series Regression. Practical Illustrations |
| 11.00 – 11.30 | Health Break |
| 11.30 – 13.00 | Further Illustrations with ML Techniques |
| 13.00 – 14.00 | Lunch Break |
| 14.00 – 16.00 | Class Exercise: Based on the data provided and the relationship being examined, participants are expected to: 1. Write and implement ML algorithms for tree regression and random forest. 2. Present the results accordingly. 3. Discuss the results Interactive Q&A |
| 16.00 – 16.30 | Health Break |
| End of Day 9 | Participants work on the assignments. |
| Day 10: Friday, 18 October 2024 | |
| Session | n 10: Lecture Review, Assessment & Agenda for Future Research Collaboration |
| 09.00 -11.00 | Review of All Lectures |
| | Interactive Q&A |
| 11.00 – 11.30 | Health Break |
| 11.30 – 13.00 | Presentations by Participants/Groups and Discussion |
| 13.00 – 14.00 | Lunch Break |
| 14.00 – 16.00 | Agenda for research collaboration among the participants for the AERC biannual workshop in 2025/publishing in standard academic journals |
| 16.00 – 16.30 | Wrap up of the Workshop and Closing Remarks. |
| End of Day 10 | |