



JÖNKÖPING UNIVERSITY

*Jönköping International  
Business School*

**Second Virtual African Productivity Conference**

**December 14-16, 2023**

(12/14/23)

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## Welcome to vAPC 2023!

Dear Colleagues,

Welcome to the Second (virtual) African Productivity conference (vAPC2023), co-hosted by ISEaPA (ISEaPA.org) and the Jönköping International Business School, Jönköping University, Sweden.

vAPC 2023 will span three days, December 14<sup>th</sup>, 15<sup>th</sup> and 16<sup>th</sup>. We are excited to have such a diverse array of excellent plenary speakers and contributed papers from across the globe.

- Conference website: <https://iseapa.org/event/view/39>
- Submission and registration website: Conference Maker
- Registration fee: FREE

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## Zoom Link: vAPC-2023

Time: This is a recurring meeting, Meet anytime December 14-16, 10:45-17:45 GMT

Join Zoom Meeting

<https://ju-se.zoom.us/j/64095712607?pwd=R3VsRmZoSWFzWjAyZi9sdzRMNG00dz09>

Meeting ID: 640 9571 2607

Passcode: 000045

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All of us on the local organizing and scientific committees welcome you to vAPC 2023.

## Committees

### Organizing Committee:

- Felicity Addo, Institute for Sustainable Economic Development, Austria, E-mail: [felicity.addo@boku.ac.at](mailto:felicity.addo@boku.ac.at)
- Almas Heshmati, Jönköping International Business School, Sweden, E-mail:

- [almas.heshmati@ju.se](mailto:almas.heshmati@ju.se)
- Mekonnen Bersisa, Ambo University, Oromia, Ethiopia, E-mail: [mbersisa@gmail.com](mailto:mbersisa@gmail.com)
  - Christopher Parmeter, University of Miami, USA, E-mail: [cparmeter@bus.miami.edu](mailto:cparmeter@bus.miami.edu)
  - Robin Sickles, Rice University, USA, E-mail: [rsickles@rice.edu](mailto:rsickles@rice.edu)

**Scientific Committee:**

- Almas Heshmati, Jönköping International Business School, Sweden
- Christopher Parmeter, University of Miami, USA
- Robin Sickles, Rice University, USA
- Levent Kutlu, University of Texas @ RGV, USA

**Keynote Speakers:**

- Awudu Abdulai, University of Kiel, Germany
- Hervé Dakpo, French National Institute for Agriculture, Food, and Environment, France
- Lilyan Fulginiti, University of Nebraska, USA
- Ayele Gelan, Kuwait Institute of Scientific Research, Kuwait
- Daniel Henderson-University of Alabama, USA
- Almas Heshmati, Jönköping International Business School, Sweden
- Levent Kutlu-University of Texas @ RGV, USA
- Christopher O'Donnell-University of Queensland, Australia
- Spiro Stefanou-USDA, Economic Research Service, USA

## **Conference Mechanics**

### **Sessions**

- All sessions will be hosted on Zoom.
- The majority of sessions contain three papers. Each parallel session is scheduled to run for 60 minutes with each paper being allotted 20 minutes for presentation and discussion.
- Each day's events will be hosted through a unique web address that is open through the date of the actual session. The breakout room technology presumes attendees have installed the latest version of Zoom on their machines.
- The chair of the session is the presenter of the last paper listed in the session. Chairs are responsible for keeping the session on time and directing question and answers at the conclusion of each presentation.
- In case a presenter is not present in the parallel session, the session will continue and finish early. In this setting the chair can give more time to each paper at his or her discretion.
- All times listed are in Greenwich Mean Time (GMT, UK time). Please be aware of this when making plans for your presentation or for those presentations you wish to attend live.

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**Zoom Link: vAPC-2023**

Time: This is a recurring meeting, Meet anytime December 14-16, 10:45-17:45 GMT  
Join Zoom Meeting

<https://ju-se.zoom.us/j/64095712607?pwd=R3VsRmZoSWFzWjAyZi9sdzRMNG00dz09>

Meeting ID: 640 9571 2607

Passcode: 000045

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**Schedule for the Conference Program**

**(GMT is UK time and CET is Central European Time)**

**Thursday December 14<sup>th</sup>, 2023**

<b>GMT</b>		<b>CET</b>
10:45-11:00	Opening Remarks	11:45-12:00
11:00-12:00	Parallel Sessions I, A, B	12:00-13:00
12:00-12:45	Zoom Lunch Break	13:00-13:45
13:00-14:00	Parallel Sessions II, A, B	14:00-15:00
14:00-14:15	Zoom Coffee Break	15:00-15:15
14:15-16:45	Plenary Session I	15:15-17:45

1. Toward Data- and Evidence-Driven Policy Making: The Data Imperative-**Spiro Stefanou, USDA, Economic Research Service, USA**

**There will be a 5-minute break between presentations.**

2. Agricultural Productivity in Africa- **Lilyan Fulginiti, University of Nebraska, USA**

**There will be a 5-minute break between presentations**

3. “Green Innovations and Patents in OECD Countries”-**Almas Heshmati, Jönköping University, Sweden**

**Friday December 15<sup>th</sup>**

<b>GMT</b>		<b>CET</b>
11:00-12:00	Parallel Sessions I, A, B	12:00-13:00

12:00-12:45	Zoom Lunch Break	13:00-13:45
13:00-14:00	Parallel Sessions II, A, B	14:00-15:00
14:00-14:15	Zoom Coffee Break	15:00-15:15
14:15-16:45	Plenary Session II	15:15-17:45

1. Adopting Improved Technologies to enhance Agricultural Productivity in Sub-Saharan African Countries- **Awudu Abdulai, University of Kiel, Germany**

**There will be a 5-minute break between presentations**

2. Production Analysis with Asymmetric Error-**Daniel Henderson, University of Alabama, USA**

**There will be a 5-minute break between presentations**

3. Modelling pollution-generating technologies: an overview of existing possibilities- **Hervé Dakpo, French National Institute for Agriculture, Food, and Environment, France**

#### **Saturday December 16<sup>th</sup>**

<b>GMT</b>		<b>CET</b>
11:00-12:00	Parallel Sessions I, A, B	12:00-13:00
12:00-12:45	Zoom Lunch Break	13:00-13:45
13:00-14:00	Parallel Sessions II, A, B, C	14:00-15:00
14:00-14:15	Zoom Coffee Break	15:00-15:15
14:15-16:45	Plenary Session III	15:15-17:45

1. Structural Transformation and Productivity Growth-**Ayele Gelan, Kuwait Institute of Scientific Research, Kuwait**

**There will be a 5-minute break between presentations**

2. Greenhouse Gas Emissions and Productivity Change in Selected Sectors of the Australian Economy-**Christopher O'Donnell, University of Queensland, Australia**

**There will be a 5-minute break between presentations**

3. Handling Endogeneity in Stochastic Frontier Analysis-**Levent Kutlu, University of Texas-Rio Grand Valley, USA**

16:45-17:00	Closing Remarks	17:45-18:00
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## Parallel Sessions

**Thursday, December 14**

### **Productivity Indices, Estimation, and Inference I-Thursday, December 14-Session IA**

1. Discrete variables in data envelopment analysis- **Zhichao Wang** (*University of Queensland, Australia*)
2. Laspeyres-Paasche bounds for productivity index- **Hideyuki Mizobuchi** (*Doshisha University, Japan*)

### **Agricultural and Productivity I-Thursday, December 14-Session IIA**

1. Examining agricultural efficiency, emissions and technological heterogeneity in Africa using a stochastic meta-frontier approach- **Lindikaya Wiseman Myeki** (*University of North West, South Africa*)
2. Factors determining differences in organic agricultural production across Spanish region-**Alan Wall** (*University of Oviedo, Spain*)
3. Impacts of adopting organic farming on the livelihood of cotton farming households in Meatu and Maswa Districts, Tanzania- **Arne Henningsen** (*University of Copenhagen, Denmark*)

### **Environmental Efficiency and Sustainability- Thursday, December 14-Session IIB**

1. Behavioural economics for sustainable development: enhancing efficiency and productivity in Africa- **Bineetha P Bose** (Christ [Deemed to be University], India)
2. Comparing scenarios of the carbon regulation for the BRICS and EAEU economies using the GTAP-E model-**Davydova Altana Yurievna** (*Russian Foreign Trade Academy, Russia*)

## Friday, December 15

### Governmental Policies, Economics Transitions, and Productivity -Friday, December 15- Session IA

1. US military aid in the post-cold war era: two-tier stochastic frontier analysis- **Alecos Papadopoulos** (*Athens University of Economics and Business, Greece*)
2. Nudging rail transportation forward: the role of contracts and behavioral insights- **Fabio Pereira Simoni da Silva** (*University of Valencia, Spain*)
3. Does organic farming reduce returns to land and labor? Micro-evidence from Benin- **Ghislain Dossou Boris Aihounton** (*University of Copenhagen, Denmark*)

### The Financial Sector, Governmental Policy, and Productivity-Friday, December 15- Session IB

1. Direct and indirect impacts of natural disasters on banks: a spatial framework-**Fisher Yu** (*Digonex, USA*)
2. Islamic banks, square peg in a round hole? evidence from MENA region using meta-frontier directional distance functions- **Mohamed Mekki Ben Jemaa** (*University of Carthage, Tunisia*)
3. Money demand function stability and uncertainty in Rwanda-evidence from linear and nonlinear ARDL bounds tests-**Vincent Byusa** (*Jönköping International Business School, Sweden*)

### Agriculture and Productivity II-Friday, December 15-Session IIA

1. Assessing the impact of rural-urban migration on technical efficiency in maize production in Ghana: insights from difference in differences selectivity corrected stochastic frontier modeling-**Bright Owusu Asante** (*Kwame Nkrumah University of Science and Technology, Ghana*)
2. Farmer education, farm efficiency and agricultural productivity in Ghana: Is there a nexus?- **Jacob Asravor** (*University of Hohenheim, Germany*)
3. Does land consolidation promote livestock production and combat rural depopulation in northern Spain?-**Luis Orea** (*University of Oviedo*)

### Economic Growth and Labor Markets-Friday, December 15-Session IIB

1. Policy reforms and self-employment in developing countries: a multi-good approach- **Yu Shi** (*McGill University, Canada*)
2. Language as a strategic choice — drawing global research talent by switching to english-**Yihui Cao** (*University of Westminster, UK*)



## Saturday, December 16

### Education, Innovation, and Public Policy-Saturday, December 16-Session IA

1. The effect of government cuts of doctoral scholarships on science-**Giulia Rossello** (*University of Pisa, Italy*)
2. Regulatory costs and vertical integration: evidence from supply chain disclosure regulations-**Enshuai Yu** (*Boston College, USA*)
3. European firms productivity growth and environmental regulation. Re-examining the Porter hypothesis- **Nikolaos Rigas** (*University of Patras, Greece*)

### Governance, Natural Resources, and Productivity-Saturday, December 16-Session IB

1. Macroeconomic benchmarking on base erosion and profit shifting: a systematic literature review-**Athanasios Vasilakis** (*International Hellenic University, Greece*)
2. Do governance and institutions affect agricultural productivity?- **Gabriel Rosero** (*University of Göttingen, Germany*)
3. Does financial inclusion enhance farmers' resilience to climate change? Evidence from Ethiopia-**Mebratu Negera** (*Addis Ababa University, Ethiopia*)

### Productivity Indexes, estimation, and Inference II - Saturday, December 16-Session IIA

1. Statistical inference for Hicks–Moorsteen productivity indices-**Shirong Zhao** (*Dongbei University of Finance and Economics, China*)
2. Russell and slack-based measures of efficiency: a unifying framework- **Shirong Zhao** (*Dongbei University of Finance and Economics, China*)

### Health, Education, and Gender-Saturday, December 16-Session IIB

1. Breaking down bullying: empathy, social networks, and adolescents-**Qinyou Xu** (*Rice University, USA*)
2. Improved cookstove adoption and time use of children: Evidence from selected African countries-**Amare Tareke** (*Jönköping International Business School, Sweden*)
3. The digital gender gap and entrepreneurship in MENA region- **Zuzana Brixiova Schwidrowski** (*UN Economic Commission for Africa, Morocco/Masaryk University, Czech Republic*)

### Economic Growth, Health, and Environmental Factors- Saturday, December 16-Session IIC

1. Intra-regional trade, institutional quality and economic growth in the ECOWAS- **Idrissa Ouedraogo** (*Thomas Sankara University, Burkina Faso*)
2. Evaluating the relationship between CO<sub>2</sub>, GDP, renewable energy, and agricultural sector in OECD countries using STIRPAT framework-**Gaetano Perone** (*University of Pisa, Italy*)
3. Effects of healthcare financing policy tools on health system efficiency: Evidence from sub-Saharan Africa-**Kwadwo Arhin** (*Ghana Institute of Management and Public Administration, Ghana*)

# List of Abstracts

## Discrete variables in data envelopment analysis-**Zhichao Wang**

- The influence of discrete environmental variables may be too significant to be disregarded in the efficiency analysis, especially when DMUs from different subgroups are performing with non-identical technology sets. In the vein of DEA, one prevalent solution is the ‘two-stage’ approach, where the environmental variables are assumed not influencing the technology and excluded during the efficiency estimation. Estimating within each subgroup (e.g., the conditional DEA) is an alternative solution, yet a decreasing sample size would be critical for the envelopment-type estimators in accuracy and speed of convergence. In this paper, we propose a dDEA model to incorporate the discrete environmental variables into DEA by adapting a kernel smoothing method. We contain all the DMUs in the estimator to overcome the above caveats of the ‘separate frontier’ method while comprising the influence of the discrete environmental variables during the estimation. In simulations, the proposed dDEA models overperform the conventional DEA significantly, while also overcoming the ‘curse of dimensionality’ problem facing the separate frontier method.

## Laspeyres-Paasche bounds for productivity index-**Hideyuki Mizobuchi**

- The Laspeyres and Paasche indices are two widely used empirical indices. Among their important features is their ability to provide the upper and lower bounds, respectively, for the cost-of-living index, which is the representative theoretical consumer price index. In this paper, we demonstrate that the Laspeyres and Paasche indices can also provide bounds in the context of measurement of productivity growth. However, their role changes such that the Laspeyres and Paasche productivity indices provide the lower and upper bounds, respectively, for theoretical productivity indices. Furthermore, we find that the Laspeyres productivity index is necessarily lower than the Paasche index under Hicks-neutral technological change. Finally, by applying this inequality to the US industry data, we reveal that its annual technological changes from 1987 to 2021 can be regarded as non-Hicks-neutral and biased towards certain inputs.

## Examining agricultural efficiency, emissions and technological heterogeneity in Africa using a stochastic meta-frontier approach-**Lindikaya Wiseman Myeki**

- Agriculture plays a critical role in ensuring food security and fostering economic growth in Africa. To tailor appropriate policies, analyses that account for production heterogeneity and inefficiencies caused by variations in factors such as climate, soil fertility, emissions, and diseases across regions are necessary. Current evidence of agricultural production heterogeneity and efficiency in Africa relies on non-parametric and semi-parametric metafrontier approaches. This paper analyses agricultural production heterogeneity and efficiency growth across the five African regions while considering agricultural emissions using data from 2000 to 2019 and a stochastic metafrontier model developed by Amsler et al. (2017). The production function results show a varying relationship between agricultural emissions and production output across the regions, with positive elasticities observed for North and West Africa, negative elasticities for Central Africa, and no significant relationship in the other regions. The study shows that East African countries are producing near their potential. The technical efficiency with respect to the metafrontier shows that South Africa, Mauritius, and Kenya were the most technically efficient countries, while Sao Tome and Principe, Equatorial Guinea, and Libya were the least efficient countries during the study period. From a policy perspective, countries near the metafrontier may need to increase investments in local research to generate new technologies, while those lagging behind the metafrontier could benefit from adaptive research, which makes borrowed technology applicable to local conditions, improving agricultural performance.

## Factors determining differences in organic agricultural production across Spanish region-**Alan Well**

- Organic production has been given an increasingly important role in Europe and worldwide in the drive towards achieving sustainable agriculture. In Europe, organic production is still relatively small compared

to conventional production but it has been increasing in recent years: the share of agricultural land used for organic farming increased by 58% from 2012 to 2020 and increased in every EU Member State except one. The importance given to increasing organic production by European authorities is reflected in the European Commission's Farm-to-Fork strategy, which includes a target to have 25% of agricultural land under organic farming by 2030. Spain has the largest area of organic land in the EU-27, with the share of organic land varying widely across regions and provinces. In this work, we analyse the determinants of the differences in organic land area across the 50 Spanish provinces using a dataset covering the period 2007-2013, where we pay particular attention to the role of subsidies and regional socioeconomic and physical characteristics. The data, publicly provided by the Spanish Ministry of Agriculture and the Spanish National Statistics Institute, include variables found in the previous literature to influence regional uptake of organic farming in Europe. Thus, the chosen variables capture factors such as capturing institutional support for organic farming (agri-environmental aid), number of organic food industry firms, age structure of population, farm size, distance to major population centres, and GDP. To model the factors determining the share of land dedicated to organic production, stochastic frontier model is estimated under the assumption that greater organic production desirable and that provinces may deviate more or less from this frontier depending on differences in demand conditions or unobserved structural conditions. Subsidies (institutional support) are found to increase adoption of organic production, but provinces with more subsidies are further from the 'frontier' share of organic production. Thus, subsidies are found to work as far as organic production is concerned. Another policy implication from our results is that the organic food industry (commercialization, processing, and distribution) should be promoted at regional level in order to increase the share of organic production.

#### Impacts of adopting organic farming on the livelihood of cotton farming households in Meatu and Maswa Districts, Tanzania-**Arne Henningsen**

- The use of synthetic agricultural inputs such as chemical fertilisers and pesticides increases agricultural productivity but often also causes environmental and health problems, particularly in developing countries, where rules for applying these inputs are less strict than in developed countries. Organic farming strictly prohibits the use of synthetic agricultural inputs and, thus, has the potential reduce negative environmental and health effects of agricultural production. Whether price premiums for certified organic products can sufficiently compensate for a lower productivity of organic farming is particularly relevant for resource-poor farm households in developing countries as a decrease of their already low income could have severe effects on their well-being. However, little is know about the net effect of adopting organic farming on the well-being of resource-poor farm households in developing countries. In order to shed some light on this highly relevant issue, we empirically analyse the effect of adopting organic farming on the livelihood of smallholder cotton farmers in Meatu and Maswa districts of Tanzania. Our empirical analysis considers both monetary and subjective measures of livelihood. It is based on a cross-sectional data set of 2,526 households engaged in small-scale cotton production, of which 1,810 apply conventional farming methods and 716 apply organic farming methods. In order to take into account that farm households self-select into conventional and organic farming, we estimate the effect of organic farming by using the two-stage least-squares regression method with the distance from the location of the farm household to the organisation that monitors the organic farmers and buys the organically produced cotton as instrumental variable. While farm households that are located closer to this organisation clearly have a higher probability of having adopted organic farming, it is very unlikely that the distance to the organisation affects the livelihood of farm households or is correlated with unobserved variables that affect the livelihood of farm households. Hence, this distance is an ideal instrumental variable for our analysis. Our preliminary results indicate that adoption of organic farming has statistically and economically significant positive effects on monetary indicators of the household's livelihood, while the effects on subjective livelihood indicators are statistically and economically insignificant. A split-sample analysis indicates that the positive effects on monetary outcomes are driven by male-headed households, while no statistically significant effects could be found for female-headed households. The estimated effects on subjective livelihood outcomes tend to be positive for male-headed households, while they tend to be negative for female-headed households (although still statistically insignificant both for male-headed and female-headed households). Hence, our preliminary analysis indicates that male-headed households of smallholder cotton farmers in Meatu and Maswa districts of Tanzania benefit from adopting organic farming, while female-headed households do not benefit from this. Investigating the reasons for this gender difference is a highly relevant topic for future research.

#### Behavioural economics for sustainable development: enhancing efficiency and productivity in Africa-**Bineetha P Bose**

- Introduction Africa, a continent of immense potential and challenges, is striving to achieve sustainable growth, efficiency, and productivity. Traditional economic models often overlook the nuances of human behaviour that influence decision-making and impact economic outcomes. Behavioural economics, rooted in psychology and cognitive science, offers insights into the cognitive biases and heuristics that drive decision-making processes. This abstract provides an overview of an interdisciplinary study that applies behavioural economics to African development, focusing on its potential to enhance efficiency, productivity, and sustainability. The seminal work of Thaler and Sunstein (2008) introduced the concept of "nudges" as a means to influence individuals' decisions without resorting to prohibitive measures. Nudges have been successfully implemented in various domains, including public health (Marteau et al., 2012) and financial decision-making (Benartzi & Thaler, 2007). The relevance of nudges extends to Africa, where policymakers are increasingly exploring behavioral insights to promote public health and financial literacy (Mulenga et al., 2019). Education, a cornerstone of sustainable development, is a domain where behavioral economics principles find application. Muralidharan and Sundararaman (2010) demonstrate how behavioral insights have improved learning outcomes in India, offering valuable lessons for African countries. Methodology The research methodology focuses on existing literature, case studies, policy analysis, and expert insights to assess the application of behavioural economics in the African context. A comprehensive review of existing literature on behavioural economics, its key concepts, and its applications in diverse cultural and economic contexts, with an emphasis on African case studies. In-depth examination of specific African cases are done where behavioural economics principles have been applied to enhance efficiency and productivity. Case studies may include interventions in agriculture, healthcare, education, and finance. Evaluation of existing policies in African countries and the potential integration of behavioural economics insights to drive sustainable development. Assessment of policy implementation and its impact on efficiency and productivity. Conducting interviews with experts in the field of behavioural economics and African development to gather insights and recommendations. 1 Bineetha. P. Bose, Ph.D., Assistant Professor, Department of Economics, CHRIST (Deemed to be University), Bangalore, email: bineethap.bose@christuniversity.in 2 N A Khan, Retired Professor, School of Economics, University of Hyderabad, Telangana, India. The abstract presents preliminary findings based on the initial stages of the research are as follows, a) Cultural Relevance: Behavioural economics principles should be adapted to suit the cultural context of African nations to ensure effectiveness in promoting efficiency and productivity. b) Educational Initiatives: Incorporating behavioural economics concepts into educational curricula to equip future generations with the tools to make more informed decisions. c) Financial Inclusion: Behavioural interventions that promote savings and responsible financial behaviour can have a significant impact on individual and community well-being. d) Healthcare Decision-Making: Understanding the behavioural factors influencing healthcare choices and designing interventions to encourage healthier behaviours among African populations. Conclusion This abstract provides a glimpse into an ongoing research endeavour that explores the application of behavioural economics principles to enhance efficiency, productivity, and sustainability in Africa without relying on primary data collection. The study emphasizes the importance of understanding and addressing cognitive biases and decision-making heuristics to achieve sustainable development in the African context. By integrating existing literature, case studies, and policy analysis, this research aims to offer practical recommendations for policymakers, institutions, and communities to unlock Africa's economic potential. Keywords: Behavioural Economics, Africa, Sustainable Development, Efficiency, Productivity. References Bandiera, O., Buehren, N., Burgess, R., Goldstein, M., Gulesci, S., Rasul, I., & Sulaiman, M. (2016). Empowering adolescent girls: Evidence from a randomized control trial in Uganda. *The World Bank Economic Review*, 30(3), 549-574. Benartzi, S., & Thaler, R. H. (2007). Heuristics and biases in retirement savings behavior. *Journal of Economic Perspectives*, 21(3), 81-104. Bertrand, M., Mullainathan, S., & Shafir, E. (2006). Behavioural economics and marketing in aid of decision making among the poor. *Journal of Public Policy & Marketing*, 25(1), 8-23. Karim, S. S., Mehmood, Y., & Saleem, M. (2015). Cultural dimensions in nudging: An empirical analysis. *Journal of Economic Psychology*, 50, 35-48. Marteau, T. M., Hollands, G. J., & Fletcher, P. C. (2012). Changing human behavior to prevent disease: The importance of targeting automatic processes. *Science*, 337(6101), 1492-1495. Mulenga, J. N., Abas, A. B., & Kumwenda, W. (2019). The role of behavioural economics in addressing non-communicable diseases in Sub-Saharan Africa. *African Journal of Health Economics*, 8(2), 67-84. Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.

Comparing scenarios of the carbon regulation for the BRICS and EAEU economies using the GTAP-E model-  
**Davydova Altana Yurievna**

- The paper compares the economic effects of the introduction of a national carbon taxation and the emission trading system (ETS) between the EAEU and BRICS countries in the medium-term. We also add to this

group of countries Uzbekistan, which has an observer status in the EAEU, and Turkmenistan, trade and economic partner of the EAEU. The static computable general equilibrium model GTAP-E is used. Targets for reducing emissions are formulated on the basis countries' intermediate goals, according to the national documents under the Paris Agreement. The results of simulations show that in terms of real GDP, countries such as Belarus, Russia, Kyrgyzstan, Kazakhstan, Armenia, Brazil, and India prefer an emission trading scheme to national taxation. While for China, South Africa, Uzbekistan and Turkmenistan, participation in the ETS leads to a greater reduction in GDP. Since the second group of countries has lower abatement costs than the equilibrium carbon price under the ETS, in the ETS scenario they reduce emissions by a greater amount and sell emission permits. The analysis also shows which sectors increase production after the carbon regulation. A considerable increase in production and exports is observed in chemicals, nonferrous, ferrous metals in several BRICS and EAEU countries. For example, for Russia, Belarus, Kazakhstan, Brazil, and India the export of chemical products is increasing. In Kazakhstan, Russia, Armenia, Uzbekistan and Turkmenistan, South Africa, export growth is observed non-ferrous metals. In South Africa, Brazil, China, Armenia there is an increase in exports and output of ferrous metals. Despite that these industries are energy-intensive, countries decrease emissions by reducing production in the energy sectors. These industries can be potential joint comparative advantages in the context of declining demand for traditional energy sources. The findings can be useful for the integration policy.

Toward data- and evidence-driven policy making: the data imperative-**Spiro E. Stefanou**

- Economics is a science of making choices and can significantly contribute to public policy. The starting point is evidence and facts. While facts are crucial to driving policy, we depend on the theories to interpret these facts. This presentation will focus on the paradigm and infrastructure for the data inventory and statistics that undergird economic measurement. The case of the Federal Statistical System in the U.S. is presented as a case study. The Data Imperative acknowledges the responsibility and challenges for ensuring the quality, objectivity, and the transparency of the statistical information, guaranteeing the trust of data providers and users, and finally where we acquire data in the coming decades. Our job is to explain the interrelationships and themes that can catalyze the decision maker's thinking. We do this by being relevant and getting the numbers right.

Agricultural Productivity in Africa-**Lilyan Fulginiti**

- At aggregate level productivity change is used to represent growth and ultimately it is a proxy for changes in wellbeing. I first briefly examine the potential discrepancy between the rate of productivity change and the corresponding rate of consumer welfare change as measured by Hick's Equivalent variation. Then I contrast Solow's 'residual' as a measure of productivity and growth with Schultz and Griliches 'explain all' approach to measuring productivity. Lastly, I present examples of our estimates of agricultural productivity growth in Africa. We find that in the last fifty years in Sub-Saharan Africa the average annual rate of agricultural productivity growth has been around 0.80 percent, with low rates in the 1960s and 1970s and improving rates thereafter. For North Africa we notice that the share of agriculture in the economy has stayed relatively stagnant. Changes in endowments, rather than changes in terms of trade or biased technical change in favor of agriculture dominate this evolution.

Green innovations and patents in OECD countries-**Almas Heshmati**

- No Abstract.

US military aid in the post-cold war era: two-tier stochastic frontier analysis-**Alecos Papadopoulos**

- Wang (2021) "Bargaining power and U.S. military aid in the post-cold war era" modeled US military aid as an "aid for policy" bargaining situation, and used a two-tier stochastic frontier model to measure bargaining effects between US and recipient countries in the post Cold War era using global country-level data from 1992-2011. We enhance the data set with political and economic characteristics of USA and we correct also for a severe collinearity issue. We find that these were not "Nash-bargaining" situations, and that the internal political and economic situation in USA affects military aid. We examine who is getting surplus out of the transaction (the US or the recipient country), and how this evolved over time. We explore in more detail this facet of International Relations for African countries.

Nudging rail transportation forward: the role of contracts and behavioral insights-**Fabio Pereira Simoni da Silva**

- This study examines the subsidy improvement policies for soybean transportation in Africa. The focus is on the strategic integration of behavioral nudges to incentivize rail transportation instead of road transportation within the soybean industry, with a particular emphasis on enhancing rail infrastructure. The research evaluates the effectiveness of various rebate policies, namely the Unrestricted Rebate, Variable Conditional Rebate, and Fixed Conditional Rebate through a Monte Carlo simulation, under diverse conditions. The inclusion of a nudge factor ( $\nu$ ) significantly impacted policy outcomes, highlighting the profound impact of nudges on policy effectiveness. Interestingly, the simulation showed that the Unrestricted and Fixed Conditional Rebate Policies yielded similar profits, while the Variable Conditional Rebate Policy was less profitable, underscoring the complexity of policy design in agricultural transport. A significant finding of this study is the crucial role of nudges in constructing rail infrastructure and ensuring its accessibility. The introduction of nudges shifts the focus beyond mere infrastructure development to encompass ease of access, enhancing the practicality and efficiency of rail transport for soybeans. This aspect is particularly relevant in African contexts where logistical challenges often impede agricultural progress. By integrating considerations of agricultural yield potential, transportation infrastructure, and behavioral economics, this study sheds light on the multifaceted nature of subsidy policies in the soybean sector. It advocates for a holistic approach that aligns infrastructural development with behavioral insights to optimize the transportation and distribution of soybean crops in Africa. The findings provide valuable guidance for policymakers and stakeholders, emphasizing the necessity of building rail infrastructure and ensuring its accessibility and usability through well-considered nudges, thereby enhancing the overall effectiveness of subsidy policies in the region.

Does organic farming reduce returns to land and labor? Micro-evidence from Benin-**Ghislain Dossou Boris Aihounton**

- Organic farming and other sustainability standards have gained importance around the globe. While previous studies analysed the effects of organic farming on economic outcomes, its effects on labor outcomes are not yet understood. This raises potential empirical gap and questions the relative importance of economic outcomes alone for spurring rural development. Furthermore, as casual and informal employments largely dominate the rural labor force, it is also important to question the potential of organic farming to facilitate the transition from an economy based on small household agricultural enterprise due to high self-employment to a more commercial enterprise with high potential of productive wages. Thus, understanding the changes in labor markets induced by the adoption of organic farming is highly relevant for informed policy actions. Using data collected from Benin, and employing selection on observable strategy, and instrumental regression approach, we show that while adopting organic farming increases labor allocation, it reduces land and labor productivity as well profitability when accounting for shadow cost of labor. Heterogeneity analysis reveals that organic farming provides employment opportunity for vulnerable households, particularly women. Our findings have policy implications for rural development initiatives that support rural employment and transformation in developing countries.

Direct and indirect impacts of natural disasters on banks: a spatial framework-**Fisher Yu**

- We examine the direct and indirect impacts of natural disasters on deposit rates of U.S. bank branches from 2008 to 2017. We capture the indirect impact by the spatial spillover effects of disasters, from branches directly exposed to such disasters to neighboring branches. We theoretically motivate our spatial framework by local competition for deposits among branches and provide empirical evidence consistent with this model. We find that indirect effects contribute to at least two-thirds of the total impact for deposit rate-setting branches. Rate-setting branches in affected counties, on average, raise their deposit rates on 12-month CDs by 1.5 basis points directly due to the disaster shock. However, there is an additional indirect increase of 2.7 – 4.3 basis points for all rate-setting branches, including those in adjacent but unaffected counties, due to the local geographical competition for deposits. We also confirm that the spillover effect occurs among branches across counties via an overlooked social connectedness. Moreover, and importantly, online and one-county banks are more likely to rely on the information channel embedded in the social connectedness in response to natural disasters. Branches in less concentrated local markets also respond more to the nature disaster and rate adjustments of neighboring branches.

Islamic banks, square peg in a round hole? Evidence from MENA region using meta-frontier directional distance functions-**Mohamed Mekki Ben Jemaa**

- In the past two decades, a substantial body of empirical research has emerged to compare the performance of Islamic and conventional banks. This study contributes to this literature by focusing on a sample of the MENA

region from 2000 to 2019, employing a hyperbolic distance function approach to assess the impact of the Risk-Sharing principle claimed by Islamic finance on banking efficiency. The empirical studies in this domain can be categorized based on the performance indicators used and the sample structure. Traditional financial ratios and frontier analysis approaches, both parametric and non-parametric, have been employed to gauge banking performance. Furthermore, the structure of the sample can vary, with some studies evaluating the efficiency of Islamic and conventional banks separately, while others directly compare the two. While there is a slight tendency in empirical studies to suggest that Islamic banks might be more efficient than conventional banks, no conclusive evidence supports this claim. To delve deeper into this debate, this study introduces a new method by considering a bad output technical efficiency to empirically assess the impact of Risk-Sharing on banking efficiency. The fundamental idea behind this methodology is to redefine the output produced by banks. Unlike traditional efficiency analysis, which assumes both Islamic and conventional banks produce a single homogenous output, this study relaxes this assumption by considering a composite and differentiable bundle of output, distinguishing between "good" and "bad" loans. This distinction is crucial, as Islamic banks claim it as the core difference between their operations and conventional banking. The loan selectivity process conducted a priori by Islamic banks has dual effects - it allows them to reduce inherent risks but simultaneously limits loan possibilities and potential banking activity. In contrast, conventional banking tends to take more risks upfront, potentially enhancing profitability but exposing the bank to a higher risk of non-solvability. Therefore, empirical assessments of the gap between conventional and Islamic banks should consider this trade-off between loan granting and risk-taking. The paper employs the stochastic frontier directional distance function to investigate bank efficiencies in MENA countries, allowing for a comprehensive analysis of both desirable and undesirable outputs. The inclusion of non-performing loans as an undesirable output reveals intriguing findings. Technical efficiency scores derived without considering undesirable outputs are significantly higher for Islamic banks, suggesting a potential operating risk for them. The analysis also reveals that conventional banks in the MENA region are more efficient in holding the optimal mix between desirable and undesirable outputs. The metafrontier directional distance function further supports this conclusion, indicating that Islamic banks operate under a more volatile production process. The average technical efficiency scores Technological Gap Ratios show no significant difference between conventional and Islamic banks. However, the adjusted scores of technical efficiency indicate that, on average, conventional banks outperform Islamic banks across the sampled countries, with exceptions in Jordan and Tunisia.

Money demand function stability and uncertainty in Rwanda-evidence from linear and nonlinear ARDL bounds tests-**Vincent Byusa**

- The National Bank of Rwanda (NBR) has recently shifted from monetary aggregate targeting to inflation targeting based on the idea that the money demand function has become unstable. As a result, the current monetary policy simply ignores the role of money in the conduct of monetary policy. Given the paucity of empirical evidence on the subject in Rwanda, this paper offers fresh evidence by considering three aspects of the question of whether it has a stable money demand function. First, this paper empirically investigates whether the quantity theory of money that defines the relationship between the real gross domestic product, inflation rate, interest rate, nominal exchange rate, uncertainty, and the money supply hold in Rwanda in the long run, but not in the short run, as the theory postulates. Second, this paper empirically assesses whether the function of the money demand is stable. Finally, this paper examines whether uncertainty associated with economic and political events has asymmetric effects on the desired money holdings. Based on the scatter plots, linear and nonlinear autoregressive distributed lag bounds testing approaches, cumulative sum, and cumulative sum of squares tests, and using Rwanda's quarterly macroeconomic time series over the period 1998-2022, this paper finds that the quantity theory of money holds in the long run, the money demand function is stable, and uncertainty has asymmetric effects on the real money balances. The general conclusion that this paper draws is that the shift from monetary aggregate to inflation targeting seen in Rwanda cannot be justified on the grounds of unstable money demand function. Hence, the current inflation targeting policy framework should not overlook the importance of monetary aggregates in the quest for price stability.

Assessing the impact of rural-urban migration on technical efficiency in maize production in Ghana: insights from difference in differences selectivity corrected stochastic frontier modeling-**Bright Owusu Asante**

- This study aims to assess the impact of rural-urban migration on changes in technical efficiency in maize production in Ghana. To address our objective, we utilized the Ghana Socioeconomic Panel Survey (2013/14 and 2017/18), propensity score matching (PSM), and difference-in-differences (DID) techniques in conjunction with stochastic production frontiers (SPF). After accounting for sample selection, the SPF results demonstrate a

causal effect of GHS155.14 on maize production. Furthermore, migrant households exhibit significantly higher levels of maize output value compared to non-migrant households. Overall, the findings reveal relatively low levels of technical efficiency in maize production, with migrants consistently demonstrating higher levels of technical efficiency than non-migrants. Furthermore, experience, credit access, and education were identified as the technical inefficiency factors across all the time periods. Therefore, implementing policies aimed at providing agricultural extension services such as capacity building and ensuring a reliable supply of agricultural technologies, such as improved seedlings and agrochemicals, has the potential to enhance the technical efficiency of maize farmers in Ghana.

#### Farmer education, farm efficiency and agricultural productivity in Ghana: Is there a nexus?-**Jacob Asravor**

- The projected growth in human population in sub-Saharan Africa (SSA) along with its concomitant increase in food demand, shrinking land frontiers, heightened climate change impacts and natural resource degradation have underscored the need for policies that pay attention to sustainable agricultural productivity growth on current croplands in the region. While agricultural productivity growth in SSA is seen as a precondition for enhanced food security and poverty reduction, this has largely trailed behind that of other regions in the world. One of the suggested pathways to sustainably raise productivity in the region is by narrowing the potential productivity gaps on existing croplands via improvements in farm household's human capital. Generally, education is regarded as the most critical form of human capital, having significant impact on agricultural productivity by enhancing the decision-making skills of farm families. However, evidence of its impact on farm efficiency and productivity has generally remained unclear. While some studies establish a positive link between education, farm efficiency and productivity, others reported either a negative or no relationship. These divergent findings may likely stem from inherent differences in the estimation techniques adopted by prior studies and how education was measured. For instance, in most of these studies, education was captured either as a covariate of technical inefficiency or as a factor input in the stochastic frontier model (SFM). However, the SFM is unable to account for possible heterogeneities among farm families with different levels of educational attainment, but rather assumes homogeneity across the different farmer populations. Thus, the magnitudes and directions of the interplay between education, farm efficiency and productivity in these earlier studies may likely be biased. Against this backdrop, our study seeks to fill this empirical gap by examining the effect of farmer's educational attainment on farm efficiency and productivity in Ghana. We apply the stochastic metafrontier framework to a country-wide data of 17,534 farm households, drawn from the 6th and 7th waves of the Ghana Living Standards Survey. The stochastic metafrontier framework is more appropriate for this study because it considers variations in the production setting of farm families with different forms and levels of educational attainment. Our empirical results indicate that attaining some form of formal education leads to only 3.2% gains in both farm technology and production efficiency. This implies that receiving some form of formal education does not considerably translate into higher technological and managerial advantages for beneficiary farmers. Even after further disaggregating the form of educational attainment into a three-tier index, the results corroborate our earlier findings that formal educational attainment does not substantially translate into greater technical efficiency and technological endowment of farm households, and consequently, agricultural productivity in Ghana. These findings suggest that the agricultural technology landscape in Ghana is so uniformly rudimentary that attaining higher level of formal education does not translate into significant productivity gains for farm families. Consequently, raising agricultural productivity in Ghana would require further investment in agricultural research to generate and diffuse improved technologies and farming practices to farm families.

#### Does land consolidation promote livestock production and combat rural depopulation in northern Spain?-**Luis Orea**

- This paper evaluates the effect on livestock production and rural population of the land consolidation (LC) processes that occurred over recent decades in Asturias, an autonomous region located in north-west Spain. We use a novel Difference-in-Difference (DiD) model with heterogeneous timings and spatial spillovers. As many parishes have been involved in two or more LC processes, we test whether we can simplify our analysis using a specification that accumulates the effect of consecutive, and often distant, LC processes. We find that this simplification can(not) be implemented when we analyse the effect of the LC processes on parishes' livestock production (population). We find that parish livestock production increases on average about 3% once we take into account the spatial effects, and that the LC processes have especially attenuated the decline in the number of farms in (coastal) parishes where dairy farms predominate. We do not find strong evidence regarding the effectiveness of the LC processes in redressing rural depopulation, except in some of the parishes located in western Asturias



## Policy reforms and self-employment in developing countries: a multi-good approach-**Yu Shi**

- Developing countries have more self-employment and less wage employment than developed countries. Along these lines, this paper documents two interesting facts. First, self-employed and wage-employed have distinguishable occupational distributions in low-income countries, with the self-employed concentrating on home-production-related occupations. Second, the decrease in home-production-related self-employment is the primary driver of the decline in the self-employment rate along the development path. Given the enormous amount of the self-employed in developing countries, it is essential to understand how policies affect the size of the wage and the self-employment sectors. This paper builds a simple heterogeneous agent model with occupational choice. My innovation is to assume that the self-employed and the wage-employed produce different goods, in line with the empirics. The model calibrated to Tanzania shows that with a realistic elasticity of substitution between goods produced by two sectors, occupational choice in response to corporate income tax cuts is only 1/3 as elastic as in a case with very high substitutability. When the wage and self-employment sectors provide goods that are harder to substitute, a reduction in the supply of home production substitutes increases its price, making self-employment more attractive, thus weakening the effectiveness of those policies.

## Language as a strategic choice—drawing global research talent by switching to english-**Yihui Cao**

- Global universities are switching their language of instruction to English to strengthen international rankings and research power. This paper quantifies the benefits of switching to English on university research performance and faculty recruiting. Using the two-way fixed effects (TWFE) estimator and the staggered difference-in-differences (DiD) estimator, we show that introducing English as the official language of instruction in a degree program increases the academic ability, proxied for by publication performance, of new faculty hires in Dutch and Belgian universities. These results are robust to a battery of controls including university and time fixed effects as well as university specific time trends. We argue that switching to English reduces labour mobility barriers, allowing universities in non-English speaking countries to recruit from the global talent pool. It removes language hurdles to scientific communication, which potentially accelerates knowledge diffusion and increases research power.

## Adopting improved technologies to enhance agricultural productivity in Sub-Saharan African countries-**Awudu Abdulai**

- No Abstract.

## Production analysis with asymmetric error-**Daniel Henderson**

- Symmetric noise is the prevailing assumption in production analysis, but it is often violated in practice. Not only does asymmetric noise cause least-squares models to be inefficient, it can hide important features of the data which may be useful to the firm/policymaker. Here we outline how to introduce asymmetric noise into a production or cost framework as well as develop a model to introduce inefficiency into said models. We derive closed-form solutions for the convolution of the noise and inefficiency distributions, the log-likelihood function, and inefficiency, as well as show how to introduce determinants of heteroskedasticity, efficiency and skewness to allow for heterogenous results. We perform a Monte Carlo study and profile analysis to examine the finite sample performance of the proposed estimators. We outline R and Stata packages that we have developed and apply to three empirical applications to show how our methods lead to improved fit, explain features of the data hidden by assuming symmetry, and how our approach is still able to estimate efficiency scores when the least-squares model exhibits the well-known “wrong skewness” problem in production analysis.

## Modelling pollution-generating technologies: an overview of existing possibilities-**Hervé Dakpo**

- No Abstract.

## The effect of government cuts of doctoral scholarships on science-**Giulia Rossello**

- I provide estimates of the impact of government cuts on PhD scholarships in Science. I leverage a unique quasi-natural experiment, the staggered cuts made by the Hungarian Government between 2010 and 2021 to expand Orbán’s political influence over the university system. The political aim of the cut ensures that it is exogenous to the economic cycle and to the scientific activity of universities. My analysis couples the complete enrolment records of doctoral students in the country around the years of scholarship cuts with a

generalized difference-in-differences approach. I find that while government cuts of PhD scholarships have an ambiguous effect on students' attainments, the policy has a clear negative effect on Science. That is, the severe reduction of scholarships increases the chance of completing the PhD by 1 pp, and the effect is stronger for female students. However, this positive effect is counterbalanced by a reduction of a similar amount of entry rates for females and non-traditional students. This suggests that besides training might improve, or the system might become more efficient, this is at the expense of social inclusion. Additionally, the effects of cuts on scientific production are negative both in terms of quantity and quality. The productivity of doctoral students drops by 2 pp while their scientific quality decreases between 0.2 pp and 1 pp. My results suggest that the reduction of doctoral scholarships might produce efficiency in terms of student attainment but at the expense of social inclusion, scientific production, and quality.

#### Regulatory costs and vertical integration: evidence from supply chain disclosure regulations-**Enshuai Yu**

- I study whether and how supply chain disclosure regulations shape corporate boundaries, particularly, firms' vertical integration decisions. I employ a 2010 California supply chain disclosure regulation requiring firms to disclose information regarding their efforts to eradicate human trafficking and slavery in supply chains. This disclosure regulation imposes potential costs on focal firms, especially litigation risk arising from the legal responsibility for suppliers' treatment of workers, reputational costs from consumers, and supply chain information acquisition and monitoring costs. Difference-in-differences analyses demonstrate that treated firms make more vertical acquisitions, especially upstream vertical acquisitions, following the regulation, relative to control firms. The effects are concentrated among firms with greater vertical integration incentives (e.g., stronger incentives to reduce litigation risk, protect reputational capital, maintain supply chains opacity, and manage overall risks) and ability (e.g., are cash-rich and have prior acquisition experience). Examining a set of additional vertical integration-related outcomes, I find that following the regulation, treated firms become more vertically integrated across their supply chains and reduce production outsourcing, demonstrated with (i) a higher text-based vertical integration score, (ii) more voluntary disclosures of vertical integration activities, (iii) more business segments, (iv) higher product similarity to upstream firms, (v) a higher value-added ratio, (vi) more strategic alliance activity, (vii) fewer suppliers, and (viii) less outsourcing based on a stochastic production function. My collective evidence suggests that supply chain disclosure regulations incentivize firms to become more vertically integrated across their supply chains.

#### European firms productivity growth and environmental regulation. Re-examining the Porter hypothesis-**Nikolaos Rigas**

- The European Union has proposed a set of new regulations that aim to transform Europe to a climate neutral continent by 2050. European manufacturing firms have to cope with the new regulations that advocate a greener and more sustainable future with less emissions and at the same time enhance or at least maintain their productivity levels and withstand the heavy pressure of global competition. Thus, it is imperative for economic science to study the effects that newly imposed regulations have on economic growth and suggest any appropriate modifications. We construct a unique dataset by combining information on firms' emission quantities from the European Pollutant Releases and Transfer Register (E-PRTR), with firms' financial information derived from Orbis database. Our aim is to study the impact of environmental regulations on firms that create undesirable outputs during their production process. The final dataset consists of 8,631 firms that we classify according to the pollutant group they emit. We focus on three available pollutant groups (greenhouse gases, heavy metals emitted in air and other gases) for the period 2011-2017. We follow a non radial directional distance function where each firm uses a vector of inputs and produces a vector of desirable and also a vector of undesirable outputs. We adopt a non-radial efficiency estimation, which assumes that inputs and undesirable outputs decrease at a different rate as desirable outputs increase. We compute a regulatory impact indicator that provides information about the loss of outputs resulting from new policies and is used as a proxy based upon the comparison of two scenarios. A scenario that accepts the existence of weak disposability of undesirable outputs due to the imposed environmental regulations and a second scenario, which makes the conjecture of free disposability of undesirable outputs. Moreover, we compute environmental productivity growth and its components, namely best practice change, technology gap change and efficiency change based on Oh (2010). Environmental productivity growth has the advantage that takes into consideration the incorporation of emissions in the production function in order to estimate the firm productivity (known as Malmquist-Luenberger index). It also addresses the existing problem of heterogeneity by adopting the concept of metafrontier. Our dataset consists of firms that belong to various sectors with different production technologies, thus the metafrontier concept is a more accurate method to estimate productivity

growth by considering the group heterogeneity. Finally, we explore the impact of regulatory impact indicator on environmental productivity growth using a panel vector autoregression method that explicitly remedies endogenous variables and takes into account the unobserved heterogeneity. Our results indicate that the three pollutant groups have similar regulatory impact indicator scores with the highest score belonging to the other gases pollutant group. The low scores advocate that the inefficiency when taking into account the undesirables as weakly disposable, is very close to the inefficiency when considering the undesirables as freely disposable. Furthermore, our findings regarding the environmental productivity showcase that it has deteriorated for the three pollutant groups we examine during the period of interest. The average value of environmental productivity is 1.007 for heavy metals and 1.002 for greenhouse gases indicating small productivity increases by 0.7% and 0.2% for the 2011- 2017 period. On the contrary, environmental productivity is equal to one for other gases indicating that neither a catch up nor lagging behind took place. The component of best practice change is the main reason that environmental productivity growth increased on average, since it increased for all pollutant groups on average, indicating technical innovation increases from 2011 to 2017. Finally, we compute the impact that environmental regulations exert on environmental productivity and find a positive and statistically significant impact for heavy metals and greenhouse gases. More specifically, increasing the index of regulations by 1%, causes an increase of environmental productivity by 0.24% and 0.44% for heavy metals and greenhouse gases groups, respectively. The other gases group does not provide a statistically significant result. We find evidence that the effect of environmental regulations on environmental productivity growth depends on the technological and sector characteristics that exist and also on the specific features of the pollutant groups. We support the “weak” Porter Hypothesis, which attests that well-designed environmental regulations can exert a positive effect on environmental innovation. The fact that we focus on the impact of regulations on environmental productivity, which is further decomposed into three components is the reason we support the “weak” Porter Hypothesis.

#### Macroeconomic benchmarking on base erosion and profit shifting: a systematic literature review-**Athanasios Vasilakis**

- A macroeconomic review of the determinants of Base Erosion and Profit Shifting (BEPS) is the main purpose of this study. This has been achieved by a Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) that was conducted using five databases (ABI-ProQuest, EBSCO, Google Scholar, Scopus and Web of Science) published between 2003 and 2022. This review is based on 30 studies out of 16.700 (the larger number from Google Scholar) that were identified. The chosen 30 articles were retrieved as triple listed journals on Scopus, The Chartered Association of Business Schools (ABS) and Web of Science (WoS). Our approach identifies the serious macroeconomic issues that Base Erosion and Profit Shifting (BEPS) causes, such as severe acute international tax avoidance that has a destructive impact on the Global and European economies.

#### Do governance and institutions affect agricultural productivity?-**Gabriel Rosero**

- The rapid increase in global food demand, driven by population growth, urbanization, and rising incomes, intensifies the pressure on the agricultural sector to enhance the production of food, feed, and raw materials. Within this context, it becomes crucial to understand the factors that can support agriculture in meeting these growing needs. While existing literature has predominantly focused on the impact of environmental factors on agricultural production, little attention has been given to the role of domestic institutions in agricultural production across countries. Using a cross-country translog production function, this study analyses domestic institutions’ effect on the use of agricultural production factors (i.e., capital, labor, fertilizers, livestock, feed, and machinery). We study a panel of 162 countries spanning 22 years that we constructed with data from the World Bank’s World Governance Infrastructure Index (WGII) —which we use as a proxy for governance and institutions— and the International Agricultural Productivity data set compiled by USDA-ERS. Thus, the production function accounts for country income levels and non-neutral technical change. We also integrate the WGII into the production function specification, allowing the quality of governance and institutional infrastructure to interact with the agricultural production factors. Our assumption is that domestic institutions may contribute to changes in the use of agricultural production factors, resulting in variations in input productivity and output levels. Our findings reveal a positive effect of domestic institutions on agricultural productivity, with variations observed across national incomes and production factors. A one-point increase in the WGII will increase the production output by 0.06 percent, indicating a better government infrastructure will provide more agricultural output for the same amount of inputs. Notably, we observe different WGII output elasticities across countries, with positive values for upper- and high-income countries

and adverse effects for low-income countries; this underscores that governance and institutions play a role in agricultural production only in developed countries.

#### Does financial inclusion enhance farmers' resilience to climate change? Evidence from Ethiopia-**Mebratu Negera**

- In today's global landscape, economies worldwide grapple with the repercussions of climate change. The adverse effects of climate change disproportionately affect the most vulnerable communities, particularly smallholder farmers in developing countries. The limited availability of affordable financial services, such as agricultural insurance, credit, and savings options, is one reason why smallholder farmers in developing countries are vulnerable to the impacts of climate change. Financial inclusion plays a crucial role in enhancing farmers' resilience to climate change by providing them with access to financial products and services. However, there is a dearth of empirical evidence regarding the impact of financial inclusion on the climate resilience of farming households in Ethiopia. To fill this gap, this study assessed the impact of financial inclusion on the resilience of rural households in the face of climate change, using data from the 2018/2019 edition of the Ethiopian Economic Survey. The principal component analysis was applied to construct a climate resilience index, incorporating relevant indicators. The indicators include income and food access, assets, access to basic services, adaptive capacity, stability, and social safety nets. We developed a financial inclusion index based on three dimensions: penetration, availability, and usage. The level of penetration is assessed using ownership of accounts at financial institutions. Availability is measured using ownership of mobile money accounts and debit/ATM cards. Usage is measured using indicators such as insurance, access to credit, and savings. In order to address the problem of endogeneity associated with financial inclusion, we employed an instrumental variable approach. We used the distance from the nearest financial institution and religious factors as instrumental variables. The results of the study show a positive and significant impact of financial inclusion on enhancing the climate resilience of rural households. In particular, account ownership and ATM card usage emerge as influential financial services that stimulate the resilience of farming households against the impacts of climate change. Therefore, it is imperative for policymakers to initiate and implement financial sector reforms that prioritize climate-resilient agricultural finance and contribute to the achievement of the climate action goals of sustainable development.

#### Statistical inference for Hicks-Moorsteen productivity indices-**Shirong Zhao**

- The statistical framework for the Malmquist productivity index (MPI) is now well-developed and emphasizes the importance of developing such a framework for its alternatives. We try to fill this gap in the literature for another popular measure, known as the Hicks-Moorsteen Productivity Index (HMPI). Unlike MPI, the HMPI has a total factor productivity interpretation in the sense of measuring productivity as the ratio of aggregated outputs to aggregated inputs and has other useful advantages over MPI. In this work, we develop a novel framework for statistical inference for HMPI in various contexts: when its components are known or when they are replaced with non-parametric envelopment estimators. This will be done for a particular firm's HMPI as well as for the simple mean (unweighted) HMPI and the aggregate (weighted) HMPI. Our results further enrich the recent theoretical developments of nonparametric envelopment estimators for the various efficiency and productivity measures. We examine the performance of these theoretical results for the unweighted and weighted mean of HMPI using Monte-Carlo simulations and also provide an empirical illustration.

#### Russell and slack-based measures of efficiency: a unifying framework-**Shirong Zhao**

- We propose a unifying framework for the slack-based measurement of technical efficiency that also embraces Russell efficiency and many other important approaches of efficiency measures as special cases in this unified framework.

#### Breaking down bullying: empathy, social networks, and adolescents-**Qinyou Xu**

- This paper examines the formation of a specific non-cognitive skill – empathy – and its role in determining bullying behavior with a focus on social networks. The analysis centers on a parent-directed empathy-fostering intervention, which successfully enhanced students' empathy levels and reduced bullying. To disentangle the mechanisms underlying these findings, I develop and estimate a structural model of empathy development, network formation, and bullying decisions. The analysis reveals that 32% of the observed reduction in bullying is attributed to empathy-induced alterations in social networks. Policy counterfactuals show that social

network information is valuable. Notably, targeting students based on popularity can lead to up to a 7.5% further reduction in bullying compared to targeting students randomly. Moreover, targeting bullies' friends is more effective than targeting bullies directly. This insight holds promise for refining the efficacy of anti-bullying initiatives, which often focus more on bullies, and highlights the potential of reshaping social networks to mitigate violent behavior among adolescents.

Improved cookstove adoption and time use of children: Evidence from selected African countries-**Amare Tareke**

- No Abstract.

The digital gender gap and entrepreneurship in MENA region-**Zuzana Brixiova Schwidrowski**

- Theoretical studies on the digital gender divide and women's entrepreneurship that could inform policymaking in emerging market countries are relatively scarce. This paper strives to reduce this gap in the literature with a model that links entrepreneurship to digital skills and firm performance. The model illustrates those differences in digital skills, together with greater time constraints incurred by women, can lead to gender gaps in entrepreneurial outcomes. The results are consistent with indicators and results on survey data for Morocco from the Economic Research Forum. Policies for MENA countries should focus on strengthening the digital skills through increasing women's representation in science and technology, building confidence in own digital skills, and on easing women's time constraints.

Intra-regional trade, institutional quality and economic growth in the ECOWAS-**Idrissa Ouedraogo**

- This research investigates the interactive effects of intra-regional trade and institutional quality on economic growth in the Economic Community of West African States (ECOWAS) over the period 1996-2021. The auto-regressive distributed lag (ARDL) model estimated by the mean group (MG) and the pooled mean group (PMG) methods provides strong evidence for the positive effects of both intra-regional trade and institutional quality on economic growth in ECOWAS. The results also show that government effectiveness and control of corruption are particularly conducive to economic growth. In addition, the positive effects of intra-ECOWAS trade on economic growth are higher when they interact with good institutional quality. This study highlights the need for ECOWAS countries to improve intra-community trade and the quality of institutions that promote government effectiveness and control corruption, to enable and foster economic growth.

Evaluating the relationship between CO<sub>2</sub>, GDP, renewable energy, and agricultural sector in OECD countries using STIRPAT framework-**Gaetano Perone**

- The goal of this article is to examine the relationship between CO<sub>2</sub>, GDP, agriculture, and renewable energy in 26 OECD nations from 1976 to 2018, using a Stochastic Impacts by Regression on Population, Affluence, and Technology (STIRPAT) framework. The STIRPAT model is fitted with the common correlated mean group (CCEMG) and augmented mean group AMG estimators. The general method of moment (GMM) estimator for panel vector autoregression (PVAR) is then used to investigate Granger non-causality. On the one hand, a large body of research has shown that CO<sub>2</sub> emissions are a key contributor to climate change (Stips et al., 2016; Al-Ghussain, 2019). Research on the impact of agriculture on GDP and CO<sub>2</sub> emissions, on the other hand, has been concentrated on underdeveloped countries (Chandio et al., 2015; Jebli and Youssef, 2017; Elalaoui et al., 2021), with less emphasis placed on advanced countries. These circumstances necessitate a more thorough investigation of the link between environmental degradation, economic growth, and the agriculture sector. The following controls are included in the STIRPAT model: energy intensity, patent density, overall population, population density, total renewable energy consumption, and coal consumption. GDP, energy intensity, population density, and coal consumption, on the one hand, have a positive and significant relationship with CO<sub>2</sub> emissions; on the other hand, renewable energy consumption and the agricultural sector have a negative and significant relationship with CO<sub>2</sub> emissions. Although the livestock sector coefficient is positive, it has no statistically significant association with CO<sub>2</sub> emissions. A 1% increase in agricultural value added per capita leads to a 0.1% reduction in CO<sub>2</sub> emissions per capita. Furthermore, increasing renewable energy consumption by 1% reduces CO<sub>2</sub> emissions by 0.06% to 0.11% (Table 1). The GDP per capita results are summarized below. CO<sub>2</sub> emissions, patent density, renewable energy consumption, agricultural and livestock sectors all have a positive and significant relationship with GDP per capita, whereas energy intensity and coal use have a negative relationship. A one-percentage-point increase in agricultural value added per

capita boosts GDP per capita from 0.06% to 0.14%, while a one-percentage-point increase in livestock value added per capita raises GDP per capita from 0.05% to 0.09%. Furthermore, increasing renewable energy usage by 1% can improve GDP per capita by 0.04% to 0.05% (Table 2). The GMM-PVAR study reveals that agriculture value added to GDP and livestock value added to CO2 have unidirectional causality. This has significant policy implications since it emphasizes the importance of agriculture in driving economic growth (Table 3). Furthermore, there is a unidirectional causality from agricultural value added to CO2 at 1% statistical significance, as well as from renewable consumption and CO2, while the latter is only statistically significant at 10%. As a result, both agriculture and renewable energy can be effective strategies for reducing CO2 emissions and combating climate change. Then, for the rest, there is bidirectional causation between CO2 and livestock and unidirectional causality between CO2 and GDP. Overall, the findings show that (i) the agricultural sector is to be more effective than the livestock sector in terms of reducing CO2 emissions and increasing GDP per capita growth, and (ii) a combined strategy involving the use of renewable energy and the development of the agricultural sector can be effectively used to support sustainable economic growth in OECD countries. This is particularly noteworthy in light of the OECD countries' ambitious goal of achieving net-zero carbon emissions by 2050.

#### Effects of healthcare financing policy tools on health system efficiency: Evidence from sub-Saharan Africa-**Kwadwo Arhin**

- Background: Evidence shows high levels of catastrophic and impoverishing healthcare expenditure among households in sub-Saharan Africa (SSA). The way healthcare is financed has an impact on how well a health system performs its functions and achieves its objectives. This study aims to examine the effect of healthcare financing policy tools on health system efficiency. Method: The study classifies 46 sub-Saharan African (SSA) countries into four groups of health systems sharing similar healthcare financing strategies. A two-stage and one-stage stochastic frontier analysis (SFA) and Tobit regression techniques were employed to assess the impact of healthcare financing policy variables on health system efficiency. Data from the selected 46 SSA countries from 2000 to 2019 was investigated. Results: The results revealed that prepayment healthcare financing arrangements, social health insurance, mixed- and external-financing healthcare systems significantly enhance health system efficiency. Reliance on a single source for financing healthcare, particularly private out-of-pocket payment reduces health system efficiency. Conclusion: For policy-making purposes, health care systems financed through a mix of financing arrangements comprising social health insurance, private, and public funding improve health system efficiency in delivering better health outcomes as opposed to depending on one major source of financing, particularly, private out-of-pocket payments.

#### Structural transformation and productivity growth-**Ayele Gelan**

- This paper is concerned with analytical and empirical disconnections between measurements of productivity growth and structural transformation in developing countries. Developing economies are characterized by dualistic features, consisting of two distinct sectors existing alongside each other (Stifel & Thorbecke, 2003). On the one hand, the industrial sector employs a small proportion of the labour force, mostly concentrated in few urban centres and it utilizes modern and relatively advanced technologies in the process of producing goods and services. On the other hand, the agricultural sector employs a considerably large proportion of the work force, it is disbursed in rural hinterlands and it relies on traditional and backward production techniques. Dual economies come into existence due mainly to misallocation of resources. Inefficiencies prevail in both sectors because too much resources are trapped in agriculture sector and too little in the industrial sector. In development economics, economic growth is understood as the process of transforming the structure of less developed economies from predominantly rural-traditional-agricultural to urban-modern-industrial. Structural transformation involved two distinct procedures. First, progressive shift in resources (labour, land, and capital) away from low productivity agriculture to high productivity modern sectors, manufacturing and other industries. Having released resources for the modern sector, the agricultural sector should utilize the remaining amounts of factors and produce even more output per farmer. Hence, genuine structural transformation involves substantial extent of productivity increment in the agricultural sector. Second, structural transformation involves progressive enhancements in linkage and interdependence (backward and forward) between agriculture and industry through sales and purchases of intermediate inputs. The input-output relationships are mechanisms through which productivity gains in industry are transmitted to agriculture and vice versa (Hallward-Driemeier, 2022, Herrendorf, Rogerson & Valentinyi, 2014). Since the advent of economic reform and structural adjustment programs in the 1980s, the structural transformation has been halted and its meaning somewhat distorted. The comparative advantage rhetoric that accompanied the economic reform

programs meant the ambition of developing economies to industrialize has remained unrealized. The focus of policymakers shifted away from the dynamics in the structure of the domestic economy toward the external sector, primarily to promoting exports (Monga & Lin, 2019). The focus of economic policy analysts has changed as well, particularly in the way productivity growth has been measured. Total factor productivity (TFP) has mostly been used to explain growth, both at industry and economy-wide gross domestic products. Of course, TFP is concerned only with net output, that is Gross Value-Added, hence it ignores inter-industry linkages through flows of intermediate inputs between industries (Valentinyi, 2021). Given that industry interdependence is the cornerstone of structural transformation, it follows the increasing emphasis on TFP in policy analysis amounted to neglecting the most substantive component of structural transformation. The departure from structural transformation as articulated in development economics has had dire consequences. By far the most serious adverse outcome has been premature de-industrialization as discussed in the literature in recent years (Rodrik, 2016). Many developing countries, particularly in Sub-Saharan Africa, have leapfrogged from traditional agriculture to services, by-passing industrialization. More critically, this transformation occurred without any meaningful improvements in agricultural productivity. In this presentation, I will first discuss theoretical issues related to structural transformation, specifically in the context of developing economies. I will then establish conceptual links between structural transformation and productivity growth. The rest of the discussion will focus on empirical issues related to the current status and evolution of structural transformation in Sub-Saharan Africa.

Greenhouse gas emissions and productivity change in selected sectors of the Australian Economy-**Levent Kutlu**

- No Abstract.

Handling endogeneity in stochastic frontier analysis-**Levent Kutlu**

- We illustrate the developments in stochastic frontier analysis (SFA), with a specific focus on addressing endogeneity issues. Traditional SFA models, pivotal in measuring efficiency and productivity, have faced challenges in dealing with endogeneity, potentially leading to biased estimations. Recent methodological advancements have significantly enhanced SFA's robustness in this regard. We explore innovative approaches to mitigate endogeneity concerns. These advancements have broadened SFA's applicability in empirical research, offering more accurate insights into efficiency analyses across various industries. The speech will not only highlight theoretical enhancements but also discuss practical implications, guiding researchers in effectively applying these SFA methods.