BOOK OF ABSTRACTS

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Section 1: Keynote Speakers

Keynote 1: Food prices and the affordability of healthy diets

Will Masters - Tufts University, USA

Abstract

In a series of studies with FAO, the World Bank and other collaborators, we link consumer prices with nutritional data to compute the cost and affordability of healthy diets. These new price indexes use the least-cost combination of locally available items at each time and place to track the ability of each country's food system to meet nutritional needs. Globally we find that about 3 billion people cannot afford even the least-cost version of typical national dietary guidelines, with significant spatial and seasonal variation within countries. Least-cost diets provide an operational definition of food access to guide policy: when and where the items needed for a healthy diet are unaffordable, higher incomes or lower prices would be a necessary first step towards nutritional adequacy. For over 60% of the world's population, retail items for a healthy diet are already affordable but may not be consumed for other reasons, including the time costs of meal preparation and preferences for attractive but less healthy items. Using least-cost diets to track affordability of healthy foods provides a useful complement to existing consumer price indexes, demand system estimation and food choice experiments, guiding food policy towards improved nutrition and health around the world.

Bio sketch

Will Masters is a Professor of Food Economics and Policy, in the Friedman School of Nutrition and the Department of Economics at Tufts University in Boston. His work on the economics of agriculture, food and nutrition includes new retail price indexes used to track the affordability of healthy diets and a variety of other projects described on his research site, teaching blog, and on twitter. He is a Fellow of the U.S. Agricultural and Applied Economics Association (AAEA), an International Fellow of the African Association of Agricultural Economists (AAAE), a former editor-in-chief of the journal Agricultural Economics, and a co-author of an undergraduate textbook on Economics of Agricultural Development: World Food Systems and Resource Use.

Keynote 2: Adapting to climate change in an uncertain future: the role for agricultural and resource economics

Anita Wreford - Lincoln University, New Zealand

Abstract

With an increased recognition of the necessity to begin adapting to climate change comes an increased interest in downscaled climate data. Projections of climate data however contain irreducible uncertainty that may either present a barrier to action, or result in adaptation that may prove to be unsuitable in the future climate. Analytical approaches for decision-making despite uncertainty can be applied to support adaptation decisions and offer considerable advantages over more traditional appraisal methods (such as cost-benefit analysis). Adaptation in diverse contexts requires different approaches and this talk will present some recent applications in the land-based sector, ranging from participatory development of adaptation pathways through to more complex applications of real options analysis and portfolio analysis. Pressing questions for future research in this area are also explored.

Bio sketch

Anita Wreford is an applied economist specialising in adaptation to climate change, with a particular focus on agriculture and the primary sector. She has two decades of research experience, across many areas of climate change adaptation, including economic evaluations of impacts and adaptation (focusing particularly on applying robust methods to deal with climate uncertainty); identifying and evaluating the effectiveness of adaptation options across sectors; risk assessment; community resilience to extreme weather events; and adaptation decision-making among various stakeholders. Currently based in the AERU at Lincoln University, she leads the Deep South National Science Challenge's programme on Impacts and Implications. A lead author on two Intergovernmental Panel on Climate Change (IPCC) reports: A Special Report on Climate Change and Land (2019) and the forthcoming Australasia Chapter of the Sixth Assessment Report (2021), she works closely with policy makers both at a national level and local government (in the UK and New Zealand), providing advice and analysis for climate adaptation decisions and conducted work for the EU Commission and the OECD, the Scottish Government's ClimateXChange programme, and the UK's Committee on Climate Change.

Keynote 3: The Evolving Nature of Seasonality in Meat Demand

Barry Goodwin - North Carolina State University, USA

Abstract

Empirical studies of the demand for meats have been a cornerstone of agricultural economics since the early demand studies of the USDA's Bureau of Agricultural Economics. When using data observed at a frequency greater than annually, it is common to include indicators intended to capture seasonal variation in prices and the quantities consumed. Common practice is to include seasonal indicators with little thought to the implications of such indicators. For example, the mere presence of seasonal variation in prices is sometimes used to justify empirical recognition of such seasonality in spite of the fact that such variation, in and of itself, helps to better identify the underlying preference structure of interest. Though it is seldom noted, such practices inherently assume predictable shifts in the underlying preferences (i.e., the consumer's utility function). Anecdotal observation has suggested that such shifts do indeed occur but also that the nature of such shifts has evolved over time. This is especially true for the demand for turkey, which traditionally shows a substantial increase in consumption during the fourth quarter which coincides with the holiday season in the US. We use gradual switching demand systems to demonstrate the fact that seasonal cycles in meat demand have diminished over time. An evaluation of seasonality in the prices of individual meat products also reveals substantial seasonal differences that are associated with the traditional practices of summertime grilling and outdoor consumption of certain products.

Bio sketch

Barry Goodwin is William Neal Reynolds Distinguished Professor in the Department of Agricultural Economics and Graduate Alumni Distinguished Professor in the Department of Economics at North Carolina State University. He was named as Fellow of the AAEA in 2006 and was President of the AAEA in 2014-15. He has won numerous awards for outstanding research. He is also a visiting research fellow at the Leibniz Institute (IAMO) of Martin Luther University in Halle Germany and a visiting scholar at the American Enterprise Institute.

Keynote 4: Green, Resilient and Inclusive Agriculture: Walking the Talk

Svetlana Edmeades - The World Bank

Abstract

In a context of continuous economic downturn influenced by pandemic-related pressures on supply chains and labor shortages, increasing climate shocks, and more recent rising food prices, it is paramount to realign efforts towards a development path that is green, resilient and more inclusive. However, a green transition during a process of structural transformation that agriculture sectors in many developing countries are undergoing requires targeted incentives. Building resilience for lasting impact requires knowledge and innovation. Inclusion of smallholder producers, many of whom are women, into value chains and other off-farm activities will provide opportunities for local economic development and improve livelihoods. Making green, resilient and inclusive development (GRID) into a viable economic proposition is a challenge and an opportunity.

Bio sketch

Svetlana Edmeades, a citizen of Bulgaria and New Zealand, is a Senior Agriculture Economist in the Europe and Central Asia Region of the World Bank. After completing her PhD in Agriculture and Natural Resource Economics at North Carolina State University in 2004, Svetlana worked as a post-doctoral fellow at the International Food Policy Resource Institute (IFPRI) in Washington DC with focus on Sub-Saharan Africa. As a Young Professional in the World Bank, Svetlana dedicated 10 years to analytical and investment work in agriculture in Latin America focusing on public spending in agriculture, climate smart agriculture, innovation, linking farmers to markets, etc. She continues to work on these topics currently in the Western Balkans and new EU member states, with greater focus on the EU's Green Deal as it relates to agriculture in the region.

Keynote 5: Australia's Potential to Supply Zero-Carbon Energy to the Asia-Pacific

Paul Burke - Australian National University

Abstract

The Asia-Pacific has experienced prodigious growth in energy use and is by far the world's largest greenhouse-gas emitting region. Australia has played a leading role in meeting the region's energy and resource needs, becoming the world's largest exporter of coal, liquefied natural gas, iron ore, and alumina. These exports are tied to sizeable consequential emissions at the point of use or processing, accounting for about 8.6% of the total greenhouse gas emissions of the Asia-Pacific. This talk will investigate three pathways for zero-carbon exports to the Asia-Pacific: direct exports of renewable electricity via sub-sea cables, exports of zero-carbon fuels such as green hydrogen, and the export of processed commodities including processed ores and "green" metals. Calculations will be presented to show that Australia has the natural endowments in terms of land and renewable energy to develop large export flows of zero-carbon commodities. Realization of this potential relies on ongoing cost reductions and growing demand-side interest linked to meeting ambitious emission reduction targets in the region. Governments have the potential to play a role in speeding the move to zero-carbon exports via roles such as infrastructure planning, carbon pricing, and use of risk reduction mechanisms. With the long-term future of emissions-intensive products in doubt, Australia has a sizeable opportunity to develop a more sustainable commodity export model and to contribute actively to the meeting of emissions reduction goals throughout the Asia-Pacific.

Bio sketch

Paul Burke is a Professor and the Head of the Arndt-Corden Department of Economics, Crawford School of Public Policy, Australian National University. His research interests are in energy economics, environmental economics, transport economics, and development economics, with a focus on the Asia-Pacific. Paul has published in journals including the American Economic Journal: Macroeconomics, Economic Inquiry, Nature Geoscience, Nature Climate Change, and Global Environmental Change. His ongoing research topics include international electricity trade, energy access issues, policies for zero-carbon energy in the Asia-Pacific, carbon price designs, and electricity demand. Paul is a researcher within the Zero-Carbon Energy for the Asia-Pacific ANU Grand Challenge project and is on the Executive Committee for the Australasian Development Economics Workshop.

Keynote 6: Food security and health in a climate insecure world

Elizabeth J Z Robinson - London School of Economics, UK

Abstract

As countries grow economically, as climate change becomes a reality, and as global markets become more integrated yet more vulnerable to harvest shocks in key "breadbasket" countries, including Australia, the concept of food security has become increasingly nuanced. Further, whereas in the past we observed reductions in poverty going hand in hand with reductions in undernutrition, since 2017, global food production has been increasing and poverty rates falling, yet the proportion and number of people across the globe suffering from undernutrition has started to increase. In this presentation, Professor Robinson explores how climate change has changed how we track, calculate, and communicate the links between climate, food security, and health. Combining FIES (food insecurity experience scale) data, crop yield and child health data, with reanalysed climate data, she demonstrates that it is possible to determine the extent to which the changing climate is already worsening food security and child health, and to what extent it will continue to do so in the future while emissions continue to rise.

Bio sketch

Professor Elizabeth J Z Robinson is Director of the Grantham Research Institute on Climate Change and the Environment, at the London School of Economics. She is an environmental economist with over twenty five years' experience undertaking research particularly in lower-income countries, including six while living in Tanzania and Ghana. Her research addresses the design of policies and institutions to reduce climate change emissions, protect the environment, and improve the livelihoods of resource-dependent communities. Her recent focus includes climate change and systemic risk; and tracking the co-benefits of climate change mitigation and health, oriented particularly around food security and food systems. From 2004-09 she was coordinating lead author for the International Assessment of Agricultural Science and Technology for Development, sub-Saharan Africa. She was on the UK Defra Economic Advisory Panel for five years; and in 2019-20, Specialist Advisor to the UK House of Lords Select Committee on Food, Poverty, Health, and Environment. She is Working Group 1 lead for the Lancet Countdown, that addresses climate change impacts, exposures, and vulnerability. Elizabeth has a first-class degree in Engineering, Economics, and Management from the University of Oxford; and a PhD in Applied Economics from Stanford University. Before joining GRI, she was Professor of Environmental Economics at the University of Reading, and prior to this she has worked at the Boston Consulting Group, the World Bank, Rockefeller Foundation, Natural Resources Institute, and as a tutorial fellow in economics at the University of Oxford

KO Campbell: Transforming Food Systems Post COVID-19

Johan Swinnen - International Food Policy Research Institute (IFPRI)

Abstract

The COVID-19 pandemic has impacted local, national, and regional food systems in heterogeneous ways. The crisis has had significant negative effects on livelihoods and food and nutrition security, particularly for the poor as well as vulnerable groups such as women. At the same time, the pandemic has accelerated the growth of e-commerce and the adoption of modern technologies, helping some food value chains, especially integrated and non-labor intensive ones, become more resilient against shocks. This presentation will discuss the varied impacts of COVID-19 in detail, and offer lessons for transforming food systems in the short- and long term, so that they are healthy, efficient, sustainable, inclusive, and resilient.

Bio sketch

Dr Johan Swinnen is Director General of the International Food Policy Research Institute (IFPRI), and Global Director of the Systems Transformation Science Group at CGIAR. Dr Swinnen has published extensively on agricultural and food policies, international development, political economy, institutional reforms, trade, and global value chains. He holds leadership roles for various taskforces, including the Food Systems Economics Commission and the Think20 Task Force on Climate Change, Sustainable Energy, and Environment. Prior to joining IFPRI and the CGIAR, Dr Swinnen was professor and director of the LICOS Centre for Institutions and Economic Performance at KU Leuven, lead economist at the World Bank, economic advisor to many international institutions, and guest professor at several universities, including Stanford University's Centre for Food Security and the Environment. Dr Swinnen earned his PhD from Cornell University and holds honorary doctorates from University of Göttingen and the Slovak University of Agriculture. He is a Fellow of the Agricultural & Applied Economics Association and the European Association of Agricultural Economists and served as president of the International Association of Agricultural Economists.

Section 2: Contributed Papers

14: Alternative Fertiliser Management Methods to Increase Crop Productivity and Farmer Utility

Authors: Nicola Thomas

Presenter: Nicola Thomas - Monash University

Abstract

Fertiliser and seasonal precipitation in dryland crop production is critical for maximising yield. Low rainfall dryland crop production globally is less productive than irrigated crop production. This work introduces and evaluates a previously unconsidered alternative management practice, to increase crop productivity and farmer crop production utility, hydropriming seeds with liquid fertiliser prior to sowing. The productivity and utility benefits are evaluated, and optimal fertiliser management treatments selected for crops studied, modelled using a site characteristic of low rainfall dryland crop producing regions globally in Wagga Wagga, New South Wales, Australia. Existing research has found that an increased frequency of fertiliser application throughout the growth season increases crop productivity, to date no work has investigated the input efficiency and economic impact of higher frequency of fertiliser applications. This work addresses this and evaluates fertiliser management treatments to optimise farmer utility. Crop modelling software will be used to determine average yield for canola, wheat, barley and field pea crops for the period 1990 – 2015. Fertiliser application times and quantities will be varied and modelled with existing management practices and compared to hydropriming seeds in liquid fertiliser. The optimal management strategies to maximise farmer marginal utility will be determined. Optimising fertiliser and management strategies increases crop yield by up to 11%, with farmer utility increasing by up to 41%. The dominant strategy is a single fertiliser application, with lower fertiliser input efficiency. Multiple fertiliser applications are uneconomic with labour and machinery input costs exceeding the increased crop productivity and revenue. Hydropriming seeds is the dominant strategy to optimise canola and barley utility. Hydropriming provides dryland crop producers in low rainfall regions globally with a low technology management technique to increase productivity.

15: Vulnerable households and effects of energy efficiency: An Australian study

Authors: Mara Hammerle, Paul J Burke

Presenter: Mara Hammerle - Australian National University

Abstract

Overview Differences in sociodemographic characteristics may affect how households respond to energy efficiency measures. Yet few studies have empirically investigated whether responses to energy efficiency improvements depend on factors such as household vulnerability. Using the Australian Capital Territory (ACT) Energy Efficiency Improvement Scheme (EEIS) as a case study, this paper explores this potential source of heterogeneity. A key component of the program has been its focus on "priority" households. These households are vulnerable either because they experience socioeconomic disadvantage or due to old age or illness. The paper poses two research questions: What are the impacts of replacing natural gas heaters and hot water systems with more energy-efficient electric alternatives on energy use and greenhouse gas emissions? Does heterogeneity in household vulnerability influence these impacts? The gas heaters were replaced with reverse cycle electric air-conditioners, which we refer to as heat pumps in the paper. Methods The paper focuses on discounts for energy efficiency upgrades offered by ActewAGL, the ACT's largest energy retailer, as part of its obligations under the EEIS. ActewAGL provided energy bills for all households who received energy efficiency discounts through the EEIS over November 2017–December 2020 (3,141) plus a sample of randomly selected households who did not receive discounts (11,233 households). The dataset is an unbalanced panel over 2015–2020. Based on fixed effects panel regressions, we examine the impact of installing an energy-efficient heat pump or hot water system on the following outcomes: (1) electricity consumption (MJ); (2) gas consumption (MJ); (3) total energy consumption (MJ); and (4) estimated greenhouse gas emissions responsibility (kg of CO2-e). Results The findings identify large reductions in gas consumption and smaller increases in electricity consumption as a result of the energy efficiency upgrades. The net effect is an average decline in residential energy consumption, especially after installing a new electric heat pump. Using an emission factor of zero to align with the ACT's 100% renewable electricity commitment, the estimates suggest large emission reductions from switching to energy-efficient alternatives. The overall impacts are generally similar across households regardless of their "priority" status. Conclusions Our findings challenge the commonly held assumption that improving the energy efficiency of disadvantaged residences results in smaller reductions in energy consumption and greenhouse gas emissions. The evidence is partial, however, given that most but not all of the priority households are socioeconomically disadvantaged. Overall, the results imply that the approach of focusing on vulnerable consumers can produce a "double dividend" of both improving social equity while simultaneously achieving sizeable environmental benefits.

16: Healthy, nudged, and wise: Experimental evidence on the role of cost reminders in healthy decision-making

Authors: Adnan M S Fakir, Tushar Bharati

Presenter: Adnan M S Fakir - University of Western Australia

Abstract

We evaluate the performance of two behavioral interventions aimed at reducing tobacco consumption in an ultra-poor, rural region of Bangladesh where conventional methods like taxes and warning labels are infeasible. The first intervention asked participants to daily log their tobacco consumption expenditure. The second intervention placed two graphic posters warning participating households of the harmful effects of tobacco consumption on their children and themselves in their sleeping quarters. While both interventions reduced household tobacco consumption expenditure, male participants who logged their expenditure substituted cigarettes with cheaper smokeless tobacco. Risk-averse males who spent relatively more on tobacco responded more to the logbook intervention. Relatively more educated, patient males with children below age five responded better to the poster intervention. The findings suggest extending policies that worked elsewhere to the rural poor in developing countries, where cheaper substitutes are readily available, might be unwise. Instead, policies can leverage something as universal as parents' concern for their children's health for promoting healthy decision-making.

17: Female Smallholder Farmer's Preferences for Digital and Conventional Credit Attributes: Evidence from Madagascar

Authors: Annkathrin Possner, Yaw Sarfo, Oliver Musshoff

Presenter: Annkathrin Possner - Georg-August-Universitaet Goettingen

Abstract

Women empowerment is an effective policy instrument to achieve development goals (UN Women, 2020). A pathway to gender equity and better opportunities for women is access to formal financial services (Suri & Jack, 2016). Digital credit, a mobile phone-based technology, holds potential for female financial autonomy. However, adoption rates among women in Sub-Saharan Africa remain moderate and the literature is ambiguous whether specifically tailored products or a one-size-fits-all approach is preferable. We investigate whether selected credit attributes influence male and female preference for the innovative digital and the more established conventional credit. Madagascar offers an interesting setting as it is one of the poorest countries in the region. Further, fintech providers are established in urban areas while they still marginalize rural areas. To our best knowledge the issue of women's preference for credit attributes in rural Madagascar has not been investigated. As little data is available and digital finance is yet to be marketed on a large scale (FinScope, 2016), an economic experiment is a promising approach. Employing a Discrete Choice Experiment with 420 farmers in central Madagascar, we assess preferences for the credit attributes loan duration, repayment conditions (instalment/maturity), travelling distance and additional credit cost. Further, we include an opt-out alternative to ensure a voluntary choice. Results of the mixed logit model and comparison of willingness to pay (WTP) via a Poe-test suggest a high general demand for both digital and conventional credit. Female demand is higher than that of males. Overall, differences in participants' WTP for the credit attributes are mostly not statistically significant, indicating that the design of gender-specific products might not be advisable. Our results build upon research in well-investigated regions in Africa (Sekabira & Qaim, 2017; Suri & Jack, 2016). We add to the literature with WTPs for specific credit attributes and preferences of female smallholders in the developing market of Madagascar. By providing policy makers and stakeholders with insight about WTPs of potential clients we enable them to design policies and improve fintech products serving female smallholders. Thereby we contribute to female empowerment and economic development in countries such as Madagascar. References FinScope. (2016). Consumer survey highlights: madagascar 2016.https://www.uncdf.org/article/941/finscope-madagascar-pocket-guide-migration Sekabira, H., & Qaim, M. (2017). Mobile money, agricultural marketing, and off-farm income in Uganda. Agricultural Economics, 48(5), 597–611.https://doi.org/10.1111/agec.12360 Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. Science, 354(6317), 1288–1292.https://doi.org/10.7910/DVN/L1DVIH UN Women (Ed.). (2020). Progress on the Sustainable Development Goals: The gender s

18: How accurate is the ABARES data? An audit of the Agsurf database

Authors: T.R. Hutchings

Presenter: T.R. Hutchings - Member

Abstract

This analysis found substantial errors in the ABARES Agsurf database, which could not be resolved, and which question the accuracy of the published performance of farms in all ten major southern Australian broadacre regions reviewed. The exclusion of capital and personal costs from key benchmarks has caused ABARES (Australian Bureau of Agriculture and Resource Economics) to over-estimate the viability of Australian farm businesses since 1990. When the cashflow was reconciled by adding back these errors, annual regional costs have exceeded income by an average 5% since 1990, and all regions experienced a cash deficit in more than half of the years, resulting in a consistent increase in debt for all regions. Most importantly, the Agsurf database does not provide any evidence or measure of the accuracy of the collection process, nor does it attempt to justify the selection of farms to confirm the data accurately represents regional farm performances. Without this detail the Agsurf database cannot be properly audited; consequently, the database must be treated as an unreliable source of financial information. As a minimum standard, ABARES should only use farm data which accurately reconciles with the relevant bank accounts.

20: Development interventions and rural gender-based food security: Linking processes and expected outcomes in Bangladesh

Authors: Nishith Zahan Tanny

Presenter: Nishith Zahan Tanny - ANU

Abstract

Abstract Government agencies and non-governmental organizations (NGOs) often assume that enhancing production at the household level provides a means to improve household and individual food and nutritional security. Feminist scholars emphasize integrating gender into agricultural development to achieve food and nutrition security. However, the narratives about gendered food and nutrition only partially consider the contextual processes and causal structures. Few researchers have focused on what happens when agricultural development projects integrate intra-household gender dynamics into their programs. This paper evaluates how development interventions generate diverse food and nutrition outcomes and how intra-household dynamics affect women's ability to control food and nutrition. I explore the mechanisms of agrarian class and gender relations with access to development interventions. I use the case of Bangladesh to assess the gender-nutrition linkages within agriculture. Even after decades of development interventions, undernutrition continues to persist amongst farming households in rural Bangladesh. This paper draws on ethnographic and quantitative analyses undertaken across three villages in rural north-western Bangladesh where there are large numbers of chronically food-insecure households. I address two research gaps in particular. First, I explore how the structural factors exclude women from accessing development programs. The second, how do the intra-household gender dynamics affect women's control of food and nutrition. This paper advances two arguments. First, I argue that household socio-economic conditions and the terms of engagement between spouses affect the capacity of agricultural interventions to improve the food security of the rural poor. When the husband recognizes a woman's contribution to a household's food and nutrition security, this leads to a power redistribution within the household. Second, while a program's livelihood strategies are likely to contribute to household food security, gender impacts are rarely strong enough to transform intra-household gender relations. Field workers see service-level challenges rooted in the male-dominated farming system and gender-related constraints within households.

21: Productive performance in a dynamic setting: The application of DEA windows analysis to the estimation of total factor productivity efficiency amongst farm businesses

Authors: Steele Christian West

Presenter: Steele Christian West - The University of Western Australia

Abstract

Farm businesses operate in a dynamic production environment. For many producers in the developed world, emerging challenges arising from slowing productivity growth, rising indebtedness, increased competition in export markets from emerging country producers, heightened regulatory and trade uncertainty, and climate change contribute to the dynamism of their production environments. Against this backdrop, the declines in farm business numbers observed in recent decades are anticipated to continue, with only the most productive and financially viable remaining. Despite the large number of studies that have examined productive performance in agricultural economics (Julien et al. 2019; Scheiterle et al. 2019; Key 2019; Rada and Fuglie 2019; Thompson et al. 2019; Khan et al. 2019; Komarek and Msangi 2019), very few have sought to apply data envelopment analysis (DEA) windows analysis (Charnes et al. 1985). This method has been shown in the broader economics literature (Chen et al 2019; Al-Refaie et al. 2019; Wang et al. 2019; Chen et al. 2020; Alizedah and Safi 2020) to provide discriminatory results in the presence of a small number of Decision Making Units (DMUs) and provide smoothed results for measures with high levels of inter period volatility by averaging the estimates of a single DMU within a window, where an individual window comprises of a set of DMUs observed over multiple periods. Despite its benefits, its application to the estimation of total factor productivity (TFP) specifically has remained limited because of difficulties in the detection and identification of productivity changes between windows when DEA windows analysis is used to estimate TFP indexes, which are widely used to compare TFP estimates both intertemporally and across DMUs (Asmild et al. 2004). This study presents the first application of DEA windows analysis to the estimation of total factor productivity (TFP) efficiency, which measures the extent to which a decision-making unit falls short from attaining the best possible TFP level using the prevailing production technology endemic to each period (O'Donnell 2008). Unlike TFP, TFP efficiency provides a readily interpretable measure of relative productive performance across periods since it does not require disentanglement of technological effects and change between periods. The study estimates in levels TFP efficiency for a sample of farm businesses in Western Australia's Wheatbelt between 2002 and 2011 for individual years and windows. The study demonstrates that the use of DEA windows analysis can provide less variable estimates of productive performance than those estimates obtained from individual time periods. This reduced variability can assist agricultural advisers, managers, and policymakers seeking to better identify trends in relative productive performance over time in dynamic settings, particularly in the context of a small number of DMUs that exhibit high inter season volatility.

22: Top manager's gender and firm level innovation in South Asia: the moderating role of institutional quality and financial constraints

Authors: Sadia ABBAS

Presenter: Sadia Abbas -

Abstract

Firm level innovation is widely recognized as the most effective way to accelerate economic growth and recover a damaged economy. Sustainable growth of an economy depends on the active involvement of women in the business activities along with their male counterparts. Women's entrepreneurial activity is a globally recognised phenomena and their participation in business activities is also considered as a source of creativity and diversity. Little research has considered how the institutional environment influences the gender-innovation relationship in developing countries. This paper examines the role of institutional quality and financial constraints in moderating the relationship between a top manager's gender and firm level innovation. The empirical results are based on a binary logit model using a rich micro-level and cross-country enterprise survey undertaken by the World Bank in 2013-14 from the South Asian region. Our findings suggest that female-led businesses are more likely to innovate in comparison to their male counterparts when the institutional quality is good and credit is not a major constraint to the operation of the business. However for male-led business, this study reveals that they innovate under both good and bad institutional environments. Our study also reflects the patchy socioeconomic development and the impact of different tribal, feudal and social formations as South Asia contains a range of cultures each with considerable diversity in the status of women across classes, ethnicity and geographical regions. Focusing on an improving institutional environment and enhancing female led businesses' access to formal credit markets are essential policy measures to promote innovation and stimulate economic development in the South Asian region. A conducive business environment with good institutional quality and availability of credit increases the innovative ability of women. Self-reliant and independent female owners and managers together use their resources to foster the mechanism of innovation, gain economic power, access credit and offer a model for countering female subordination in a patriarchal society.

24: Does social capital improve farmers' climate change adaptations? Evidence from banana production in China

Authors: Laurent Cishahayo, Yueji Zhu, Fang Wang

Presenter: Laurent Cishahayo - Department of Agri-forestry Economics and Management, Management School, Hainan University, Haikou 570228, China

Abstract

The threat of climate change on agri-production systems in developing countries has been well documented. Climate change adaptation strategies are being promoted among farmers as a way to mitigate the adverse impact of climate change on farming practices. This study attempts to examine the effect of social capital on farmers' adoption intensity of adaptation strategies to climate change and assess the determinants of farmers' participation in social capital while social capital is specified into two components including participation in training and social networks, based on the primary data collected from 422 banana farmers in China by stratified random sampling. To account for selectivity bias, we fitted an endogenous treatment effect for count data model, namely Poisson Regression, augmented with the inverse probability-weighted-regression-adjustment (IPWRA) estimator. The results reveal that social capital (both participation in training and social networks) significantly increased farmers' adoption intensity of adaptive measures, highlighting the positive role of social capital in farmers' climate change adaptations. Land ownership, climate change perception, and drought frequency also positively influenced farmers' adoption intensity of adaptation strategies whist the greater age and distance to banana plot decreased the probability of farmers' adoption intensity of adaptation strategies to climate change. Moreover, farmers' participation in social capital was positively influenced by farmers' political participation, soil fertility, membership of farmer-based organization (FBOs), education and income, while irrigation and distance to banana plot reduced the likelihood of farmers' participating in social capital. The findings suggest that policymakers need better understand farmers' adaptation decisions under climate change, and take farmers' social capital into account when promoting adaptation strategies to increase their resilience in agricultural production. Well-designed training programs can help farmers improve their climate change adaptations.

25: Tanneries in Kanpur and Pollution in the Ganges: A Theoretical Analysis

Authors: Amit Batabyal

Presenter: Amit Batabyal - Rochester Institute of Technology

Abstract

The problem of cleaning up pollution in the Ganges at Varanasi now appears to have a champion and that champion is the current Prime Minister Mr. Narendra Modi. Mr. Modi's parliamentary constituency in 2014---the earlier year in which a national election was held---and in 2019 was and remains Varanasi. Therefore, it is perhaps not surprising to observe that Mr. Modi has initiated an ambitious plan to clean the Ganges called the "Namami Gange Project" and that he has also promised to convert Varanasi into a vibrant city for religious and other tourists. Recently, the problem of cleaning up pollution in the Ganges at Varanasi has been studied from a variety of perspectives by Batabyal and Beladi (2017, 2019, 2020) and by Xing and Batabyal (2019). Therefore, we shall not dwell on the Varanasi specific aspects of pollution cleanup in the Ganges in this paper.

Instead, we shall focus on pollution in the Ganges caused by the tannery industry in Kanpur. In this regard, the work of Khwaja et al. (2001), Gowd et al. (2010), and Bhatnagar et al. (2013) clearly tells us that many of the pollutants---such as chromium---that are deposited into the Ganges by the tanneries are extremely injurious to human health and hence the problem of regulating the deposition of these pollutants is a serious matter. Despite the seriousness of the underlying problem, to the best of our knowledge, there are no theoretical studies in either economics or regional science that have rigorously analyzed the control of pollution in the Ganges caused by the tannery industry in Kanpur. Given this lacuna in the literature, we provide what we believe is the first analysis of pollution in the Ganges arising from the activities of the tannery industry in Kanpur.

The remainder of this paper is organized as follows: Section 2 describes our model of pollution in the Ganges caused by the tanneries in Kanpur. Specifically, there are two tanneries, A and B, that are located on the same bank of the Ganges in Kanpur. Both produce leather and the production of leather requires the use of chemicals that are toxic to humans. Tannery A is located upstream from tannery B. Tannery A's leather production depends directly only on labor use but tannery B's leather production depends on labor use, the chemical waste generated by tannery A, and the natural pollution absorbing capacity of the Ganges. Section 3 determines the equilibrium production of leather by both tanneries in the benchmark case in which there is no pollution. Section 4 ascertains how the benchmark equilibrium is altered when tannery B accounts for the external diseconomy imposed on it by tannery A. Section 5 analyzes what happens to leather production and to labor use when the two tanneries merge and then comments on some policy implications stemming from this paper's research. Section 6 concludes and then suggests two ways in which the research delineated in this paper might be extended.

26: Drought and hotter temperature impacts on suicide: Evidence from the Murray-Darling Basin, Australia

Authors: Ying Xu, Sarah Wheeler, Alec Zuo

Presenter: Alec Zuo - The University of Adelaide

Abstract

The Murray-Darling Basin (MDB) is Australia's prime agricultural region, where drought and hotter weather pose a significant threat to both rural residents' income and mental health – hence increasing their potential suicide risk. The suicide rate in remote Australia has been shown previously to be almost double that of major cities. This study is the first to examine the relationship between suicide and increased temperature and drought severity within the MDB, using a monthly database from 2006-2016. This time-period encompasses the main period of the Millennium drought (from 2001/02-2009/10). Poisson fixed-effects regressions with robust standard errors were used to model total suicide rates at an SA2 area level, followed by a series of subsample analyses by age and gender. The results suggest that drought as well as higher temperatures increased total MDB suicide rates, while a higher proportion of the population working in agriculture was also associated with increased suicide rates. The type of drought was also found to be important. The higher the duration and severity of the drought (i.e. extreme droughts), the higher the total suicide rate, driven largely by suicide rates among MDB males aged under 50. However, suicide risk in females aged under 50 also contributed to total suicides in the MDB, and females were vulnerable to extreme droughts. Higher maximum monthly temperatures in the MDB impacted more on male suicide than female, which is consistent with other findings, such as higher temperatures affecting Australian boys' mental health more than girls. Reasons for the greater impact of temperature on male suicide risk compared to females may include genetic biological factors; greater male interaction/exposure to the outside environment; or farming masculinity issues. More research on gender-specific mental health and environmental influences will be needed to clarify the exact relationship. Although people aged 10-29 in the MDB had the lowest overall suicide rate by age group during 2006-2016, they were the most vulnerable in the face of extreme drought. This study provides several insights for suicide prevention. In the rural sector especially, coordinated and integrated policies are necessary to reduce the negative consequences of drought. Such policies will include both macroeconomic climate change and drought farming policy, but also mental health, natural resource management and agricultural policy, and rural economic and social development policies. There may be an urgent need for developing and funding further mental health services, specifically targeting younger people, in rural areas affected by drought. Future research needs to better understand the links between various gender and age risk factors of suicide in drought-affected communities in order to build capacity and resilience.

27: Technology, gender, and sustainable livelihoods: Insights into preferences for irrigation pumps in West Bengal

Authors: Sophie Lountain, Bethany Cooper, Lin Crase, Michael Burton

Presenter: Sophie Lountain - University of South Australia

Abstract

Technology and access to technology stand to significantly influence the livelihoods of the rural poor. However, technology cannot simply solve poverty – it requires uptake and that can vary greatly between people. Who takes on a technology can also matter a great deal, with some groups of users applying the same technology differently. This paper presents one of the first rigorous analyses of heterogeneous preferences of farmers towards groundwater pump technologies. The results provide insight into the nuanced relationships between energy and groundwater markets in an area where groundwater access stands to improve the livelihoods of millions of poor farmers. The research uses the lens of gender and sustainable livelihoods, in order to better trace the impacts on those more disadvantaged. Using primary field data from West Bengal, India, we employ a paired comparison technique to explore how the relationships between irrigation technology, institutions, and gender interact to affect sustainable livelihoods via the groundwater market. Our findings illustrate that preferences for irrigation pump attributes vary significantly between farmer groups and policies that put technologies in the hands of some groups versus others could have significantly different impacts on groundwater markets.

29: Have women broken through the Grass Ceiling? An analysis of the contemporary role of farm women -

Authors: Margaret Alston, Zhaoen Pan

Presenter: Margaret Alston - University of Newcastle

Abstract

This paper assesses the contemporary role of farm women in Australia. In doing so, it compares current gender roles in agriculture with those that were evident in the 1990s when my book, Breaking through the Grass Ceiling, was first published. This book outlined the significant gendered attitudinal and physical barriers to women's involvement and acceptance as farmers. Based on interviews with farm women undertaken in 2021, the paper will explore women's contemporary roles on farm, in the community and in farm politics in order to analyse whether gender relations are more equitable, and women involved in agriculture have equal opportunities on the farm and in the boardroom.

31: Agri-food export barriers: An Australian perspective

Authors: Peggy Schrobback, Airong Zhang, Rieks D. van Klinken, Jane Muller, Ryan R. J. McAllister, Wen Wu

Presenter: Peggy Schrobback - CSIRO

Abstract

International trade in agri-food products is important for food security in importing countries and for employment and regional economic development for food exporting countries. Yet, a range of evolving barriers can challenge agri-food export such as tariffs, financial risks, and freight costs. The aim of this study is to identify and categorise export barriers for agri-food producing industries and to empirically assess their perceived severity by producers of Australia's red meat, horticulture, and aquaculture industries as a case study. To achieve the aim a literature review, focus group interviews, and a computer-assisted telephone interviewing survey with Australian agri-food producers was undertaken. A list of 49 export barriers was identified which were categorised into four groups: trade regulations, the market, supply and distribution and the enabling environment. Survey results suggest that Australian agri-food exports are predominantly challenged by high labour costs, market and financial risks, the lack for provenance information for competitiveness, and production risks. Some variations in the rated severity of impediments were observed across industries and between producers who are currently exporting and those who are not. Interestingly, environmental sustainability and ethical/social product requirements were not currently perceived as barriers to export.

32: The value of lost agricultural production from erosion: A spatial explicit analysis from New Zealand

Authors: Tarek Soliman, Patrick Walsh

Presenter: Tarek Soliman - Manaaki Whenua - Landcare Research

Abstract

To create efficient erosion control policies, it is important that the cost of implementing an erosion control measure justifies the benefits. While costs are typically straightforward to measure, the benefits include fewer tangible effects like avoided impacts on farm incomes, natural environment, and communities. In this study we developed a spatially explicit erosion-economic simulation model to estimate the monetary value of productivity loss due to soil erosion at the regional and national level. The regional level analysis estimates the marginal cost of individual erosion processes, in particular, surficial (overland) erosion and mass movement (landslide, gully, and earthflow) erosion; while the national level analysis estimates an aggregated value of the marginal cost for all erosion processes. The national level results show that the mean marginal cost of erosion (cost of one tonne per hectare per year) ranges between NZ$0.03 and NZ$4.10. Our findings from the regional analysis also show that the marginal cost of surficial erosion is higher than the marginal cost of mass movement erosion. The value of the marginal cost of erosion depends on land use, erosion rates, and the assumed rates for the erosion-related productivity losses. Our estimates on the value of lost agricultural production from erosion alongside other estimates on the benefits related to water quality, biodiversity, and avoided landslide impacts will help policy makers in their erosion mitigation planning.

33: Assuring quality food procurement for the aged care sector

Authors: Don Gunasekera

Presenter: Don Gunasekera - Deakin University

Abstract

The Royal Commission into Aged Care Quality and Safety Report highlighted that 68% of residents were malnourished or at risk of malnutrition. It commented that food and nutrition are critical to health and wellbeing, but often there was poor quality and unappetising food provided for aged care residents. Aged care facilities provide food to many residents who already are nutritionally vulnerable. Recent Australian multi-centre research showed that only 9.8% of residents in aged care facilities completed their main meal (lunch or dinner) across a 24-hour period, suggesting that food waste and sustainability considerations exist across aged care facilities. Over a million people used aged care services during 2019-20, and the Productivity Commission reports that, by 2050, over 3.5 million Australians will use such services. Currently, 845 providers deliver residential aged care through 2,722 establishments, according to the Australian Institute of Health and Welfare. The 2021 Inter-Generational Report indicates that, in 2018-19, the Australian Government funded 80% of aged care spending. By 2023-24, it is estimated to rise to $4.5 billion. Aged care spending is expected to increase from 1.2% of the GDP in 2020-21 to 2.1% in 2060-61. Food and beverage sector is in the top three ANZSIC industries that provide agricultural product inputs into the aged care sector, accounting for 18% of all intermediate inputs. It has been noted that aged care residencies should endeavour to offer choices of fresh, local, organic and seasonal produce, as well as providing culturally appropriate meals, in order to increase the residents' satisfaction and to decrease food waste and malnutrition. Government procurement of aged care services from private providers has become an important way to respond to the growing demand for aged care. However, while the government's goal is to pursue social benefits, the providers are bound to pursue economic interests. This goal divergence and the existence of asymmetric information increases the quality risk of services, including that of food services. We use the principal-agent theory to better understand how to reduce the risks that can rise in relation to the quality of procured food. In this respect, the information and material flow related to food supply is an important component of the aged care sector. It entails a complex supply chain made up of multiple stakeholders and operations. In this context, we analyse the role of food traceability tools and digitisation support which have been introduced to help address information asymmetry along food supply chains. This support, with its focus on food quality and nutrition, is a key factor in improving food procurement in the aged care sector. We examine the usefulness of a range of technology-related approaches to ensure the maintenance of food and nutrition quality standards in the aged care sector. This work, we suggest, will guide decision making and

35: Digital Credit and Financial Inclusion of Women: Empirical Evidence from Kenya

Authors: Constantin Johnen, Martin Parlasca, Oliver Musshoff

Presenter: Constantin Johnen - Georg-August University Gottingen

Abstract

Women in low- and middle-income countries remain less likely to be financially included compared to men. This gender gap has far reaching negative consequences for the economic development of women. With the impetuous diffusion of mobile financial services however, financial inclusion for women seems to rise. Arguably one of the most important mobile financial services, digital credit, appears to be particularly suitable to overcome obstacles towards formal credit usage which are relatively larger for women, such as transaction costs or collateral requirements. However, little is known about whether financial inclusion for women increases through digital credit and which factors might hinder such a relationship. The present study aims to fill these gaps by analyzing four nationally representative cross-sectional datasets for Kenya, collected between 2009 and 2018. Firstly, we compare conventional and digital credit usage rates for men and women over time. Secondly, to shed more light on why potential differences between men and women in digital credit usage exist, we conduct logistic regressions. Our study finds that a substantial and rising share of women (10.2% in 2018) uses formal digital credit, albeit the share of men remaining statistically significantly and considerably larger (15.2% in 2018). We further find that the persisting gender difference in digital credit usage can be largely attributed to gender differences in mobile phone ownership, income, financial literacy and saving patterns. The present study thereby identifies direct mechanisms on how to increase financial inclusion for women and reduce the gender gap thereof, for example by providing women directly with mobile phones. These mechanisms are likely to applicable in a large number of low- and middle-income countries in which digital credit has recently become available and in which women have an unfavorable position in society.

36: Weather-induced losses in field-level quality, yield, and revenue

Authors: Sarah C. Smith, Timothy K.M. Beatty

Presenter: Sarah C. Smith - University of California, Davis

Abstract

Does weather affect the revenue of irrigated horticultural crop producers and if so, how? We analyse the effect of temperature exposure on field-level revenue through its effect on both quality and quantity. We use proprietary data from a large tomato processor operating in California's $1 billion processing tomato industry. This detailed data contains yield, quality, price, and grower practices for every field contracted with the processor between 2011 and 2020. These data are linked to grower identifiers so we can track growers over years. The processing tomato industry prefers high-quality tomatoes and pays growers a price per ton that depends on quality attributes of the consignment. Despite being irrigated, we find both yield and quality are negatively affected by exposure to hot temperatures, leading to reduced grower revenue. Exposure to temperatures above 35°C decreases revenue up to 4 percent relative to a day of average temperatures. We decompose the effect of temperature exposure on revenue into the effect driven by yield and effect driven by quality. While the yield effect dominates, failing to account for quality underestimates the true effect of temperature exposure on revenue by up to 20 percent. This paper adds to the relatively small literature on the effect of weather and climate change on agricultural product quality (Kawasaki & Uchida 2016; Dalhaus et al. 2020). Quality is important because of its role in contractual arrangements and price. Ignoring quality may bias estimates of the impact of weather and climate change on agricultural production and farm income. Moreover, by focusing on an irrigated horticultural crop, we contribute to a literature largely focused on rain-fed staple crops. Our setting allows us to improve on earlier work. First, quality is precisely measured and linked to price. Quality attributes are measured by an independent third party, so neither grower nor processor can accidentally or intentionally misstate quality. Second, in many agricultural settings, quality is only observed for the subset of production selected to be graded that may bias observations of quality and yield. The Californian processing tomato industry is a unique setting in which selection is unlikely. We identify the marginal effect of weather exposure on quality attributes and their cumulative effect on revenue. We use the panel approach with grower fixed effects to control for time-invariant, location-specific unobservables. The source of identifying variation is deviation in temperature exposure from its average for a grower. We estimate both a piecewise linear degree day model and a semiparametric restricted cubic spline model to account for nonlinearity in the relationship between temperature exposure and the outcome variable. Field-level analysis is key to our finding. Applied to county-level data, the same estimation method uncovers a much smaller effect.

37: Gender and intergenerational farm succession in Australia: An exploratory study

Authors: Alison Sheridan, Lucie Newsome, Skye Charry, Andrew Lawson, Ellyse Fenton, Susan Field

Presenter: Alison Sheridan - UNE

Abstract

Farm succession is a crucial issue to the Australian agricultural industry. A large proportion of the farming workforce is facing retirement and the continued success of this sector depends on smooth intergenerational transition. Existing research from Australia indicates farm succession is gendered, with women the nominated successor in only 10% of cases (Barclay, Foskey, & Reeve, 2007). The unequal distribution of agricultural wealth has undesirable consequences, including limiting opportunities for women's empowerment and financial security, stifling industry growth, and exacerbating population drain in rural and remote communities. This research aims to provide deeper insights into the impact of succession decisions on the intergenerational transfer of farming assets, and assist farm succession planners and affected community members to address gender equity issues in succession practices. It will inform the development of a larger project investigating the economic and social impacts of intergenerational land transfer in Australia. Building on earlier work synthesising the literature on farm succession from 2000-2020 (Sheridan, Newsome, Howard, Lawson, & Saunders, 2021), in this paper we address the question 'how does gender influence contemporary farm succession decisions in Australia?'. The study uses a qualitative, semi-structured interview-based approach, drawing on data from interviews with 20 industry stakeholders, including farm succession planners, lawyers, accountants, business planners and rural financial counselors from across Australia, to explore their experiences of farm succession practice and how gender may be informing the succession decisions. Our initial analyses suggest there are mixed views. While most interviewees recognised that historically sons were treated as the 'natural successor' and daughters were overlooked, for many interviewees, their experiences of more recent succession decisions were framed in less binary terms. Factors impacting on the blurring of gender roles in the farm succession context include the changing nature of farming with there now being less emphasis on physical prowess and more on problem solving skills, increasing education levels of both female and male children on farms allowing them more career options, the importance to the farm owner of the successor having a passion for farming and the increasing capital requirements of farming that make taking over the farm less attractive to all parties. While some reported hard to shake gender stereotypes continuing to play out in farm succession discussions with clients, there was a collective sense of being at a juncture with the potential for disruption to traditional patterns.
References Barclay, E., Foskey, R., & Reeve, I. (2007). Farm succession and inheritance : comparing Australian and international trends : a report for the Rural Industries Research and Development Corporation. Retrieved from Barton, A.C.T.:

38: The Role of Credence Attribute Claims in Food Product Launch - A Comparative Study of New Zealand and Australia

Authors: Wei Yang, Alan Renwick, Cesar Revoredo-Giha, Waranan Tantiwat, Le Wang

Presenter: Wei Yang - Lincoln University

Abstract

This paper aims to empirically investigate the role of claims of credence attributes in the launch of food and drink products using a large dataset of new product development by food companies in Australia and New Zealand. Multinomial regression models are employed to analyze the association between the type of product launch and the positioning claims adopted by firms in the two markets. The results provide evidence that claims of credence attributes play an important role in the product launch strategy of firms in both Australia and New Zealand. Food companies tend to choose the most cost-effective strategies to launch products with credence attributes. Hence, claims that are seen as most important for consumers are more likely to be engendered for the more costly launch approach. For example, the attribute of "environmental-friendly" is highly important in both markets and its use is related to launching brand new products which generally is the most costly launch strategy. In contrast, other credence attributes, such as "ethical" and "safety", are linked to relatively simpler and cheaper strategies, such as new packaging and new extension. Note that whilst the attribute of "health and nutrition" is regarded as an important claim to firms in the Australia market, it is not related to any product launching approaches in the New Zealand market. Given most studies on credence attributes have focused on the consumer side, results of this study fill in the gap of understanding how food suppliers respond to consumer demand for food products with credence attributes.

39: Honey bee losses and underlying causes in New Zealand, 2015-2021

Authors: Pike Stahlmann-Brown, Richard Hall, Hayley Pragert, Thomas Robertson

Presenter: Pike Stahlmann-Brown - Manaaki Whenua - Landcare Rese

Abstract

Since systematic records began in 1945, the number of honeybee colonies in New Zealand has grown exponentially. Indeed, buoyed by high prices for mānuka honey, the ratio of honeybee production colonies to humans is now approximately 1:6. The New Zealand beekeeping industry is also distinguished by its professionalism: approximately 7.8% of New Zealand beekeepers have more than 150 production colonies compared to approximately 0.1% of UK beekeepers. Because managed honeybees in New Zealand are threatened by varroa mites, diseases such as Nosema cerranae and American Foulbrood, competition for floral resources, agrochemical drift, wasps, and other acute challenges, annual surveys of winter colony losses have been undertaken since 2015. In this paper, we report overwintering loss rates at a national level for seven annual surveys, 2015 through 2021. We also report regional breakdowns of loss rates for six annual surveys, 2016-2021, in addition to attributions of losses for five annual surveys, 2017-2021. While overwinter loss rates have consistently been low-moderate by international standards, we show that loss rates nevertheless increased monotonically during the study period, amounting to some 100,000 colonies lost over winter 2020 (results for 2021 are pending and will be available in early 2022). These losses are approximately 35% higher than those experienced in 2015. Loss rates also vary spatially, with some regions experiencing higher loss rates than other regions and some showing considerably more year-on-year variability than others. Finally, we show that while losses attributed to queen problems, suspected starvation, wasps, and other causes are broadly similar over time, losses attributed to varroa have increased sharply. In addition to reporting on attributions of losses over time, we also exploit the panel nature of the dataset to analyse losses between and within individual beekeepers. Preliminary evidence suggests that about half of the variation in losses is explained by environmental factors while half is explained by individual effects, suggesting that losses may be reduced through improved beekeeping practices.

40: Tell us something we don't know: the potential for herbicide resistance testing to inform weed management decisions

Authors: Masood Azeem, Fiona Dempster, Roberto Busi, Rick Llewellyn

Presenter: Masood Azeem - CSIRO

Abstract

Australian grain growing has one of the most extensive herbicide resistant weed problems in the world, posing a persistent threat to the sustainability of crop-weed management systems. Growers have responded to the ongoing evolution of resistance to important herbicides by introducing new practices and alternative herbicide options. Herbicide resistance testing services have been available for over 3 decades that allow growers and their agronomy advisers to confirm resistance status of weed populations and the potential for successful control by alternative herbicide options, most commonly by submitting weed seed samples. However, there has been concern that testing services are underutilized. In this study we address the following research questions: i) how is herbicide resistance testing currently being used by growers and agronomists and why? ii) how well do current grower and agronomist estimates of resistance status align with what can be learnt through test results. The study involved 128 paddocks on 51 farms and 15 advisers in the WA grain growing region with sampling and tests of annual ryegrass and wild radish weeds for resistance to 50 herbicides in 2020-21. Perceptions of testing use and perceptions of resistance status in particular farms and paddocks was collected from 23 farmers before test results were received. Agronomists' perceptions of resistance status of 44 farms were also obtained through a primary survey. Quantitative descriptive analysis was used to describe herbicide resistance test outcomes and primary survey data of farmers and agronomists. Differences between two sample proportions were analyzed by using the Pearson's chi-squared test of independence. Fisher's exact test was applied when one or more of the cell counts of categorical variables was less than 5. Results indicate that 60 percent growers have undertaken herbicide resistance testing before but usually not regularly, mostly facilitated by the agronomist. Time constraints at sampling time was the most commonly stated reason for not doing some or more testing, with visual observation of in-paddock herbicide performance being the main source of information for determining resistance status. Growers very rarely assume resistant populations (based on test results) were susceptible. Growers often overestimated the resistance status of some herbicides, particularly for ryegrass control to herbicides with relatively low resistance levels, and were more likely to underestimate the resistance status of wild radish to important broadleaf herbicides – these were often scenarios where simple in-paddock observation of resistance status was more difficult (e.g. where herbicide mixes were often involved). The study indicated the potential value of tests to better inform both under and over estimates of resistance, and confirm the susceptibility of weed populations to alternative herbicide options.

41: Impact of Agricultural Extension service on Farmer's Welfare: Evidence from Bangladesh

Authors: Mohammad Mahbubur Rahman, Professor Jeff Connor

Presenter: Mohammad Mahbubur Rahman - University of South Australia, UniSA Business

Abstract

Abstract This paper investigates the impact of agricultural extension on the application rate of chemical fertilizer, crop yield and income using panel data from a nationwide survey of farmers in Bangladesh where there is an overuse of nitrogen and phosphorous fertilizer. An endogenous switching regression model that accounts for selection bias is employed in the analysis. While many studies have assessed extension impacts, most use extension presence or absence as a binary dependent variable, despite good reason to believe that types of extension (govt./private) and intensity of extension (number of extension visits) could be important. This paper addresses the lack of studies that account for the type and intensity of extension on farm welfare outcomes by using the traditional binary extension contact as an explanatory variable as well as variables measuring intensity, and type (government or private extension). The empirical results reveal that the traditional binary variable indicator did not have any impact on nitrogen and phosphorous fertilizer use. On the other hand, government extension service receivers used significantly less nitrogen and phosphorous fertilizer. Farms receiving more than one extension contact used significantly less phosphorous fertilizer. In contrast, private extension service receiving farms used a significantly higher amount of fertilizer. Farms receiving more than one extension contact had higher yield and income. While private extension appeared to achieve higher income, but it did not reduce the over-application of fertilizer. More intensive extension with more frequent farmers contacts in contrast resulted in both income benefit and reduced application of fertilizer.

42: The effectiveness of the UN-REDD Programme as a guardian of tropical forests in developing countries

Authors: Lakmini Fernando, Firmin Doko Tchatoka, Stephanie F. McWhinnie

Presenter: Stephanie F. McWhinnie - School of Economics and Public Policy, University of Adelaide

Abstract

This paper examines the effectiveness of the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD). We employ a novel staggered difference-in-differences approach recently proposed by Athey and Imbens (2018) to analyse deforestation and carbon dioxide emissions data from 2001 to 2018. We show that, on average, adoption of UN-REDD reduces deforestation and associated emissions, but that these effects take 9-10 years to accrue. In addition, heterogeneous programme effects are observed across geographical regions and economic development levels. Latin American and Caribbean countries have a strong reduction in both deforestation and associated emissions while countries in Africa and Asia-Pacific have no deforestation reductions and slightly increased emissions. Across income levels, only upper-middle income countries have lower deforestation and associated emissions, while emissions rose in low-income countries.

43: Risk management in Australian wheat export: A descriptive analysis of market outlook and options for price risk management

Authors: Richard J. Culas, Ishan Dhakal, Nan Wang

Presenter: Richard J. Culas - School of Agricultural, Environmental and Veterinary Sciences, Charles Sturt University

Abstract

There are various reasons for price risk in wheat export for Australian wheat and fluctuation in product price can impact negatively on agricultural sector as well as affect the country's economy. Despite its significance, price is not well managed in practise. The profit of the agricultural product may decrease due to improper price management. Price risk is also associated with other forms of risk mainly to production risks. We discuss about different risks present in agriculture, their causes and approaches for the proper management of these risks. Further, the trends of wheat export are analysed and shows a great fluctuation in price risk along with the production risk. The national and state-wide data for wheat production and export are discussed along with the comparison of the countries in the world which are major wheat exporting nations. Australian Wheat Board was the solo monopoly body responsible for wheat trading before 2008 as a Single-desk marketing body. The AWB followed the two-price scheme model for selling of wheat. The price of wheat for domestic market and export market were different. AWB was abolished in 2008 and many other agribusiness firms enter in the market for trading of wheat which also created the situation of more price risk. The rise and fall of AWB is discussed along with the consequences the wheat sector has faced after the fall of AWB. Moreover, the current supply chain of wheat is discussed along with different pricing management options. Price management is comprehensively a regulatory framework so that it is always necessary to make appropriate check before implementing any pricing measure. For the price management in Australian wheat, it comprises of three components of prices. Based on analysis of data from 1993 to 2018, it is shown that there is much more variation in local price and basis price compared to other components future price and exchange rate. There is fluctuation in local price of wheat. Due to the fluctuation in local price and future price it has also impacted in the basis price of wheat. For example, the standard deviation of local price and basis price comes out to be 69.88 and 48.34 which are comparatively high. The more the fluctuation in basis there is more price risk. There does not seem to be regular pattern regarding the increase and decrease of price of wheat. It keeps on fluctuating in course of time. Supply and demand of the wheat is the factor that will change the market outlook of wheat. Developing a market outlook is not about trying to pick market highs and lows, rather its purpose is about analysing information and making informed decisions into whether the price objective can be achieved, and if so, what pricing alternatives can be utilized. This study provides a matrix on hedging versus physical contracts. Unless basis is at high levels and production is certain, producers should be biased towards different hedging instruments rather than physical contracts.

45: Resilience to Anthropogenic Drought in the Northern Murray-Darling Basin, Australia

Authors: Quentin Grafton, Long Chu, Richard Kingsford, Gilad Bin0, John Williams

Presenter: Quentin Grafton - The ANU

Abstract

Causes, consequences and trade-offs of anthropogenic drought were assessed using a step-by-step analytical framework applied to the northern Murray-Darling Basin (MDB), Australia. This region, like other mid-latitude locations elsewhere in the world, suffers from 'fragile' water security and a drying trend projected to continue with climate change. Streamflow was analysed on a highly modified river (Lower Darling) and an adjacent, unmodified river (Paroo). Findings include: (1) half of the recent reduced streamflow on the Lower Darling River has occurred because of a drying trend and about half is attributed to increased water extractions; (2) recent (1983-2020) declines in waterbird diversity, abundance and resilience have been much larger along the Lower Darling River compared to the Paroo River Wetlands; and (3) ecosystem resilience is supported by the reallocation of water to streamflow. The analytical framework supports improvements in water institutions, infrastructure, and information in the northern MDB and promotes the 'three key pillars' of the Drought Resilience, Adaptation and Management Policy framework; (1) to implement drought monitoring systems, (2) to assess drought vulnerability and risks, and (3) to implement measures to reduce the impacts of droughts.

47: Implications from the Ban on Glyphosate for the Farm Sector of the Sri Lankan Tea Industry

Authors: Chinthani Rathnayake, Bill Malcolm, Garry Griffith, Bob Farquharson, Alexandria Sinnett

Presenter: Chinthani Rathnayake - The University of Melbourne

Abstract

The tea production sector of Sri Lanka comprises many smallholdings and a few large-scale estates. They play a significant role by supplying the main input to made tea manufacture for export, earning foreign exchange. Many challenges have directly and indirectly affected production, profitability and sustainability of the farm sector recently. A government policy decision that influenced both grower sectors directly was to restrict the use of Glyphosate island-wide, at a time when the sector was highly dependent on this input for weed control. Subsequently, the tea industry including the farm sector experienced consequences of banning Glyphosate use during the ban. In this study implications of this Government policy banning the use of Glyphosate for the farm sector of tea industry are investigated. The main research question is 'What are the implications from the Glyphosate ban for the farm sector in the tea industry?'. Research objectives of the study are (i) to study impacts of the Glyphosate ban on grower sectors (ii) to estimate welfare changes of the ban on farm sector through value chain of the industry and (iii) to explore the resilience of farm sector to potential policies that restrict farm production. Data were collected from tea industry participants including growers and stakeholders in tea growing regions in Sri Lanka through in-depth interviews and official industry statistics. The largest impact of the ban was seen on entire estate sector and smallholdings that used Glyphosate before ban to control weeds. The effect mainly came about from producers requiring more labour for weed control, with associated labour shortages and increasing labour wages faced by farm sector. Although there were recommended alternatives to Glyphosate, growers from both sectors have had access to, and have used, illicit Glyphosate products with unknown compositions from the informal market. Producers reported frequently that there were escalated production costs from employing extra labour on manual weeding, higher chemical costs, labour inefficiencies, quantity and quality losses in crop, and yield losses by abandoning marginal tea lands. Quantitative analysis of tea production gross margins per hectare suggested profit declines at farm level, especially in estate sector, where an economic loss of more than Rs. 2,000 million was estimated for the industry. In a period where domestic growth of the industry and farm sector is vital for the country's economy to maintain competitiveness in global tea market, production shocks such as those brought on by a ban on a key input are unaffordable and impede progress of the industry. Building the capacity to withstand economic setbacks - resilience - is the key to recovery in the sector, such as the one brought about by policy recommendations that inhibit good agricultural practices including weed control. Reinvestments on tea cultivation, technology adoption and informed decision making too are all hindered.

48: A highly granular model of China's coal production and consumption system shows how China's decarbonization and energy security plans will affect coal imports

Authors: Jorrit Gosens, Alex Turnbull, Frank Jotzo

Presenter: Jorrit Gosens - Australian National University

Abstract

China aims for net-zero carbon emissions by 2060, and an emissions peak before 2030. Simultaneously, China aims for improved energy security, primarily with expanded domestic coal production and transport infrastructure. We analyze effects of both these pressures on seaborne coal imports. We do so with a linear optimization model of China's coal production and transport network with very high geospatial detail. The model minimizes total production and transport costs, with constraints on production, transport, and consumption capacities, and considering coal qualities. Earlier models of this node-and-link type model represent China's coal system with provincial level nodes which conflate all production and consumption. Our model provides a strong improvement on this state of the art, as it includes every individual power plant, steel plant, port, railway, and inter-city road connection. This allows for a far better representation of transport costs and the relative competitiveness of foreign vs domestic suppliers of coal. We are also the first to gauge the relationship of how likely future imports will depend on the level of Chinese consumption of coal, using a wide range of possible future domestic demand. We use this model to assess how China's decarbonization and energy security plans affect China's imports of thermal and coking coal. We find that reduced Chinese coal demand affects seaborne imports more strongly than domestic supply. For thermal coal, our model suggest that total imports will see lower growth, or bigger reductions, than total demand. Overland imports from Russia are expected to remain stable, whilst imports from Mongolia are expected to grow strongly, due to expansion of rail connections into Mongolia and of Mongolian mining capacity. Seaborne imports from Australia and Indonesia in particular are expected to fall due to a combination of infrastructure investment and expected development of Chinese mining capacity. These seaborne imports would grow only in a scenario in which Chinese demand would grow at 1% pa or more; a level of growth that is beyond the range of most future projections. For coking coal, total imports are set to grow, due entirely to growing imports from Mongolia. This is in turn almost entirely due to expanded production at the New Tavan Tolgoi mine, a low-cost producer of high quality hard coking coal, and two newly built rail lines from this mine to the Chinese market. This new supply is expected to push out some of the Australian coking coal imports. Different scenario runs show that recent infrastructure investments in rail, ports, and a UHV network have all had a negative effect on likely levels of coal imports. Future levels of imports will also depend on how Chinese national level reductions in coal-fired power and steel production will be distributed over coastal and inland provinces. By far the strongest determinant of levels of coal imports, however, is domestic demand levels.

49: Assessing the Importance of Localised Agronomic and Environmental Characteristics for Farm Level Yield and Intensity on Pastoral Based Livestock Systems

Authors: Yan Jin, Cathal O'Donoghue, Mary Ryan, Kevin Kilcline

Presenter: Yan Jin - Teagasc

Abstract

Natural capital plays an important role in contributing to production in livestock systems worldwide. However, in the agricultural economics literature, production functions typically only take account of physical and human capital while natural capital is often ignored, partly due to the data constraints. Yet ignoring elements of natural capital such as agronomic and environmental farm characteristics could result in biased and inconsistent model estimates. In addressing this gap, our study contributes to the literature by assessing the importance of natural capital on farm level yield and intensity on Irish pastoral based livestock systems. We adopt a three-factor production function that takes account of natural capital to 1) study how agronomic and environmental characteristics contribute to production and efficiency, and 2) analyse the heterogeneity of contribution to two partial productivity measures: yield (gross output per livestock unit) and intensity (livestock unit per hectare). Three-factor Cobb-Douglas and Translog production functions are estimated for farm level yield and intensity across dairy, cattle and sheep systems using latent class stochastic frontier analysis over a fifteen-year period, 2001-2015. We use panel data from the Teagasc National Farm Survey (the Irish contribution to the European Commission Farm Accountancy Data Network) together with weather data from the Irish national meteorological service, Met Éireann, and add to the existing literature by using geo-referenced farm level data including principal soil type, landscape physiological reference, grass cover and grass growth index. Overall, we find that natural capital variables are important factors to consider in order to mitigate against omitted variable bias in farm level partial productivity analysis. There is a particularly strong explanatory effect on intensity across livestock systems when natural capital is included. Yield is not as strongly responsive to the inclusion of natural capital variables; however, there is an improvement in the explanatory power of our yield regressions across livestock systems when agronomic and environmental variables are added into the econometric regressions. Our preliminary results for the Irish cattle system show that the McFadden R squared increases by 17% for the intensity model after considering agronomic and environmental characteristics, while it only increases 1.5% for the yield model due to genetic constraints. The paper stresses the importance of using geo-referenced farm level data as a new economic analysis tool to incorporate natural capital effects in future analyses and highlights the benefits of this work to the research community in providing the infrastructure necessary to understand the interplay between agronomic and environmental conditions and farm level outcomes. These results are relevant beyond the Irish context to other countries with pastoral based livestock systems.

50: Measuring the economic impacts of exotic dung beetles on livestock productivity in Western Australia.

Authors: Marcela Del Carmen Vieira, Jake Manger, Benedict White, Jacob Berson, Theodore Evans, Fiona Dempster

Presenter: Marcela Del Carmen Vieira - University of Western Australia

Abstract

Dung beetles, by moving and burying dung provide ecosystem services such as recycling nutrients, improving plant growth, suppressing pest flies and reducing nematode parasites. In the 1960s, CSIRO initiated a ”natural experiment” by introducing dung beetles from Africa and Europe into Australia. However, little is known about the economic impacts of this natural experiment on the Australian livestock industry. In this paper we analyse the benefits of dung beetles by measuring the effects that their introduction had on stocking rates. First, we develop a spread model to predict the spread and abundance of five dung beetle species in Western Australia between 1972 and 1980. Livestock numbers, manure production, climatic variables, species biology and release locations are used as model inputs. The prediction of spread from the model is then used for the policy impact evaluation. This spread variable is a key input to the Difference-in-Differences method (DID). It allows the identification of treatment (dung beetles present) and comparison areas, before and after the introduction of dung beetles. Second, we discuss the use of Difference-in-Differences to estimate historical economic impacts of exotic dung beetles on livestock productivity as measured approximately by stocking rates. Our preliminary results show a significant ($P < 0.05$) increase in the stocking rate when the dung beetle species Onthophagus binodis was introduced in the South-West region. This may be explained by the high concentration of dairy and beef cattle in the region, which is the preferred dung source. Further analysis will be presented using multiple treatment periods for the remaining dung beetle species. The outcomes of this research will improve our understanding of the economic impacts of ecosystem services provided by dung beetles to the beef, dairy and sheep industry in Western Australia. In addition, the results will be communicated to landholders and governments to inform future decision making related to dung beetle imports and agricultural practices.

51: Quality uncertainty and willingness to pay for organic quinoa - Evidence of organic-labelled quinoa in Peru

Authors: Angie Higuchi, L. E. Morales

Presenter: Angie Higuchi - Universidad del PacÃ-fico

Abstract

Consumers buy organic quinoa mostly motivated by environmental, health and safety beliefs. They spend hundreds of billions of dollars worldwide buying organic products that are in some cases mislabelled, as they are not organic products in line with the standards. The objectives of this study are first, to identify if a group of Peruvian consumers perceive a higher quality for organic over conventional quinoa, determining their maximum willingness to pay premiums for those products. Second, this research aims to analyse if the final price of the current quinoa products sold in Peru is influenced by the fact of being advertised as organic quinoa, even though they are not always organic. In order to fulfil the first objective, a gamma regression model was estimated using data collected during 2017 in Modern Metropolitan Lima, Peru. The results showed that those who are concerned about nutrition and have higher income are willing to pay premiums for organic quinoa. However, the premiums paid for organic quinoa in the Peruvian market are related to the organic labelling, despite the products might not meet all the requirements for being classified as organic. In addition, in order to test the potential mislabelling of organic quinoa in Peru, thirty-two (32) different brands of packed white quinoa, with seventeen organic certified and nineteen non-organic or conventional, were purchased in different supermarkets and bio-shops from metropolitan Lima in January 2021. The samples were analysed in a laboratory to trace pesticides residues. The results identified several quinoa brands that are commercialized as organic, even with organic logos in their packages, which are not fulfilling organic standards, as pesticides were found. Data analysis demonstrates that those mislabelled and truly organic quinoa products receive a similar premium; therefore, the government is encouraged to increase the efforts to reduce food fraud in the organic supply chain, in order to fulfil the needs of the Peruvian organic consumers and help those companies who sell truly organic products to receive the premium they deserve for their high-quality products.

52: Consumer Preferences for Blockchain-based Traceability of Leafy Greens

Authors: Alba J. Collart, Matthew G. Interis, Ajita Giri, Elizabeth Canales

Presenter: Alba J. Collart - Associate Professor & Extension Economist, Department of Agricultural Economics, Mississippi State University, USA

Abstract

The recurring linkage between high-profile foodborne illness outbreaks and the consumption of leafy greens and consumers' increasing attention to field-to-fork traceability has made the food industry and governments worldwide prioritize the improvement of traceability systems in the produce sector. Numerous food industries are testing and implementing new digital traceability systems based on blockchain technology, such as IBM Food Trust in the United States and Europe and FreshChain in Australia. Applications of blockchain technology aim to modernize food traceability by providing more decentralized, tamper-proof records of the movement of a food product and its ingredients through all steps in the supply chain. Using data from two online surveys, each with a discrete choice experiment, we estimate consumer willingness-to-pay (WTP) for blockchain-based traceability information accessible via QR codes placed on the packaging of two economically important leafy greens: romaine lettuce and spinach. We examine consumer preferences for blockchain-based versus standard (non-blockchain) traceability information or no information, organic versus non-organic leafy greens, and the labeling of the detailed growing region information. We also conduct sensitivity testing using a variety of random parameter logit (RPL) model specifications, including allowing for preference heterogeneity in price and other non-price attributes, non-zero correlations across random taste parameters, and correlation across the utilities of the buying options through the inclusion of an error component. For each model specification, we simulate the WTP distributions to incorporate the sampling variation in the point parameter estimates, and the variation in preferences within the population as captured by the random parameters. Simulation results indicate that consumers are willing to pay median premiums of $0.33-$0.38 for a QR code providing access to blockchain-based over standard traceability information, of $1.45 for a QR code providing access to standard traceability information over having no access to additional information, and of $1.02-$1.41 for organic over non-organic leafy greens. If the leafy greens are domestically produced, consumers have no strong preference for knowing over not knowing the detailed growing region. However, if the growing region is unknown, consumers prefer domestically produced over imported leafy greens. Results also indicate significant heterogeneity in the price parameter and that the inclusion of an error component improves model fit. While estimating WTP based on RPL models with uncorrelated random taste parameters might be the state of practice when modeling food choice behavior, we find that unrestricted RPL models that allow for correlation across random parameters provided the best model fit.

53: Greenhouse Gas Emissions and Productivity Change in Selected Sectors of the Australian Economy

Authors: Chris O'Donnell

Presenter: Chris O'Donnell - University of Queensland

Abstract

Using GDP as a measure of economic performance encourages overcapitalisation of the economy and destruction of the natural environment. This paper suggests that economic performance should instead be measured using total factor productivity (TFP). Measures of TFP are defined as measures of output volume divided by measures of input volume. The most widely-used measures of output volume ignore sectoral outputs that have zero or negative market value. For example, many sectors of the economy produce greenhouse gas (GHG) emissions. This paper shows how to measure output volumes (and therefore TFP) in such a way that, all other things being equal, the measured productivity of a sector rises as GHG emissions fall. The methodology is applied to the agriculture, electricity and transport sectors of the Australian economy. Stochastic production frontier models are then used to identify the drivers of productivity change. The main drivers of productivity change over time are found to be technical progress (i.e., the discovery of new techniques for transforming inputs into outputs), technical efficiency change (i.e., changes in how well producers use existing technologies) and scale-and-mix efficiency change (i.e., changes in how well producers capture economies of scale and substitution). The paper explains how policy-makers can use these findings to drive increases in TFP.

54: Assessing and reporting on nature-related risks for Australian forestry

Authors: Greg Smith, Francisco Ascui, Anthony O'Grady, Libby Pinkard

Presenter: Greg Smith - CSIRO

Abstract

All businesses, to some extent, draw on and rely upon natural capital—natural capital dependencies—whilst they also affect the stock of those assets either positively or negatively—natural capital impacts. Significant impacts and dependencies can manifest in various risks at a business level, for example, as increased operational costs, lower yields or productivity, decreased demand or loss of access to certain markets, an increase in regulatory requirements, or reputational damage. Natural capital dependencies and impacts can also create opportunities for businesses; many businesses that own or manage natural capital, such as forestry and agriculture, are involved in creating, maintaining, or enhancing a range of ecosystem services which provide benefits to society. Managers of businesses and their stakeholders, such as investors or regulators, need to understand the full picture - including any existing natural capital risks and opportunities and how that might change in the future. While there are well-developed analytical protocols for investors and managers to assess traditional financial material risks or opportunities, this is not true for natural capital information. We address this problem by applying a standardised methodology to develop the first systematic, evidence-based materiality assessment of natural capital risks for the Australian forestry sector. Furthermore, we identify suitable indicators, metrics and data that would enable a consistent industry-wide approach at the enterprise scale. We go on to show, through case study examples, how natural capital risks can be mapped spatially, and can be represented in natural capital risk accounts – consistent with natural capital accounting frameworks. Overall, this work contributes to the preparedness of the forestry industry and its stakeholders to address questions about its sustainability under future changes. We show lessons learned from working directly with industry on the first steps for incorporating natural capital risks into their decision-making. This study also paves the way for the systematic assessment of both natural capital risks and opportunities, with the methodologies developed being both compliant with emerging international standards, and applicable to a wide range of industry groups.

55: Growing the NSW Agricultural Economy: constraints and opportunities as perceived by farmers

Authors: Derek Baker, Carolyn Tran, Michael Coleman, Mary Goodacre, Peter Arkle, Jonathan Tuckfield, Brian Sindel

Presenter: Michael Coleman - University of New England

Abstract

The NSW Farmers' Association (NSW Farmers), a farmer representative organisation, has the aspiration for agriculture to contribute $AU30 billion to the economy of the state of New South Wales (NSW), Australia, by 2030. This "30 by 30 vision" would increase agriculture's contribution to the NSW economy from just under $AU14 billion in 2020. The NSW Farmers' goal sits within a national target, established by the National Farmers' Federation, of a $AU100 billion contribution by agriculture to the Australian economy by 2030. Within NSW, growth in production and productivity, shifts in production and enterprise mix, technological change, investment in public and on-farm infrastructure, product quality upgrades and value-adding, and improved marketing are a few of the approaches projected to achieve the 30 by 30 vision. Government agencies and farmer representative bodies are keen that growth in these areas be market-led, though facilitated by appropriate policy and government/private sector support. While many farmers are well positioned to participate in the growth and to benefit from it, concerns remain about some farmers and rural communities being excluded, or "left behind". This paper reports on a survey of farmers in NSW administered in late 2021, which identified the constraints and opportunities associated with the likely approaches towards growth. Consequently, the survey reports on areas in which support may be necessary to maximise farmers' participation in the projected growth. Recognising that farms and farmers are highly heterogeneous, the survey partitioned respondents according to their stated goals for their farm businesses, by the activities undertaken to achieve those goals, and by physical, production, and geographic attributes of farm businesses. The survey sought farmers' responses to a variety of statements of opportunity and constraint, which were subdivided according to their relevance to each of the five "capitals" within the widely-used capitals framework (comprising financial, physical, human, natural and social capital). Data reduction techniques were used to identify key constraints and opportunities as perceived by farmers, and to cluster these according to goals, needs, and enterprise type. Gap analysis provided insight into the roles to be played by the capitals in advancing farmers' production value, filling gaps in capability, and maximising the inclusiveness of growth. The paper concludes with a set of strategic tasks defined from the survey results, identifies the likely stakeholder group surrounding each task on the basis of commonly held attributes, and characterises the needs of that group to ensure that they are well positioned to both contribute to and benefit from opportunities to expand agricultural productivity in NSW. Specific challenges for NSW Farmers as a representative and support organisation were also identified, including policy priorities.

56: Effects of information and communication technology on objective and subjective well-being inequality in China

Authors: Wanglin Ma, Puneet Vatsa, Hongyun Zheng, Victor Owusu, Emmanuel Donkor

Presenter: Wanglin Ma - Lincoln University

Abstract

The present study examined the impacts of ICT adoption on objective and objective well-being inequality using 2018 China Family Panel Studies (CFPS) data. We used income inequality and consumption inequality to capture the objective well-being inequality, while happiness inequality and life-satisfaction inequality were used to capture objective well-being inequality. We employed the the two-stage residual inclusion (2SRI) model to address the endogeneity problem inherent in ICT adoption. We contribute to the growing literature on ICT adoption and household well-being in three important ways. First, we examine the impacts of ICT adoption on both objective well-being inequality (measured by the Gini coefficient) and subjective well-being inequality (measured by the variance). Specifically, we capture objective well-being inequality using income and consumption inequality and subjective well-being inequality using happiness and life-satisfaction inequality. Second, we apply a two-stage residual inclusion approach to address the endogeneity of ICT adoption emanating from self-selection of individuals as adopters and non-adopters, and the presence of systematic differences in observed heterogeneity between the two groups. Third, we investigate how objective well-being inequality affects subjective well-being and inequalities. The empirical results of the first-stage 2SRI model showed that people's decisions to adopt ICTs are positively and significantly influenced by education, CCP membership, insurance ownership, dependency ratio, average education of household members, car ownership, and living in urban areas. Age and family size are two key factors that negatively affect people's ICT adoption decisions. The second-stage estimates of the 2SRI model revealed that ICT adoption tends to lower income inequality and consumption inequality. Furthermore, ICT adoption significantly decreases happiness inequality but shows no effect on life-satisfaction inequality. The results indicated that the age of household heads, family size, and urban residence significantly lower income and consumption inequality, while the average education of household members significantly increases income and consumption inequality. We also found that subjective well-being inequality, as captured by happiness inequality and life-satisfaction inequality, is negatively influenced by age. The comparison analysis using the AIPW estimator revealed that the inequality effects of ICT adoption tend to be underestimated if one only controls for observable selection bias but ignores unobservable selection bias. Further analysis demonstrated that both income inequality and consumption inequality have insignificant impacts on happiness and life satisfaction. Income inequality significantly increases both happiness inequality and life-satisfaction inequality, while consumption inequality does not have a significant impact on objective well-being inequality.

57: Off-farm work and technical efficiency of wheat production in China

Authors: Wanglin Ma, Hongyun Zheng, Victor Owusu, Emmanuel Donkor

Presenter: Wanglin Ma - Lincoln University

Abstract

The present study examined the effect of off-farm work on the technical efficiency (TE) of wheat production, using data collected from farming households in China. We mainly explored four dimensions of off-farm work, including the household heads' off-farm work participation, local off-farm work participation, migrated off-farm work participation, and off-farm work intensity. To further our understanding, we also measured off-farm work variables at the household level (i.e., number and ratio of off-farm workers in a household and off-farm income) and estimated their impacts on TE. A stochastic production frontier model was used to estimate the TE of wheat production. Given that off-farm work variables are potentially endogenous due to self-selection issues, we employed a two-stage residual inclusion (2SRI) approach to address such endogeneity problems. The findings from our study revealed that off-farm work participation of household heads exerted a positive and significant impact on TE. Local off-farm work participation showed a significant positive effect on TE but migrated off-farm work participation did not indicate any significant effect on TE. Although off-farm work intensity does not show a significant impact on TE, further analysis using intensity dummies suggested that off-farm work intensity tends to increase TE of wheat production when household heads work off-farm between 9 and 12 months. Additional analysis suggested that a higher TE of wheat production is not necessarily associated with the number and ratio of off-farm workers in a household and off-farm income. Generally, our research has supported the positive impact of off-farm work on TE of crop production from multiple dimensions. We found that TE is positively and significantly influenced by the household heads' age, health status, and farm size but negatively and significantly affected by distance to the market. Our findings underscore that off-farm work participation is a critical pathway for smallholder farmers to boost efficient farm production. From the perspective of promoting production efficiency, our research shows that it is essential to encourage household heads to participate in off-farm work locally, especially those unable to migrate due to household responsibilities. Therefore, the policy aiming to achieve efficient production should consider cultivating and developing industries with local characteristics, which can help create more off-farm work opportunities. Disseminating local off-farm work information via accessible channels, such as radios or message services of smartphones, and providing job-seeking subsidies might make a difference in encouraging household heads' off-farm work participation. Farmers' health status is positively associated with a higher TE. The finding underscores the importance of saturating health knowledge among rural farmers to improve their health levels and human capital.

59: Can value chain interventions be used to support broadscale land use change for environmental and social outcomes? A case study in Bandung, Indonesia

Authors: Daniel Hill, Oscar Cacho, Daniel Gregg

Presenter: Daniel Hill - University of New England

Abstract

Intensive horticulture is highly valuable in peri-urban areas, but can generate substantial negative environmental impacts on urban communities, including creation of major environmental risks such as landslides, soil erosion, reduced biodiversity, and deforestation. Smallholders often have limited incentives or capacity to change into more sustainable land use practices such as mixed agroforestry systems, but value chain upgrading is one approach to provide new opportunities and incentives for smallholders to change land use practices. In this study we develop a farm simulation model to test whether different coffee supply chain interventions can provide sufficient incentives and productivity improvements in the peri-urban uplands around Bandung, West Java. Having smallholders in this region remain or shift into coffee agroforestry systems can limit impacts on soil erosion and landside risks, but relatively low returns from coffee compared to vegetables provides competing incentives to shift into intensive horticulture. Using household and plot level data collected from 499 households in 2019, the model tests whether different coffee supply chain interventions can provide sufficient incentives and productivity improvements, for farmers with plots on the upland slopes, to change land use towards agroforestry systems. We simulate land-use choices and welfare outcomes from coffee value chain interventions that support increased returns to coffee agroforestry against the status quo. To account for the economic costs of participation, this study estimated and validated agroforestry establishment costs, coffee production costs, and supply chain transaction costs of different coffee supply chain interventions. Spatial and agent heterogeneity are incorporated into the model, the latter relying on a bounded rationality perspective in which agents use heuristics to make decisions over land use.

60: Nitrogen for better and worse

Authors: Bill Malcolm, xi laing, Alex Sinnett, Paul Deane, Garry Griffith

Presenter: Bill Malcolm - University of Melbourne

Abstract

Nitrogen for Better or Worse By Bill Malcolm, Xia Liang, Alex Sinnett, Paul Deane, Garry Griffith In this paper is set out economic ways of thinking about estimating the private and social effects of using nitrogen (N) to produce agricultural and horticultural crops and associated implications for policy to promote socially optimum use of N fertilizers. For agricultural and horticultural production the private benefits of using N fertilizer are large; so too are the social costs of the losses of N in various forms, which has contributed to global warming, ammonium adversely affecting air quality and human health, and groundwater and surface water pollution, acidification and eutrophication. If more of the N currently used in agricultural and horticultural production went into output with positive private value, and less of it went to creating negative externalities for society, further private and social benefits would result. Enhanced efficiency N fertilizers result in less N losses from agricultural and horticultural production than traditional N fertilizers. Less losses of N from production means either less N is required for a given yield, or more of N that is applied is available to the plant to create yield. On the farm there will be a new cost and production response functions that apply with a changed N input. These will determine a changed optimum amount of N to use, for any given output price. The cost per hectare of the optimum amount of new-N will differ from the cost per hectare of the optimum amount of old-N. This change in cost per hectare comes from two sources: (i) potentially a higher cost per kg of new-N associated with the changed properties of new-N that enables it to be more efficient with less losses from production, and (ii) changed quantity of new-N required compared with old-N because more of the quantity of new-N that is applied is available for productive use. In the agricultural and horticultural input value chain, there may also be beneficial changes in the mix of inputs used in fertilizer manufacture and the mix of products produced. This will depend on the additional costs of developing and manufacturing increased efficiency N fertilizers and the additional revenues that can be obtained from enhanced efficiency N fertilizers. There could also net value added along the value chain by consumers who attribute value to products produced with less N pollution, which would be distributed along the N fertilizer inputs and outputs value chains. Having more technically efficient N fertilizer flowing through whole agricultural and horticultural value chains has potential benefits for all parties directly involved, as well as reduced social cost from negative externalities affecting the surrounding atmospheric and natural environments.

61: Identifying impacts of factors on waste generation and recycling

Authors: Ying Xu, Sarah Wheeler, Firmin Doko Tchatoka

Presenter: Ying Xu - Dr

Abstract

Waste reduction and recycling have attracted more attention during the last decades as waste, especially waste in landfills is one of the major environmental issues globally. Waste recycling is not only beneficial to the environment and sustainability in several aspects but also is a good means to reduce economic costs. Specifically, products made from recyclates could reduce the demand for virgin raw materials, and thereby having fewer environmental impacts through material extraction, processing and transportation, and also save less energy in manufacturing (Fiorillo, 2013). Moreover, less waste into the landfill through waste reduction and recycling could reduce both economic and environmental and economic costs, and also reduce the health and environmental risks resulting from wastes sent to landfills. Therefore, waste management in many countries including Australia focuses on reducing waste production, promoting waste recycling and reducing the waste sent into landfills. There are several studies investigating household waste in developed countries (e.g. Italy, Canada), as household waste and recycling becomes a pressing worldwide environmental issue over the decades (Fiorillo, 2013; Lakhan, 2015). However, very few such studies have been found in Australia though it faces the same issues of household waste. Most studies on related issues employ aggregated quantity data to investigate household waste generation, sorting and recycling (Kinnaman and Fullerton, 2000). However, many of these studies are not concerned with the impacts of policies on waste generation and recycling. Though Chalak (2016) points out that the policies, well-defined regulations, and strategies are effective in mitigating household waste generation, the evidence on the impact of policies and regulations on household waste generation is limited. This paper fills this gap by identifying the impacts of key factors, especially policies on household waste generation and recycling in South Australia. The fixed-effects linear model with an AR(1) is used to analyze the complex longitudinal monthly data from 2006-2020. It was found that policy variables such as opt-in or roll-out of food waste, roll-out of food diversion systems (food diversion from residual to organic bins) are positively associated with the diversion rate, by significantly decreasing the waste in general bins and increasing waste in organic recycle bin. However, education campaign neither affect waste generation nor recycling.

62: Patterns of Agriculture Labour Productivity in Agro-Ecological Zones of the Brahmaputra Valley, India

Authors: Bimal Sharma, Michael Jasper, Charles Lemckert, Milica Muminovic

Presenter: Bimal Sharma - PhD Candidate, Arts and Design, University of Canberra

Abstract

There are numerous studies on the agriculture workforce and labour productivity patterns and interpretation of the causes of its regional variations (Das, 1984, 1995; Bhalla and Tyagi 1989, Nath, 1983, 1993; Singh, 1994) and Sharma, 2007). Variations of patterns of agricultural workforce and productivity is the result of agro-ecological zones, aerial variation of labour force employed in the rural agricultural practices and the other socio-economic factors related to the land tenancy size and partial of land and so on (Sharma, 2007). There are three main attributes which are closely related to and considered for determining the agriculture labour productivity. They are: (a) the land productivity, (b) the labour intensity and (C) the crop intensity. The crop yield index that is prepared by considering principal crops of the districts for two points of time. The weighted mean technique is applied for the composite yield index. Agricultural labour intensity is calculated as dividing the total; agricultural workers by total cropped area. Agriculture in the Brahmaputra valley is food grains dominated. However, agricultural census does not provide many details about the general land use categories and its economic attributes. Therefore, aggregated land use statistics have been used to measure crop intensity (Bhatia 1967, Shafi 1960).The main aim of the present research is, thus, to examine agriculture labour productivity patterns in the Brahmaputra valley of India. The statistical data collected from the Directorate of Economics and Statistics, Govt. of Assam, India and Directorate of Census, India for districts' for two points of time i.e. 2011 and 2021 and data analysis carried on using statistical techniques, namely, the Coefficient of Variation (CV), Standard Deviation (SD) and Coefficient of Correlation (r) to measure the regional patterns. It is observed that the there is significant variations of agriculture labour productivity patterns in the agro-ecological zones of the Brahmaputra valley.

63: Exploring the impact of the COVID-19 pandemic on the purchase and consumption of fruits and vegetables: A social media analytics approach

Authors: Sara Thaichon, Park Thaichon, Alec Zuo, Robin E Roberts

Presenter: Sara Thaichon - Griffith Asia Institute, Griffith University

Abstract

The COVID-19 pandemic has substantially disrupted our daily lives. Concerns about the widespread transmission of the virus have led to strict government measures for communities, such as lockdown and border closures, which significantly impact consumer behaviours and the agribusiness industry. For example, lockdown orders give rise to home cooking and the emergence of new food shopping channels such as online stores since consumers are unable to go out, and many restaurants and catering venues are closed. Similarly, restrictions on cross-border movements have constrained food supply chains resulting in shortages of food products, especially fresh fruits and vegetables, prompting concerns about food security. During this period, consumers have focused more on aspects relating to safety, hygiene and the health benefits relating to their food purchasing in order to protect themselves during the pandemic. Therefore, this study aims to explore the patterns of consumption and purchase of vegetables and fruits in the pre- and post-COVID-19 periods. 659,537 individual tweets from March 2019 to March 2021 were collected from Twitter, by users based in Sydney and Melbourne metropolitan areas. Sydney and Melbourne were chosen, as both are the largest capital cities in Australia, and both had experienced different levels of government interventions during the data collection period. Melbourne was identified as the most locked down city in the world. In contrast, Sydney was open for business and functioning for most of the data collection period (the longest lockdown in Sydney started in June 2021). By comparing the purchase and consumption patterns of vegetables and fruits in these cities, this study was able to analyse the impact of the restriction measures on consumer sentiments, attitudes, and behaviour towards fresh fruit and vegetable. Sentiment analysis was used to explore themes including buying channels (for example, online, brick-and-mortar, and hybrid), food safety (packaging, country of origin, chemical use and health benefits) and sustainability (food waste and environmental consciousness). Customer sentiment was mapped against changes in lockdown orders and the number of COVID-19 cases to determine the impact of government measures and the health crisis. Overall, this study sheds light on the new normal in agribusiness sector by revealing how the COVID-19 pandemic has impacted the way consumers shop and consume fruit and vegetables. The findings offer significant implications for a number of sector stakeholders such as food retailers, supermarkets, farmers, and government to effectively adapt to emerging customer demands and expectations.

64: Evidence against the Environmental Kuznets Curve (EKC) from a regional analysis for Indonesia

Authors: Rizky Rahman

Presenter: Rizky Rahman - University of Western

Abstract

Testing for the EKC wihinin a developing country is challenging due to limited data on environmental indicators at a regional level. The NASA Aerosol Optical Depth (AOD) data enhanced with the climatology data, is used in this study to measure AQI PM2.5 and PM10 for 2002-2019 in 30 Indonesian cities. The data set is extended to allow for natural factors. In particular volcano activities and forest fires are frequently observed across Indonesia. Structural variables are indicated by vehicle density and the capacity of the coal power plants. Further, regional environmental expenditure represents policy intensity. The EKC model is initially estimated as standard random effects and fixed effect panel data models. However, some variables are non-stationarity based on unit root tests. We also check for cross-sectional dependency and cointegration. We then apply the dynamic system Generalised Method of Moments (GMM), to account for the possibility of spurious panel regression models from non-stationary variables. This study finds that there is no EKC in Indonesia, instead we find the relationship between our measures of environmental degration and growth are monotnically increasing. The structural and natural factors are also significant in worsening air pollution. At the same time, the environmental expenditure variable significantly reduces air pollution. These results imply that natural factors will shift the potential EKC outward in the future, while environmental expenditure is effective in moderating air pollution.

66: Estimating the Socio-economic Impacts of Protected Area Policy on Household Welfare: Evidence from Chitwan National Park, Nepal

Authors: Pratikshya Kandel, Ram Pandit, Benedict White

Presenter: Pratikshya Kandel - School of Agriculture and Environment, The University of Western Australia

Abstract

Establishing Protected Areas (PAs) is the most widely implemented policy approach for biodiversity conservation. Yet, its socio-economic impact on local communities is one of the most controversial issues in conservation policies. In this study, we evaluate the socio-economic impacts of PA policy, particularly the buffer zone policy on local households using a case study of Chitwan National Park in Nepal. Our specific research question is: do the households living in buffer zone areas enjoy higher levels of welfare relative to the conditions they would have been in had these areas not been designated as buffer zone? We surveyed 728 households and used a quasi-experimental research design (Propensity Score Matching) to evaluate the socio-economic impacts. We evaluated the impacts in two ways; firstly, we compared the per capita income levels of the households residing inside and outside the buffer zone areas. Secondly, we examined the impacts of specific livelihood intervention i.e. the alternative income-generating training programs carried out as a part of the PA interventions by comparing the per capita income levels of the households receiving such training with those not receiving the training, among those residing inside the buffer zone areas. Our results showed that the local communities residing in the buffer zone areas have a 19% higher level of per capita income, 22% higher employment income, but 10% lesser business income than communities who are residing in adjacent areas outside the buffer zone. In terms of impacts of the income-generating training, buffer zone households receiving training showed a 20% higher level of per capita income, 13% higher business income, and 20% higher agricultural income than households not receiving such training. The households in buffer zone areas have significantly higher per capita income than the households in areas outside the buffer zone, mainly due to better access to natural resources in the buffer zone areas (e.g. fuelwood, fodder, and NTFPs for livelihood and income generation), greater employment opportunities due to tourism development and greater agricultural support to local communities (e.g. irrigation canal, commercial vegetable farming, and animal husbandry training) extended by various government and non-government agencies. Similarly, the greater positive impact of income-generating training on household income could be mainly due to support in capacity building and entrepreneurship development through various training e.g. homestay establishment and management training and support in agricultural extension (e.g. through commercial vegetable farming and animal husbandry training). The results of our study add to the growing body of evidence that environmental conservation does not necessarily come at the expense of local communities, and conservation interventions if designed appropriately can be an effective tool for delivering conservation goals whilst benefiting local people.

67: Asymmetric Response of Carbon Emissions to Recessions and Expansions and Oil Market Shocks

Authors: Xueting Jiang, David I. Stern

Presenter: Xueting Jiang - The Australian National University

Abstract

The 2020 COVID-19 driven recession saw a sharp drop in carbon dioxide emissions as transportation and some other energy uses were curtailed. This was an unusual recession as it was driven by a pandemic. Previous research shows that when GDP declines carbon emissions fall faster relative to GDP than they rise in economic booms. Using US monthly data from January 1973 to December 2020, we provide new evidence on the asymmetric response of CO2 emissions to changes in GDP during recessions and economic expansions. We find that carbon emissions respond asymmetrically to changes in GDP in the 1973-75, 1980, 1990, and 2020 recessions but not in the 1981-82, 2001, or 2008-09 recessions. The 1973-75, 1980, 1990 recessions are associated with negative oil supply shocks. The 2020 recession is associated with a negative oil demand shock. In both cases, oil consumption fell sharply. By contrast, in 1981-82, 2001, and 2008-09 carbon emissions fell by the amount that would be expected given the decline in GDP. We conclude that the asymmetry is mostly due to the decline in energy use associated with the consequent reductions in petroleum consumption. Controlling for changes in oil use removes this asymmetric response. On the other hand, controlling similarly for coal and natural gas use does not. The response of sectoral emissions to changes in GDP vary. The transportation and industrial sectors show significantly asymmetric carbon emissions changes during economic contractions compared to expansions while the other sectors do not. These two sectors are also key oil consumers compared to other sectors, accounting for approximately 94% of total petroleum consumption in 2020. These findings strongly suggest that it is negative oil market shocks rather than recessions per se that result in higher emissions-income elasticities in some recessions. We also estimate a distributed lag specification. Using the optimal lag length, the difference between the elasticity in recessions and expansions is smaller than in the static regression but is still statistically significant. Adding further lags eliminates the asymmetry. Therefore, asymmetry is most pronounced in the short run. Because the asymmetric response of emissions appears to be mostly due to negative oil market shocks, we should not expect all recessions to have outsize effects on emissions. Therefore, counter to Sheldon (2017, Energy Economics), we should expect a small role for asymmetry in the future path of carbon emissions.

69: On the estimation of the impact of improved maize adoption on technical efficiency: evidence from smallholder maize farmers in Ethiopia

Authors: Abebayehu Girma Geffersa

Presenter: Abebayehu Girma Geffersa - Newcastle Business School, University of Newcastle

Abstract

This paper investigates whether the adoption of improved maize varieties (IMV) enhances the technical efficiency of smallholder maize farmers. Utilising comprehensive household-level data in 2010, 2013 and 2015, for three major maize producing regions, we estimate technical efficiency using a stochastic meta-frontier estimator. We account for technological differences in maize production and unobservable farm heterogeneity. Our results show a significant difference in technical efficiency and technology gap between adopters and non-adopters of IMV. We find that the technical efficiency of adopters of IMV is 13 percentage points higher than that of non-adopters. Exploiting technology adoption practices' policy implication, the paper further highlights that promoting the adoption of improved maize varieties can enhance technical efficiency to increase maize production in Ethiopia.

70: Attitudes and Preferences Towards Soil-Based Ecosystem Services: How Do They Vary Across Space?

Authors: Luisa Fernanda Eusse-Villa, Mara Thiene, Cristiano Franceschinis, JÃ¼rgen Meyerhoff, Alex McBratney, Damien Field

Presenter: Cristiano Franceschinis - University of Padova

Abstract

Soil ecosystem services (ES) provide multiple benefits to human well-being, but the failure to appreciate them has led to soil degradation issues across the globe. Despite an increasing interest in the threats to soil resources, economic valuation in this context is limited. Importantly, most of the existing valuation studies do not account for the spatial distribution of benefits that soil ES provide to the population. In our study, we tackled such issues by collecting survey data on attitudes and preferences towards soil ES and by estimating their economic value. Attitudes were investigated via specific questions retrieved from well-established psychological theories (New Ecological Paradigm Scale and Protection Motivation Theory), while the valuation was performed via a choice experiment focusing on several soil ES. Spatial heterogeneity of both attitudes and economic values was explored via GIS techniques. Our results highlight how individuals generally have positive attitudes towards soil conservation and are willing to financially support policies aimed at preserving soil ES. More specifically, we found that citizens of most municipalities of the study area (the Veneto Region in Italy) are aware of the importance of preserving soil and feel a moral obligation towards contributing to it. We also estimated positive willingness-to-pay values for soil ES in most of the study area and a considerable degree of heterogeneity in the spatial taste distribution. Finally, our results provide some evidence for the spatial correspondence between the distribution of attitudes and welfare measure, in that citizens living in areas where people generally have positive attitudes towards soil conservation tend to be willing to pay more to support policies aimed at increasing the level of soil ES. From a policy perspective, our results suggest how it is important to preserve soil capability to generate well-being for societies and how being able to account for spatial distribution of the perception of soil ES benefits can be useful to design soil conservation programs that are coherent with public preferences. Given the link between attitudes and willingness to pay for soil conservation, it also seems that increasing the awareness of soil importance among the population would be beneficial to increasing the public acceptance of soil conservation policies, which often require financial support from citizens

71: Trade-Offs in Restoration Areas for Carbon Market and Koala Conservation

Authors: Maria Luiza Almeida Luz, Oscar Cacho

Presenter: Maria Luiza Almeida Luz - University of Brasilia, Brazil

Abstract

Due to limited resources, providing economic opportunities while meeting socio-ecological objectives is a major challenge when selecting priority areas for restoration. The trade-offs between ecological and economic outcomes need to be assessed to better design prioritization frameworks and to understand the relationships among socioeconomic goals and the revenue, if any, that could be generated from restoration activities. The goal of this study is to spatially analyze trade-offs between ecological and economic management objectives to restore habitats for koala conservation. Priority areas for each objective were identified, production possibility frontiers (PPF) and attainment levels (the percentage of the total restoration objective in the study area that is treated in a particular scenario) were derived for various restoration scenarios and prioritization objectives, including potential revenue that could be generated with carbon credits from forest biomass. Modeling was done by combining all relevant information into a single shapefile. The Statistical Area 2 (SA2) spatial classification of the Australia Bureau of Statistics was used to select planning areas within the Brigalow Belt South in New South Wales, Australia. Each area on the map was associated with metrics for Koala Habitat Suitability, Bushfire Risk to dwellings, and Above Ground Biomass. The ForSysX model was used for the optimization of areas treated subject to budget constraints. Revenue is highly variable between areas in all scenarios, and habitat suitability and biomass generally follow similar patterns. Revenue and bushfire risk have the highest difference in attainment between the first and the last planning area. Most planning areas have negative revenue when habitat suitability or bushfire risk are prioritized. There were strong trade-offs between bushfire risk and the other two objectives, meaning that increasing efforts towards reducing risk of bushfires can compete with efforts for biomass and habitat suitability, but at the same time there is more flexibility in bushfire risk than in habitat suitability to aggregate more areas into treatment until revenue decreases to zero. On the other hand, biomass and habitat suitability were positively correlated in all scenarios. PPF show that few areas have a high potential for maximizing two objectives together. In general, the marginal benefit from improving revenue in both scenarios reduced the attainment of the other objectives, highlighting the trade-off between economic and ecological objectives. In the single prioritization scenario for each objective, cumulative revenue is positive for biomass but negative for habitat suitability and bushfire risk. However, positive revenue occurs in the trade-off scenarios when each objective receives equal weights. This suggests that ecological and economic management activities need to be reconciled to the characteristics of each area to maximize ecological benefits.

72: How to mitigate transboundary water sharing disputes

Authors: Mohammad Hossen

Presenter: Mohammad Hossen - UNISA

Abstract

There are more than 260 transboundary rivers in the world, which cover nearly half of the Earth's surface. But these rivers, traversing around 145 countries are a common cause of conflict between nations. On the other hand, a total of 145 treaties have been signed between different countries. There is no international agency to resolve the transboundary water disputes. Though several UN agencies incorporated water-related issues in their charter, none of these institutions incorporated mechanisms for the resolution of transboundary water resources disputes within its mandate. Various methods are followed to resolve water disputes. The first step is dialogue or negotiation. The other dispute resolution methods are Mediation by a third party, Benefit-sharing diplomacy, International Court of Justice, and using military power. A systematic review of international water treaties had been carried out to find how water disputes are resolved or which factors influence water agreement. At first, literature was searched in Google Scholar with some keywords and most related 50 articles were selected. The management of these river basins was divided into three categories: successful, fail and neutral. The factors for the success and failure had been diagnosed. It was found that cooperation, mediation, perfect river basin organization, proper monitoring system, information exchange, and benefit-sharing are the keys to success in most of the cases. On the other hand, non-cooperation (unfriendly relation), disregards to international laws, water hegemony or imbalance of military power, absence of proper institution, mediator, or benefit-sharing approach are the causes for failure of transboundary river management. It was seen that different author has used different words which bear the same meaning. For example, political will, faith, cooperation, good relation, upstream-downstream linkage etc can be termed as "Political will". On the other hand Conflict resolution mechanism, institutional arrangement, joint commission can be captured in one term "Institutional arrangement". Therefore the result was summarized as Political will (21 number of papers), Institutional arrangement (24 number of papers), Mediation by 3rd party (14 number of papers), Benefit-sharing (29 number of papers), Stakeholder's participation (2 number of papers), Military power (3 number of papers) and Integrated water resources management (8 number of papers). It can be concluded that the most efficient method for resolution of water sharing conflict is the benefit-sharing. In contrast, very few papers found military power as a method of dispute resolution.

74: Potential target markets for selling differentiated Nusa Tenggara Barat (NTB) beef in Indonesia

Authors: Tian Jihadhan Wankar, Luis Emilio Morales, Garry Griffith, Ali AGus, Budi Guntoro, Yudi Guntara

Presenter: Tian Jihadhan Wankar - UNE

Abstract

Beef consumption in Indonesia keeps increasing due to population growth and an increment in consumer preference for beef. Approximately 15% of total beef consumed in Indonesia is high-quality beef and most of this demand is fulfilled by imported beef. However, the production from Nusa Tenggara Barat (NTB) province has a potential to supply high-quality beef for the domestic market. A consumer survey was conducted in the cities of Bandung and Yogyakarta in the Java Island, to understand the preferences and characteristics of consumers that represent the potential domestic market and developing a marketing strategy to sell differentiated NTB beef. The respondents were interviewed to collect information about their purchase habits, food motives, psychographics, beef product attributes preferences, their propensity to buy and their willingness to pay for NTB differentiated beef. The majority of respondents surveyed in Yogyakarta (96.75%) and in Bandung (88.22%) indicated they would buy differentiated NTB beef. In Yogyakarta, 60.72% of respondents are willing to pay premiums between Rp 1,000 and Rp 30,000 and 27.65% of respondents are willing to pay premiums above Rp 30,000 per kilo of differentiated NTB beef respect to the price of domestic standard-quality beef, with an average premium of Rp 40,939. In the case of Bandung, 50.88% of respondents are willing to pay premiums between Rp 1,000 and Rp 30,000 and 10.58% of respondents are willing to pay premiums above Rp 30,000 per kilo of differentiated NTB beef respect to the price of domestic standard-quality beef, with an average premium of Rp 31,783. Based on these results, the beef industry could prioritise on selling the differentiated NTB beef in the Yogyakarta's market first, and then sell the product in the Bandung's market, due to higher proportions of respondents willing to pay premiums and higher premiums on average in Yogyakarta. Moreover, in the case of respondents surveyed in Yogyakarta, the consumer's age and the membership of consumer segment on potential target market of Yogyakarta market have a positive effect, whereas the food motives factor related to weight control has negative effect on consumer probability to buy NTB differentiated beef. In contrast, for Bandung market, the result reveal consumer education, food motives factor related to mood and familiarity on beef, consumer's appreciation of certified beef and the membership of a consumer segment included in the potential target market of the Bandung market has positive effect on the consumer probability to buy NTB differentiated beef. Finally, based on the responses of consumers interviewed in both cities, the industry should offer differentiated NTB beef that has halal slaughtering method, red bright colour and quality guaranteed by product certifications, as these attributes were indicated as determinants that can influence consumers' purchase decisions.

75: Importance of drought perception in New Zealand

Authors: Thi Mui Nguyen, Ilan Noy, Pike Stahlmann-Brown

Presenter: Thi Mui Nguyen - Victoria University of Wellington

Abstract

The weather in Aotearoa - New Zealand (NZ) is diverse, with comparably mild temperatures year-round in most of the country (except for the high-altitude inland areas) and with strong winds that lead to frequent weather changes. A variety of natural hazards - droughts, earthquakes, tsunamis, and flooding - leads to significant adverse consequences to people and to the economy. Drought, in particular, occurs regularly, especially in summertime (December-March), and has significant adverse consequences to the rural economy. Understanding the perception that farmers have about drought frequency and intensity is a necessary step for shaping any policy that leads to the improvement of farmers' climate adaptation responses. This study analyzes farmers' perception of drought risk based on survey data and a drought risk index constructed by National Institute of Water and Air (NIWA). In addition, the study will estimate the impact of drought perception on some of the main plausible adaptation actions for climate resilience and sustainable water use. This study has two main objectives: (1) To identify the factors underlying farmers' perceptions of future drought risk (2) To examine how perceptions of drought risks impact farmers' climate adaptation and mitigation actions, climate resilience, and sustainable water use. In general, farmers expect an increase in drought frequency and intensity by 2050. More than 90% of farmers believe that droughts will increase in their location. Indeed, in the northern part of the North Island (e.g., in Auckland and Waikato), nearly all farmers perceive an increasing drought risk. We also find that age, gender, and education are correlated with the future drought risk perception of farmers. Older respondents, who have experienced more drought in the past, expect drought to increase in frequency and intensity more than their younger colleagues. Female farmers are more concerned about future droughts than male farmers. Moreover, if farmers have higher education, they tend to perceive more increase in drought frequency and intensity by 2050. Importantly, the drought perception of farmers influences their choices with respect to adaptation to climate change. If farmers perceive an increase in drought risk by 2050, they will focus more on reducing greenhouse gas emissions, they focus more on the climate resilience of their farms and try to improve their use of water resources. These set of findings illustrate also that age, education, and gender all influence considerations of farmers about their current climatic challenges.We believe that understanding drought perception, and specifically their role in determining adaptation decisions will shed some useful light that can improve policy responses to the risks of droughts in New Zealand.

76: Non-market value of protecting groundwater in the Great Artesian Basin

Authors: Md Sayed Iftekhar, Jeff Connor, Le Ngoc Lan, Steven Schilizzi

Presenter: Md Sayed Iftekhar - Griffith University

Abstract

The Great Artesian Basin is one of the largest underground freshwater resources in the world. It is Australia's largest groundwater basin and spans over one-fifth of the Australian continent. It lies beneath parts of the Northern Territory, Queensland, South Australia, and New South Wales. It is a vital resource for more than 180,000 people, 7,600 businesses, and 120 towns. It also supports many ecosystems. Groundwater in the Great Artesian Basin is under pressure due to over-extraction for human uses and to climate change. The decline of groundwater has resulted in far-reaching damages to groundwater-dependent ecosystems (GDEs), such as serious declines in biodiversity; mortality of native vegetation species; river and wetland degradation; water contamination; and salinity intrusion. To maintain and improve the condition of groundwater resources several strategies could be considered, such as, reducing wastage and improving irrigation efficiency, protection, and restoration of groundwater-dependent ecosystems, reduction of allocation limit, etc. However, no study has examined social preferences for these different options. This paper contributes to this knowledge gap by investigating how much people value efforts for preventing further declines of groundwater and which groundwater management options they prefer using a choice experiment survey framework. This survey is being sent to the general population living in the Northern Territory, Queensland, South Australia, and New South Wales. The results will be useful to inform groundwater management policies in the Great Artesian Basin.

77: Land managers' participation in the land restoration and conservation program to remediate the irrigated salt-affected farmland in Punjab, Pakistan

Authors: Asjad Tariq Sheikh, Ram Pandit, Michael Burton, Stephen Davies

Presenter: Asjad Tariq Sheikh - University of Western Australia

Abstract

Soil salinization is a serious environmental problem that affects land productivity and ecosystem services on farms, jeopardizing farm household food security. Incentivizing land managers to adopt sustainable land management (SLM) practices could mitigate the impact of this problem. This study investigates land manager preferences for land restoration and conservation (LRC) program designs for reversing irrigated salt-affected farmland and maintaining agro-ecosystem sustainability. A scale-adjusted latent class model was used to analyze choice experiment data collected from 240 farm households in three irrigated agro-ecological zones of Punjab, Pakistan. The model results show that offering land managers somewhat stringent program characteristics (i.e., maximum contract length and area enrollment, minimum subsidy level, and Sesbania) increases their probability of participating in the LRC program for most classes (except Class 4) relative to the status quo option. Farm households that experienced a COVID-19 income shock asked for government subsidies. Other factors such as agro-ecological diversity, unavailability of production loans, and promotional strategies explain the preferences for class membership. The study revealed that a 30% subsidy on gypsum while promoting sesbania and improving financial delivery systems could accelerate participation in the LRC program.

82: The importance of greenness in greenspaces: Landscape preferences in urban parks

Authors: Claire Doll, Michael Burton, David Pannell

Presenter: Claire Doll - The University of Western Australia

Abstract

Local and neighbourhood parks in the Perth Metropolitan region are predominantly covered with lawns that are irrigated using groundwater. With climate change, summer rainfall levels in the region are declining, and groundwater supplies are coming under increased strain. As a result, it is becoming more challenging to continue maintaining historic watering levels in parks. To save water, local park managers could introduce a range of alternative park designs and management practices including: replacing some areas of watered grass with mulch or native, drought resistant vegetation or allowing grassed areas to go brown without irrigation in the summer. However, whether and to what extent the public would benefit from parks that deviate from conventional watered lawn designs, and may be less green, remains uncertain. This research explores potential water conservation opportunities by assessing public preferences for different park landscape designs, specifically groundcover compositions and extents of tree cover. We assess public preferences and elicit values for different groundcover types with a choice experiment survey. A unique aspect of the survey design is the flexibility to consider both willingness to pay and willingness to accept values for perceived improvements and declines in park quality, using council rates that could be higher or lower than a standard council rate increase. We analyse 1,532 responses from a survey that was administered in April 2021 with a latent class analysis to account for preference heterogeneity. We identify 4 unique preference classes and discuss optimal park designs within each class. While greenness (watered grass) in greenspaces is important, the public do appear to value a mix of groundcovers. This can in part be explained by perceptions of future water scarcity impacts. The results of this analysis, specifically values for the extent of irrigation, will contribute to a benefit cost analysis of park irrigation and will feed into an exploration of how to optimize water resource use in public spaces. These results will be communicated back to local governments to inform future park planning processes.

83: The impact of gas flaring on child health in Nigeria

Authors: Omoniyi Alimi, John Gibson

Presenter: John Gibson - University of Waikato

Abstract

Burning off the gas coming out of oil wells—gas flaring—is a common practice in oil-producing developing countries. This economically wasteful and environmentally damaging process occurs because infrastructure has been built with a focus on oil production rather than gas capture and because weak regulations and limited environmental monitoring makes flaring an attractive choice for oil producers. Moreover, gas flaring is harmful to human health, especially because of pollutants. This research focuses on Nigeria, where over 10 percent of all gas produced is flared and where about two million people in the Niger Delta live within four kilometres of a gas flare. While several studies from developed countries examine relationships between gas flaring and human (especially infant) health, a lack of data limits what research is possible in developing countries. We use infant health data from the 2013 and 2018 Demographic Health Surveys (DHS), and satellite-detected data on gas flaring in each year to examine effects of flaring on disease incidence and infant mortality for oil-producing regions of Nigeria. We use a market potential approach to link gas flaring locations to the risk of exposure to gas flaring for each DHS cluster. This approach allows us to consider exposure to pollutants from both on-shore and off-shore flaring sites. Our regression estimates are at individual child level, and also at community level (based on the DHS clusters). We find a strong positive association between gas flaring and the incidence of respiratory diseases and fever among children under-5 years old. For example, a one standard deviation (SD) increase in exposure to flaring is associated with an increase in the reported cough rate that is equivalent to 22% of the mean cough incidence. We also find significant positive associations between gas flaring and rates of child stunting, wasting, and under-weight. Overall, our study contributes to the literature measuring the wider cost to society of oil and gas production and adds to a growing body of work using satellite data to understand well-being in places where conventional data sources are unavailable or unreliable.

84: Estimating the value of self-drive recreation to the remote Kimberley: sensitivity to multi-destination trips and the value of travel time

Authors: Alaya Spencer-Cotton, Marit E Kragt, Michael Burton

Presenter: Alaya Spencer-Cotton - School of Agriculture and Environment, The University of Western Australia

Abstract

The remote and iconic Kimberley region, in the north of Western Australia, is a biodiverse landscape of ancient geology and river systems, including gorges and savanna plains that provide attractive wilderness experiences for visitors. In this paper, we estimate the value (in terms of consumer surplus) of recreation using a travel cost model. We address two challenges to travel cost modelling that are particularly relevant to remote and iconic sites like the Kimberley. Firstly, the value of travel time and hence the opportunity costs of travel, may be significant due to the large distances travelled. Secondly, it is likely that trips to remote sites are more likely to involve multiple stops or destinations. In the sensitivity analysis we test four specifications for the value of travel time and two adjustments to account for multi-destination trips in the allocation of travel costs. Recreation trip data is modelled with a correction for the effects of on-site sampling by using a model that accounts for zero truncation, endogenous stratification, and over-dispersion. Modelling suggests that the adjustment to travel costs for multi-destination trips using stated information is preferred to using revealed information about the proportion of time spent onsite. Stated information allowed respondents to indicate the value of visiting the Kimberley when making the decision to undertake the trip. Using revealed information to allocate costs caused a loss in the relationship between costs and number of trips due to the heavy penalty for large trip distances. Using a value of travel time larger than one-third wage is also preferred. Consumer surplus for wilderness recreation trips by domestic visitors to the Kimberley is estimated to range from $49 to $131 million, representing a significant source of value for the wilderness experiences in the region.

85: Innovation Behaviour and Sustainability Performance - Empirical Evidence on the Farming Sector

Authors: Fabian Frick, Hans Vrolijk, Johannes Sauer

Presenter: Fabian Frick - Technical University of Munich

Abstract

A major challenge for modern agriculture is the supply of a growing world population with high-quality products, while simultaneously minimizing the environmental and social impacts of its production. All this must be achieved while still maintaining the economic viability of farming operations. Innovation is generally seen as a key factor to reach these goals. Although farmers' primary motivation in introducing innovations into the production process can be assumed to be of economic nature, innovation activity can have a positive effect on the other pillars of sustainability, if innovations are introduced as a reaction to the introduction of stricter environmental regulations, or via productivity effects (fewer pollutants per unit of output). To what extent newly implemented production techniques can live up to these expectations is an empirical question. Our study investigates how the adoption of various new technologies in Dutch dairy and arable farms affects farm sustainability in all its three pillars. The data for our study was obtained from the Dutch FADN from Wageningen Economic Research (WUR). The dataset combines financial accounts data, farm specific sustainability indicators, and data from specialized surveys on innovation behavior. We form indicators for the introduction of new products, production processes, or marketing and organizational innovations. As indicators for economic farm performance, we use labor, cow, or land productivity; cows or hectares per worker as intensity measures; and technical efficiency scores obtained from a stochastic frontier analysis. As indicators for the environmental farm performance, we employ calculated greenhouse gas emissions, energy consumption, nutrient surpluses, ammonia emissions, and pesticide use. As an indicator for the social pillar of sustainability (animal welfare), we include somatic cell counts for dairy farms. Our estimation strategy consists of a first-differenced approach to tackle endogeneity by time-invariant farm characteristics. Additionally, time-variant confounding factors are taken into account by including indicators to control for farm management characteristics (farm size, organic production, expenditures for training, age of farm manager, and presence/absence of a farm successor). We estimate the model separately for all economic and environmental indicators as dependent variables. The results show a varying association of the examined sustainability indicators with innovation activity and therefore do not unanimously confirm a positive effect of innovation activity on farms' sustainability performance. Nevertheless, some statistically robust findings support the expectation of positive effects for some forms of innovation. This evidence can help to identify most promising new technologies that most likely will contribute to more than one sustainability indicator and dimension.

86: The Impact of Foreign Direct Investment on Food Security in Developing Countries- Evidence from Exploratory Meta-analysis

Authors: Tshering Samdrup, James Fogarty, Ram Pandit

Presenter: Tshering Samdrup - UWA

Abstract

Foreign Direct Investment (FDI) is an important macroeconomic aggregate. It is a source of finance for many countries including those industrialized countries who turn to FDI as recourse to domestic resource shortfalls. FDI is a huge relief for developing countries deprived of financial resources on their own With tremendous growth of FDI flows worldwide in recent years, similar growth in empirical evidence has been observed that studies the link between FDI with different economic activities. The emerging link between FDI and food security shows diverging conclusions. This paper attempts to reconcile the cause of divergence in the literature. Using the minimum codified quality standards for conducting meta-analysis suggested by Meta-Analysis of Economics Research Reporting Guidelines (MAER-net), 16 primary studies were tracked that provides 127 estimates of the impact of FDI on food security in developing countries. The synthesis results show absence of publication selection bias indicating that the diverging conclusions drawn by different empirical studies are not caused, atleast from the analysis of primary studies gathered for this study, by data-dredging or p-hacking process that ultimately results into authors, journals, reviewers, and editors to under-state or over-state the statistical significance. Results from the moderator analysis reveal that studies treating FDI as flow variable in combination with time series data reduces the food security estimates by 0.326 while studies treating FDI as stock variables and using panel data increases food security estimates by 0.764. The food security estimates generated by the latter is more than double compared to the former. A caution, however, is that the cause of heterogeneity could have also emerged from other moderator variables which are not considered in the model. The existence of unsettling theoretical ambiguities on how FDI variables (stock and flow variables) and data types (panel and time series data) are used, modelled, and accordingly interpreted in the primary studies is another potential source of diverging conclusions. With an on-going global crisis in which increased investment is required to recuperate the global economy as well as to remain on track to achieve global 2030 agenda, more research is required. Perhaps research comparing the effects of different forms of FDI (agricultural and non-agricultural) on food security outcomes, using representative data on the measure of FDI, classifying foreign investors by country of origin, using robust econometric techniques, and by using different food security indicators etc. are crucial.

87: Effect of Natural Disasters on Income Distribution

Authors: Maryam Abdolrahimi, David Ubilava

Presenter: Maryam Abdolrahimi - School of Economics, The University of Sydney, Australia

Abstract

Natural disasters are large-scale events with the potential of drastic welfare diminishing impacts on the affected people. However, facing a prospect of a disaster, not everyone is equally prepared to deal with its effects and repercussions. This paper attempts to move beyond the conventional mean assessment of natural disasters socio-economic consequences by providing extensive empirical evidence of heterogeneity in the impact of weather-related events on individuals income. Using the Household, Income and Labour Dynamics in Australia (HILDA) surveys from 2009 to 2019, we address unobserved spatial and temporal heterogeneity in the effects of natural disasters on individuals' and households' income using a quantile regression modelling framework. The preliminary results suggest natural disasters can have varying impacts on individuals' earnings across the wage distribution. For the lowest income group, we observe a statistically significant adverse effect, which amplifies for the lower-middle group, but is largely absent for the income groups at the upper half of the wage distribution. In the wake of the increased prevalence of extreme weather events, these results offer important insights to the researchers and policymakers for careful economic assessment of natural disasters as well as for the associated mitigation and recovery strategies.

89: Calibrating world spending and wealth: estimating the roles of human and knowledge capitals, natural resources and total factor productivity growth

Authors: Jack Pezzey

Presenter: Jack Pezzey - Fenner School of Environment and Society, Australian National University

Abstract

World Bank and other data show that major variables in the world economy, like wealth, GDP, physical capital, population, and natural resource inputs had nearly constant growth rates during 1995-2014, with an economic growth rate (of consumption per person) of 1.6 %/yr. We use this near-constancy to justify assuming exactly exponential growth always, not just asymptotically, in an extension of Stiglitz's 1974 theoretical model of closed-economy growth with a non-renewable resource. Our extension includes resource discovery, as well as depletion; investment in human capital; investment in knowledge capital, which generates spillovers and thus increasing returns to scale; and depreciation of physical, human and knowledge capitals. Global environmental variables such as climate damage could not be included, because their growth rates were far from constant, and they were effectively ignored by the world economy during 1995-2014. We use data on sectoral shares of expenditure and wealth to make three calibrations of our model in 2014, with education and R&D expenditures either omitted or included at different levels. Each calibration gives internally consistent estimates of the exponents of four production inputs, the resource discovery rate, the interest rate, and the growth rate of total factor productivity (TFP) required to fully explain the observed economic growth rate. In all calibrations, an extra dollar spent on R&D would raise this rate by nearly twice as much as an extra dollar spent on education would. However, the calibrations also reveal inconsistent estimates of the resource's shares of output and wealth. This inconsistency can be removed by raising the shares in output of education and R&D spending in our third calibration to about twice the World Bank's estimates, on the grounds that some consumption spending is effectively learning-by-doing, and so should be reclassified as investment in human and knowledge capitals. Thanks to this reclassification, the required TFP growth rate estimated in our third calibration is only 0.29 %/yr, compared to 0.86 %/yr if both education and R&D spending are ignored. We also calculate the Adjusted Net Saving (ANS) sustainability indicator for each calibration, and compare its components to the World Bank's ANS. Theoretically, the cost of resource and capital dilution by population growth, and the benefits of net resource growth and TFP growth, should be included in ANS, but all are omitted by the World Bank. All our calibrations estimate both population dilution and TFP growth at more than 5% of GDP, so they should ideally be included, although they partly cancel each other out. Overall, our ANS estimates are at least 4 %-points higher than the World Bank's; but because they ignore global environmental costs, these estimates give no reassurance about long run global sustainability. However, such fuller ANS estimates could improve cross-country comparisons of sustainability policies.

90: Implications of the net zero transition for the Australian agri-food industry

Authors: Alana Hollestelle, Robert Pattinson, Derek Baker

Presenter: Alana Hollestelle, Robert Pattinson - . Managing Consultant, Common Capital, 1/471 Harris Street, Ultimo NSW 2007

Abstract

The demand for meaningful action on climate change requires change from industry. The Australian agri-food sector, as a significant producer of greenhouse gases from production processes and supply chains, is among those facing pressure to reduce emissions. The ubiquity of food, food systems' global market engagement, food's physical and technical processing and distribution needs, and an overarching reliance on energy all implicate agri-food and its supply chains. While pathways to emissions reduction and carbon sequestration have been identified for agri-food businesses, the economic value proposition of net emissions reductions at the producer and supply chain level remains poorly articulated. This paper identifies likely scenarios under the net zero transition that will drive change in agri-food, including changing drivers across consumer demand, industry commitments and compliance, carbon markets, trade policy regime, technology and transformed financial instruments. It characterises the impacts on these drivers on Australian agri-food supply chains and constructs a strategic pathway to productive engagement with agri-food producers and supply chain actors on net emissions reduction. The paper finds extant and emerging value realisation pathways for producers to capture new economic value from net emissions reduction across key value drivers: increased market share, price premia, access to new markets and cost reductions. Some value pathways, value pathways, such as participation in carbon markets, are already generating considerable value in the agri-food industry; others are expected to emerge the global economy continues to decarbonise toward 2030 and beyond. Research has also identified a corresponding series of risk mitigation priorities that require defensive action from agri-food actors to maintain their competitive position. Successful realisation of value is reliant on producer and industry scale emissions reduction and carbon sequestration activity underpinned by enabling capabilities in finance, technology, information and networks. Options are considered for producers both on the farm and in their supply chain partnerships. Australian industry strengths and weaknesses are identified as part of targeted strategy formulation for partitions of agri-food. Agri-food supply chains provide a conduit for the exercise of market power both in terms of value capture and risk transfer, and the paper considers implications of market power for value realisation propositions. Recommendations are made for further research, industry and policy intervention.

91: Gains to smallholder production systems associated with differentiated business models within a smallholder population

Authors: Zenal Asikin, Derek Baker, Renato Villano, Arief Daryanto

Presenter: Zenal Asikin - 1. School of Business, IPB University, Indonesia

Abstract

Growing Indonesian demand for beef (Deblitz, Kristedi, Hadi, Triastono, & Puspadi, 2011) and concerns over self-food sufficiency has promoted domestic production on the national policy agenda. Most Indonesian beef production, and cows and calves in particular, occurs in smallholder households (Ilham, Saptana, Purwoto, Supriyatna, & Nurasa, 2015). A number of constraints limit smallholders' access to improved management and marketing approaches (Waldron, Mayberry, Marthen, Quigley, & Poppi, 2013). Smallholder systems tend to be thought of as homogenous and so policy and extension initiatives address them as a single group. This paper employs a disaggregation approach based on business models, as derived from smallholder innovation behaviour (Asikin, Baker, Villano, & Daryanto, 2020), to characterise separate smallholder types. A survey (n=324) of smallholder beef producers in two districts of the Indonesian island of Sumbawa in Nusa Tenggara Barat Province yielded data on households' production and marketing systems and their performance, indicators of innovations in several dimensions, and demographic information. Clusters of smallholder producers are then assembled based on innovation behaviour and assigned to business models which include a value proposition, value architecture and delivery mechanism, and payment systems. Entry points for improvements are identified for the business models. An ex ante simulation model is used to project gains in smallholder production and profits, associated with management and marketing change appropriate to the separate models. Results of the simulation contrast gains available when change is applied to different business models. Best approaches for each model are identified. Recommendations are offered for policy and extension support of Indonesian smallholder beef production systems. Future research tasks are identified to provide further focus for such assistance. References Asikin, Z., Baker, D., Villano, R., & Daryanto, A. (2020). Business models and innovation in the Indonesian smallholder beef value chain. Sustainability, 12(17), 7020. doi:10.3390/su12177020 Deblitz, C., Kristedi, T., Hadi, P. U., Triastono, J., & Puspadi, K. (2011). Benchmarking the beef supply chain in eastern Indonesia (978 1 921738 98 2). Retrieved from Canberra, Australia: http://aciar.gov.au/files/node/13866/benchmarking_the_beef_supply_chain_in_eastern_indo_20284.pdf Ilham, N., Saptana, Purwoto, A., Supriyatna, Y., & Nurasa, T. (2015). Kajian pengembangan industri peternakan mendukung peningkatan produksi daging (Development of the livestock industry supports increased meat production). Indonesian Centre for Agricultural Socio-Economic and Policy Studies (ICASEPS). Bogor. Waldron, S., Mayberry, D., Marthen, M., Quigley, S., & Poppi, D. (2013). Eastern Indonesia agribusiness development opportunities-analysis of beef value chains. Retrieved from Canberra, Australia: https://espace.library.uq.edu.au/view/UQ:326414

92: Women's Empowerment in Integrated Cattle-Farming Systems in Indonesia

Authors: Rene Villano, Isaac Koomson, Stella Thei, Moh Taquddin, Febrina Prameswari, Anwar Fachry, Luthfi Fatah, Ika Sumantri, Nuri Dwi Yanti, Akhmad Hamdan, Heather Burrow

Presenter: Rene Villano - University of New England, Armidale, NSW

Abstract

Women are active in livestock rearing and household financial management, not only in Indonesia, but also in most low-middle income countries. Recent evidence suggests that investing in women in smallholder-based supply chains helps deliver improved product quality and enhancement of a product brand's ethical credentials; increased productivity; reduced management and coordination costs; a more secure supply base; a stronger brand and improved access to premium markets; and improved delivery of broader corporate social responsibility goals. However, international experience has shown there are several challenges in integrating women into production and market systems because of the complexity and diversity of those systems. Hence, there is a need to capture wider social, cultural, economic, institutional, environmental, political and demographic contexts and variations in order to design better adoption and scaling out strategies for proven technologies. The purpose of the paper is to measure women's empowerment in the livestock sector of Indonesia. Farm-level surveys were conducted in selected districts in West Nusa Tenggara (NTB) and South Kalimantan, Indonesia. A customised instrument was developed and adapted from the women's empowerment in livestock index (WELI) tool and was used to interview a total of 754 male and female respondents. Information from women respondents was extracted to generate the index encompassing decisions about agricultural production; decisions related to nutrition; access to and control over resources; control and use of income; access to and control of opportunities; and workload and control over own time. Using the threshold of 0.80, overall, 3.6% of the women respondents considered themselves empowered in livestock production, while 33.34% were considered empowered in overall agricultural production systems. We observe that women's empowerment in livestock was highest in Sumbawa in NTB (5.7%), followed by South Kalimantan (4.6%) and Lombok (1,1%). Overall, the key driver of empowerment is women's control and use of income followed equally across all sites by 'access to and control over resources' and 'extent and control of work time'. Our results highlight the need to develop and tailor capacity building strategies and interventions to target women's specific needs and interests, thereby providing pathways to improve uptake of production technologies and ultimately households' well-being.

93: Livestock Data Collection for GHG Inventory: upgrading to Tier 2 in Ethiopia

Authors: Shimels Wassie, Andreas Wilkes, Derek Baker, Million Tadesse, Berhanu Assefa, Mustefa Abu, Dawit Solomon

Presenter: Shimels Wassie, Andreas Wilkes - Unique Forestry and Land Use GmbH, Schnewlistrasse 10, Freiburg, 79098, Germany

Abstract

Accelerated demands for action on climate change require countries to upgrade and standardise their GHG information systems. We report on developments in Ethiopia's methods for measurement, reporting and verification (MRV) of GHG emissions under the UN Framework Convention on Climate Change. Ruminant livestock account for a large share of Ethiopia's GHG emissions, and are assigned high priority for emissions reduction in nation's strategic pursuit of a Climate-Resilient Green Economy (UNDP, 2019), and within its Livestock Masterplan (Shapiro et al., 2015). The country's ruminant livestock sector is dominated by low productivity mixed crop-livestock production system, but is undergoing change. This includes the emergence of urban and peri-urban feedlot-based systems, increased use of mixed livestock and cropping, and increasing commercialisation of household production systems. Changes in herd structure, breeds, feed composition and the seasonal pattern of feeding, are also seen. These affect the profile of Ethiopian GHG emissions, and the options available for emissions reduction and other carbon-related change (Abu et al., 2019). Ethiopia's adoption of a tier-2 denominated GHG inventory alters significantly estimates of national emissions (Wilkes et al., 2020). Tier-2 requires new methods for collection of data on livestock numbers, production, land use and manure handling. Under an ACIAR-funded research project in partnership with CCFAS, a coalition of stakeholder groups was engaged in 2019 to identify gaps in the Tier-2 inventory arrangements, design new data collection initiatives and pilot alternative several methods. Stakeholder mapping of data needs and existing data flows was carried out, and pilot projects initiated. Four priority livestock production systems were identified (mixed crop and livestock, urban and peri-urban dairy farms, commercial dairy farms, and commercial feedlots), and pilots were conducted in 16 local authority areas (316 households or commercial farm sites). Analysis examined feasibility and effectiveness of collection methods, as well as their likely impact on a tier-2 inventory. Separate data collection on feeding and feed types for indigenous and exotic breeds were found to affect estimates for the inventory, particularly where they are associated with digestibility. Disaggregation of feed data by season did not affect inventory results. Documentation of manure management systems, and associated indicators, were developed and found to be effective in tier-2 inventory development. Across a number of results including animal numbers, herd structure, and productivity, detected differences in inventory do not justify the cost of change to existing collection methods. Existing recall methods for milk yield estimation was found to be sufficient for tier-2 inventory purposes. Needs for technical, organisational and institutional capacity are discussed, along with subsequent research.

94: Policy responses and food security impacts of the COVID-19 pandemic in the Philippines' agri-food supply chain

Authors: Glory Dee A. Romo, Jon Marx P. Sarmiento, Francis Levi A. Durano, Geraliza D. Wahing, Adonis M. Traje, Ian Patrick, Derek Baker

Presenter: Glory Dee A. Romo - School of Management, University of the Philippines Mindanao, Davao City, Philippines

Abstract

The Philippines implemented one of the world's longest COVID-19 lockdowns, and experienced a decline in economic growth. The agri-food sector's micro, small and medium enterprises (MSMEs) are amongst the country's most vulnerable. The pandemic also affected food security. We examine policy constraints and enablers for food manufacturing and distribution, and determine the factors affecting food security. We take a mixed methods approach, including interviews (n=30) with agri-food enterprise owners, and concept mapping using Leximancer software. A subsequent survey (n=125) was made of food manufacturers, logistics operators, traders, wholesalers and retailers. The effect of policy measures on enterprises' profitability was assessed using ordered probit regression. A further survey upstream (farmers) and downstream (consumers) (n=392) used an eight-question module of the FAO's Food Insecurity Experience Scale and questions on socio-demographics, savings, and home gardening. An ordered logistic regression was used to determine the factors affecting the severity of the food insecurity of food system actors. MSMEs in the agri-food chain experienced delays and increase in prices of raw materials despite policy guidelines. Inter-regional trade experienced varying localised policies. These constraints affected the profitability of the enterprises especially regarding labor. Those businesses that implemented labor-related health and safety protocols adapted to the new normal and were profitable. Members of larger household size, and of Indigenous Peoples groups experience the most marked increase in food insecurity. Determinants of reduced severity of food insecurity include being processors or traders, of older age, high education level, large number of household members in employment, and savings. Policy responses to reduce the COVID-19 caseloads have affected the profitability and food insecurity of agri-food supply chain actors. Opportunities exist for mitigating the long-term effects of the COVID-19 pandemic. Processors and traders have been able to adapt. Measures enabling adaptation have been initiated by both public and private sectors, facilitating easier transactions and aiding the food security needs of the vulnerable actors, along with consideration of future, more holistic, initiatives.

95: Gender Attitudes toward Empowerment Resources and Agency: A case of livestock keepers in mixed and livestock-based systems in rural Ethiopia

Authors: Wole Kinati, Derek Baker, Elizabeth Temple, Dina Najjar

Presenter: Wole Kinati - PhD Student, School of Psychology, Faculty of Medicine and Health, University of New England, Australia

Abstract

Policies and intervention efforts to empower individuals or groups must begin by first building their psychological assets —cultivating individuals' intrinsic agency to enable them make effective choices and manage the interactions between the key resources to achieve their aspirations. In doing so, policy makers and practitioners consider gendered perceptions of resources and decisions in the process of empowering livestock keepers. Understanding the valuation of empowerment resources and major decisions, and how these varies across genders and farming systems is crucial before implementing empowerment interventions. Such insights can help measure empowerment more accurately and tailor interventions to the needs of the target group. The objective of the current study was to explore empowerment resources and major decisions in mixed and livestock-based systems in rural Ethiopia by examining the level of importance placed by men and women on different empowerment resources and areas of decision making. Data was generated from men and women livestock keepers covering three districts from two regions of Ethiopia. FGDs, KIIs and scheduled interview (Ryff's Psychological Well-being Scales on Autonomy, Positive Relations, and Self-Acceptance) were employed to generate the data used for the study. The valuable empowerment resources —economic, financial, human, social, information and psychological resources —are considered major assets among men and women, with variations across gender and farming systems. Four major decision-making areas are identified —livestock, crop, finance, and social networks or membership in associations. The importance given to the decisions differs by gender and farming system. Generally, men place a greater importance on decisions about livestock, crop and finances. The women valued decisions regarding crop, livestock and social relations. Regarding the more valued empowerment resource —psychological asset —was found to be one of the most important empowerment resources, for women as well as men. Although assessment of the basic psychological needs—autonomy, self-acceptance, and positive relations—yielded no statistically significant differences between the gender groups, qualitative assessment indicated that women generally have low self-esteem and confidence.

96: Closed Borders: The invisible nexus between Passenger Flights and Air-Freight and its Implications for Australian farm exports

Authors: Adam Voak, Don Gunasekera

Presenter: Adam Voak - James Cook University

Abstract

Australia relies heavily on commercial aircraft capacity to provide its needs for time-sensitive freight such as perishable agricultural and fisheries exports. Often, unused 'belly' space on passenger aircraft provides international traders with unique opportunities to access affordable and rapid air-freight. Indeed, at this time, many sectors are wholly reliant on these cross-subsidised air cargo opportunities that passenger flows provide. It is estimated that perishables accounted for around 17% of total global air cargo movements prior to COVID-19, but this has significantly fallen since the effects of the current pandemic became manifest. When Australia's borders shut to prevent the spread of COVID-19 in early 2020 and passenger flights were stopped, these tightly interdependent and interconnected supply chains immediately revealed their fragility. While many of the main global airfreight corridors have largely been restored through existing freighter capacity, some exporting countries like Australia are still facing significant disadvantages. The Australian Government International Freight Assistance Mechanism (IFAM), since its inception in 2020, has provided some respite for more significant farm exporters who could meet specified schedules and provide sufficient capacity guarantees. However, many smaller to medium-sized enterprises across Australia have struggled to find stable markets for their perishable farm products. This study looks closely at the supply chain consequences of the pandemic, the resultant economic sectoral impacts and Australia's need to better understand the intrinsic links between tourism, air travel and air cargo. We examine the continued internal challenges within Australia as State borders remain closed and air operators face understandable difficulties in justifying continued timetabling of flights without sufficient passenger capacity. Furthermore, we analyse how the COVID 19 pandemic has highlighted the urgent need for agricultural businesses to transform their supply chain models to withstand any disruptions in the future. It will be important for exporters to understand the issues and challenges which will be faced by them after the IFAM is phased out. The pandemic has at least indirectly caused many businesses to rethink the need to adapt their supply chain business models to cope with external shocks. In this presentation, we investigate possible solutions and strategies that export businesses may implement in preparation for future shocks.

97: How are renewable generation and coal generator revenues related?: Empirical evidence from the NEM

Authors: Julia Manchester, Tiho Ancev, Zsuzsanna Csereklyei

Presenter: Julia Manchester - University of Sydney

Abstract

This paper presents an empirical investigation into the relationship between increased electricity generation from utility-scale wind and solar on the capacity utilisation rates and wholesale market revenues of coal-fired generating units in Australia. We use Australian National Electricity Market (NEM) data at a high frequency (30-minute) and daily level from July 2017 to June 2021. The data allows us to analyse the substantial intra-day volatility that characterises the wholesale spot price of electricity, and thus generator revenues. We use ARDL panel models with fixed effects to model capacity utilization rates and market revenues of coal generators. We distinguish between the contemporaneous effect of variable renewables and their average daily effect on each dependent variable, as these can differ significantly in electricity markets. Results indicate a significant negative association between increased wind generation and coal generator capacity utilisation and revenues at both half-hour and daily frequency levels. Utility solar generation was found to be negatively associated with coal utilisation rates at the half hour and daily level, but only on coal revenues at the half hour frequency level. This suggests that wind generation poses the greatest threat to the financial viability of coal plants, and that high peak spot prices may be assisting coal generators to recover lost daytime revenues arising from low marginal prices that are associated with high solar and wind output. Our estimates prove to be relatively robust when compared with similar 'wind-only' models spanning the entire decade between January 2011 and July 2021. These findings inform both managerial and policy decisions regarding market dynamics associated with the growth of variable renewables and their relationship with traditional baseload coal generators. This analysis will also prove useful to electricity system planners as they anticipate announcements of rescheduled closure dates for coal plants across the NEM.

98: Women's empowerment and life satisfaction: Evidence from integrated livestock farming system in Indonesia

Authors: Isaac Koomson, Renato A Villano, Stella Thei, Heather M Burrow

Presenter: Isaac Koomson - UNE Business School, University of New England, Australia

Abstract

This paper examines the link between women's empowerment in livestock and life satisfaction in Indonesia using data collected from 239 women operating in integrated crop-cow farming systems. Women's empowerment is measured using the multidimensional women's empowerment in livestock index. Life satisfaction is captured using three separate variables that provide an overall score of life satisfaction by with reference to different time horizons. Employing a suite of micro-econometric methods, our endogeneity-corrected results indicate that women's empowerment in livestock is positively associated with life satisfaction. This result is consistent across three measures of life satisfaction and robust to different approaches used in addressing endogeneity. Among all empowerment indicators, women's ownership and control of livestock assets shows more consistency in its positive association with life satisfaction followed by their ability to control non-farm income.

99: Motivations to enter and remain in sustainable, small scale agriculture: New female farmers in the Australian context

Authors: Lucie Newsome, Clara Murray

Presenter: Lucie Newsome - University of New England, Business School

Abstract

As the Australian government commits to becoming carbon neutral by 2050 it is time to reimagine agricultural production in environmentally sustainable ways. Agriculture is the second largest contributor to greenhouse gas emissions. Existing policy reinforces the model of 'competitive productivism' to the point of hegemony. This focuses producers on increasing profit margins via economies of scale in order to remain viable, as encapsulated in the edict "get big or get out". Attempts to foster pro-environmental behaviour amongst existing agricultural producers have yielded mixed results. Low uptake of sustainable practices has been attributed to the masculinist values of domination and control of competitive productivism. In parallel, an emerging literature has documented the rise of new female entrants to agriculture who are producing in alternative, sustainable ways. Production practices are likely to be based on diversity of product, reduced inputs such as fertiliser and herbicide, servicing local markets and decentralisation from global supply chains. In addition to strong environmental and social values, these orientations are in response to being shut out from access to the resources required to farm in the industrial agricultural sector. The present study explored the motivation of actors with strong environmental values to enter and remain in Australian agriculture. We aimed to explicate subjugated narratives around value creation within small-scale enterprises in the context of the dominant narrative of competitive productivism. Drawing on a sample of seventeen female, sustainable, new farmers we used a qualitative approach to explore their experiences. Second, we asked what motivates people to adopt and persist with sustainable practices in a system based on competitive productivism. We operationalised self-determination theory to better understand the motivations of the farmers in our sample. The participants in this study saw the value of their work as environmental and social value creation rather than just profit maximisation. We found that their participation in farming was sustained by the psychological benefits associated with this social mission orientation, particularly the experiences of autonomy, competence, and relatedness enabled by owning and working in small-scale agricultural enterprises. In the terms of self-determination theory, these experiences represent the fulfilling of basic psychological needs. Theoretically, this study challenges the conceptualisation of economic actors as motivated by market rationality to the exclusion of a recognition of the social and environmental spheres. The study is a first step towards understanding how to recruit and retain a diverse range of agricultural providers as a way of reducing emissions and safeguarding food security in the context of the climate crisis.

101: Market microstructure of Australian water market: lessons from the last decade

Authors: Maruge Zhao, Tiho Ancev, Willem Vervoort

Presenter: Maruge Zhao - School of Economics, the University of Sydney

Abstract

The water market in the Murray-Darling Basin (MDB), Australia is probably the most advanced and most active water market in the world. The market is characterised with a wide range of products and services, convenient trading process with relatively low transaction cost, competitive returns of investment, and supportive institutional setup. Despite this level of maturity, the microstructure of this water market has not been well documented. Previous literature has focused on analysing water prices and studied only one or two trading zone within the market. In this study we document the microstructure of the sMDB water market by investigating multiple key market attributes across a number of trading zones. The market attributes we study include price and price volatility, volume traded and volume volatility, number and the average size of transactions, net import and market liquidity. We study six trading zones for the entitlement market and nine for the allocation market. Our results show that while the sMDB water market is highly connected, there are some important differences in terms of key market attributes across trading zones. In particular, we find a secular divergence in the price of high security entitlements between trading zones since 2016. We investigate the possible drivers of this and other identified differences in attributes. We find that drought conditions, crop structure, institutional settings and types of market participants, likely play important roles in explaining differences in outcomes across trading zones.

103: Vietnamese consumer's demand for improved food safety

Authors: Hue T Vuong, David Pannell, Steven schilizzi, Michael Burton

Presenter: Hue T Vuong - UWA School of Agriculture and Environment

Abstract

This study was undertaken to determine the benefits to Vietnamese consumers from improved food safety of pork and vegetables. A discrete choice experiment was employed, and 314 urban consumers living in the cities of Hanoi and Haiphong in Northern Vietnam were surveyed. The food-safety attributes for vegetables included applying pesticides in safe ways, free of growth hormones in vegetable production, using clean water in irrigation, washing products after harvesting, and traceability. The attributes for pork consisted of slaughtering process, disease-free pigs, hormone-and drug-free, and traceability. Principal Factor Analysis was employed to extract nine factors representing consumers' perceptions for food safety of vegetables and pork in Vietnam. These factors along with some demographic variables and other relevant explanatory variables were then incorporated into the mixed logit models to estimate the extent to which they influence consumers' willingness to pay (WTP) for the specific attributes of both food items. In general, our results indicate that urban consumers in Vietnam have a high demand for safe products; they are willing to pay considerable price premiums for food-safety attributes. On average, the consumer is willing to pay a price premium of 240% more for vegetables produced with the safe application of pesticides. For both food items, consumers are greatly concerned about growth hormone residues. Regarding vegetables, there was considerable heterogeneity in the extent to which they are willing to pay for growth-hormone-free vegetables, depending on their education, and perceptions towards food-safety risks resulting from chemical hazards and foodborne illness in Vietnam. For some subgroups of respondents, they are willing to pay up to 400% more for vegetables produced without growth hormones. Likewise, hormone-and drugs-free seem the most preferred characteristics for pork, and consumers are willing to pay more (74% higher than the current price) for this attribute. For vegetables, the factor representing consumers' food-safety trust in vegetables and pork and the variable place of purchase, both influence their WTP for traceability and clean water attributes, respectively. For pork, if the consumers trusted the assured food safety-roles of good agricultural practices and the food was certified correctly, then they were willing to pay more for the disease-free pigs. Moreover, consumer's self-health evaluation influenced their WTP for pork traceability. Shopping convenience is also an important factor influencing purchasing behaviours for both food items. Almost all consumers would prefer not to have the inconvenience of travelling further to purchase vegetables and pork. Our study contributes insights into consumers' tastes and WTP for key attributes of both food items. A second important application is the provision of useful information for policymakers to better design food-safety policies in the future

104: Estimates of productivity growth for South African table grapes producing regions (2010 - 2020): A Fare-Primont index approach

Authors: Lindikaya Myeki, Omphile Temoso

Presenter: Omphile Temoso - UNE Business School, University of New England, Armidale, NSW, Australia

Abstract

In recent years, increased global competitiveness due to emergence of new international competitors has become a key challenge for the South African table grapes industry which is export-driven (exports more than 90% of its products) (Mtshiselwa, 2020; Van Rooyen & Boonzaaier, 2018). In seeking to respond to this increased competition, policy makers and farmers must first gain a better understanding of the productivity and efficiency of the industry as well as mechanisms that may be available to enhance it (Fleming et al., 2014; Sellers-Rubio, et al, 2016). However, there is limited empirical evidence on the efficiency and productivity of the South African table grapes industry (Conradie et al, 2006; Myeki et al, 2019), particularly covering the recent impact of droughts. Furthermore, this limited evidence has been carried out using methodologies that fails to provide productivity growth related to changes in scale and mix efficiency. This study applies a Färe-Primont index approach to a panel data of 5 major table grape producing regions in South Africa for the period 2010 to 2020 to estimate total factor productivity (TFP) and its components. The finer decomposition of productivity into measures of technological change, technical, scale and mix efficiency changes should provide greater understanding of the trends and sources of growth in the industry (O'Donnell, 2011). The results show that TFP declined at an average rate of 0.13% p.a due to technological regress (0.58% p.a). Although efficiency change was positive (0.46% p.a), it was insufficient to compensate for technological regress. Regionally, Berg River (2.13% p.a), Hex River Valley (0.63% p.a) and Olifants River (0.46% p.a) experienced the largest growths respectively, whilst Northern Provinces (3.44% p.a) and Orange River (0.51% p.a) had negative annual TFP growths. The results for the sub-period 2014-2018 corroborate the detrimental impact of the drought which was the worst in 100 years, resulting in technological regress (24.4%) and negative TFP growth for all regions except for the Northern Provinces. Policy implications at both the national and regional level are provided in the study.

105: The value of restoring and protecting native vegetation in New Zealand

Authors: Maksym Polyakov, Patrick Walsh, Md Sayed Iftekhar, Suzie Greenhalgh

Presenter: Maksym Polyakov - Landcare Research

Abstract

New Zealand's native vegetation communities are declining due to land-use change, pest plants and animals, and diseases. This trend can be arrested or reversed by implementing programs to protect and restore native vegetation. However, designing conservation and restoration programs require an evaluation of their benefits and costs. Several stated preference studies value biodiversity in New Zealand, but they use metrics that are difficult to match to policy levers. This study aims to produce estimates of the non-market values of native ecosystems that could be used for policy analysis at regional and national levels in New Zealand. We designed a choice experiment survey to estimate preferences for restoring and conserving native vegetation. The attributes of the choice experiment are restored areas of lowland native forest, hill country native forest, wetlands, and the area of covenants to protect remnants of native vegetation on private lands. The content of the survey was tested in focus groups and with experts and policymakers. We conducted a nationally representative survey and obtained approximately 1,300 responses. We estimated willingness-to-pay using a latent class multinomial logit model. We found significant and policy-relevant preferences for restoring and protecting native ecosystems, which differ across latent classes. The heterogeneity of preferences is explained by the socio-demographic characteristics and status of ecosystems in the regions of respondents. We use this information to derive regional willingness-to-pay estimates. To demonstrate the application of the estimates, we conduct a cost-benefit analysis of native reforestation in Manawatū catchment based on the study by Walsh et al. (2017). Our results will be of interest to policymakers in planning, targeting, protecting, and restoring indigenous ecosystems.

106: Exploring the relationship between welfare and groundwater dependence: An Application of dynamic agricultural-household model with intergenerational features

Authors: Anik Bhaduri, Sayed Iftetkhar, R K Amit

Presenter: Anik Bhaduri - Griffith University

Abstract

In many parts of the world, groundwater resources are depleting at a great rate due to over-extraction and climate change impacts. However, many households are predominantly dependent on groundwater for agricultural production, which may be unsustainable in the long run. The sustainable use of a household has to be analyzed within the same household context and in a dynamic framework, as dynamically changing resource conditions can have different impacts on household behaviour and welfare over time. For example, when the stock of groundwater is high, a farmer may extract groundwater intensively. In such a situation, there could be a stronger relationship between resource dependency and household welfare. However, as the groundwater stock decreases further, the farmer may use the profit to diversify income in non-agricultural activities. It will decrease the association between resource dependency and welfare. However, the relationship could be much more complex as it depends on complex ranges of choices and tradeoffs available to the households that are influenced by key factor markets (labour, credit), the households' assets and their socio-economic characteristics, as well as the environmental conditions on which their livelihoods depend. A strong theoretical research in a dynamic agricultural household framework is needed to investigate the sustainable use of natural resources with an emphasis on the wellbeing of households. In that dynamic framework, it is also pertinent to address intergenerational household welfare, where the present generation holds an altruistic concern for future generations. Such reformulation of the problem can help to get away from a zero-sum game, where the current generation gain is a straight loss for future generations; and transition to a state where welfare and sustainability are in the same direction. The objective of the study is to quantify the households' dependence on groundwater resources and how it varies with their level of income, where dependence is usually defined as the share of overall income derived from groundwater usage. The study develops a micro-level household production and consumption model that incorporates the effect of groundwater degradation and the intergenerational dimension and explores the relationship between household well-being and groundwater dependence, with an application to the Indian State of Tamil Nadu. The following three research questions are addressed – 1. How is the linkage between groundwater use and household wellbeing affected by asset endowments and other socio-economic attributes? 2. How does the relationship between groundwater dependence (income derived from natural resources) and household welfare vary with changes in the stock? 3. How can investment in other forms of capital (human and physical) decrease groundwater dependence, mitigate the intensification of groundwater use and also lead to higher welfare for the households over time?

107: Insights into the influence of indigenous values in NZ's dairy industry

Authors: Jorie Knook, Hamish Gow, Murray Hemi, Anita Wreford

Presenter: Hamish Gow - Lincoln University

Abstract

Globally, the agricultural sector is facing environmental and wellbeing challenges. Communities, scientists, policy-makers and industries are requiring farmers to address these challenges in their on-farm management, which requires a transition to a multi-faceted system focus with values that move away from productivity only and include environmental and social values. This paper searches to understand how Miraka Ltd., a milk company owned and run by the indigenous people of New Zealand and which strongly adheres to a multi-faceted system, supports institutional entrepreneurship that responds to this change amongst its supply farmers. A qualitative study was conducted, in which observations and semi-structured interviews were carried out to: i) identify farmers' change in practices, beliefs and values over the last ten years; and ii) identify how Miraka functions as an indigenous entrepreneur in the agricultural sector. Findings show that farmers were initially guided by a business and family/lifestyle logic, but in response to the institutional entrepreneurship by Miraka, a number of farmers extended their logics, by transforming the 'family' logic into a 'whānau' (wider family) logic and adding an 'environment' logic. The main strategies employed by Miraka were mobilisation of material resources such as incentives and awards, creation of a rationale addressing environmental and social concerns in the dairy sector, and proactive connection with new actors. The findings however show that only half of the supply farmers achieved a change in logics. The other farmers perceived the material resources as insufficient and experienced a loss of trust in the rationale. This research contributes to current literature by expanding knowledge on institutional change in the agricultural sector, and identifying how a value based approach based on indigenous knowledge can contribute to change.

108: The value of non-market valuation

Authors: Abbie Rogers, David Pannell, Michael Burton, Md Sayed Iftekhar, Robert Johnston

Presenter: Abbie Rogers - The University of Western Australia

Abstract

Environmental non-market valuation (NMV) studies are commonly developed with an implicit, and sometimes explicit, intention to provide information to assist in policy and decision making. However, in Australia at least, the direct use of non-market values to inform environmental policy is extremely limited. Research suggests this is in part due to decision-makers lack of awareness and capacity to utilise NMV approaches (Rogers et al. 2015). This would in turn suggest that NMV practitioners need to focus attention on ease of accessibility and socialisation of NMV methods, their outputs, and how they can be used in providing decision support. Before making that investment of practitioners' time, it begs the question of whether decision makers really need this information, and how important it is in improving decision outcomes. Nested within this question, consider that there are a spectrum of approaches that provide information about non-market values. These range, for example, from qualitative expert-judgements, to simple unit-value benefit transfers, through to best-practice and elaborate choice experiment designs collecting primary data from large, representative samples. We know that the cost of application increases along this spectrum, and one might assume that accuracy and validity of the information produced will too. However, it is not clear that the (assumed) reduction in uncertainty is worth the additional cost of applying more complex NMV approaches. Our ARC-funded project will explore the 'value of information' provided by different NMV approaches, in order to identify the trade-offs between the cost, complexity, uncertainty and usefulness associated with the approaches. Understanding these trade-offs will enable NMV practitioners to guide decision makers on what NMV approaches are most efficient in providing decision support for different types of environmental decisions. We present a conceptual model, based on Bayesian decision theory, to measure the value of NMV information for environmental decision making, and discuss the process through which we intend to populate this model.

109: The Impact of Climate Change on Grape Yields in Australia

Authors: German Puga, Kym Anderson, Firmin Doko Tchatoka

Presenter: German Puga - University of Adelaide

Abstract

The aim of this study is to assess the potential impact of climate change on grape yields in Australia. Our approach consists on first estimating the impact of weather on grape yields, and then using those estimates along with climate change forecasts to predict the potential impact of climate change on grape yields. In a first step, we estimate the impact of three weather variables (i.e., growing season temperature, growing season precipitation, and frost risk days) on grape yields. We use a panel dataset on yields by variety and region, for most wine regions in Australia, and spatial weather data for these regions. We estimate two types of models: static models and dynamic models. We justify our dynamic models based on physiological mechanisms that govern perennial crops. In a second step, we use our models' estimates and climate change forecasts from 'Australia's Wine Future – A Climate Atlas' to determine what those forecasts could mean for grape yields. Our results suggest that, in a ceteris paribus scenario, climate change may lead to an increase in grape yields in Australia. In an attempt to capture adaptation, we estimate hybrid models that allow for nonlinear response functions, although we argue these models may lead to biased results because profit maximization does not necessarily match yield maximization. While not accounting for adaptation may lead to overestimating the effect of climate change, the estimates of the effect of weather that do not account for adaptation at least can be thought of as upper limits on the potential impact of climate change. This is because grapes are perennial crops that depend on capital-intensive investments with very long investment horizons, so adaptation is relatively ineffective or limited. Nevertheless, our results could still be different due to intensification and general equilibrium effects, as well as other issues that arise when using the estimates of the impact of short-run events (weather) to predict the impact of long-run events (climate).

110: An Analysis of Operating Profit Margin: A Valuable Tool for New Zealand Dairy Farmers

Authors: Robbie Maris, Zack Dorner, Ryan Mills, Graeme Doole

Presenter: Robbie Maris - The University of Waikato

Abstract

Operating profit margin (OPM) is a well-supported and easily interpretable parameter from the DuPont framework for understanding firm performance. It has not been widely applied in the dairy industry, despite its role in driving profitability, resilience and debt serviceability in low subsidy export-oriented farming systems. We analyse the drivers of OPM in depth for the first time on New Zealand dairy farms. We utilise a 10-year panel dataset developed by applying simulation methods to sample and population data, giving a representative picture of the industry. We group farms into quartiles of their long-run OPM performance and perform non-parametric Games-Howell testing to investigate differences between the groups, providing insights into which farm variables are linked with strong long-run OPM performance. We then estimate individual and time fixed effects panel regression models for the entire sample and each quartile separately to examine the factors correlated with OPM over time. Our findings are generally consistent with research on more complex measures of farm performance and thus demonstrate that OPM is a useful tool to help farmers understand and improve their financial performance. We also produce novel insights for the New Zealand dairy industry, showing the value in analysing OPM in low subsidy export-oriented agricultural industries.

111: Adaptations to climate change in Australia

Authors: Thomas Nordblom

Presenter: Thomas Nordblom - Graham Centre, Charls Sturt U.

Abstract

ADAPTATIONS TO CLIMATE CHANGE IN AUSTRALIA The Intergovernmental Panel on Climate Change (2021, p. 13) informs us that: “Climate change is already affecting every inhabited region across the globe.” This paper focusses on several ways Australia can adapt to the consequences of climate change (higher temperatures, wilder weather, droughts, floods and fires). Anticipating that these trends will persist for some time, we need to mitigate their likely consequences. Regardless of success of global efforts to stop or reverse climate change, these challenges will remain with us. A few examples of adaptations needed in Australia are: (A) in agriculture, plant breeding, agronomic practice, pest management, animal wellbeing etc.; (B) in water, better management for agriculture, urban populations, industry and environmental sustainability; (C) in infrastructure, upgrades to mitigate climate change pressures on roads, railroads, bridges, electrical power lines, un-insulated homes, etc. and; (D) better fire-hazard mitigation. Adaptation needs for these climate change consequences in Australia have received serious attention in several forms: (A+) the major CSIRO study (Stokes & Howden eds. 2010) is well founded in biochemical, genetic, physical science covering all the main crops. Other reviews of climate-adaptation needs in agriculture have been completed by federal and state services, industries and universities, i.e., (Remenyi et al. 2019). (B+) The ACCC (2021) final report, mentions climate change 39 times as a key factor that requires adaptation in water management. The states and territories of Australia have prepared sequences of planning documents in their jurisdictions, including consequences of water flows to marine environments. (C+) State and territory-specific infrastructure improvements are needed due to climate changes with respect to roads, railroads, bridges, electrical power lines, etc. Wagga Wagga’s FloodFutures is an example of works undertaken to deal with flood threats to a growing city. (D+) Following the dreadful 2019-2020 Australian bushfire season, a Royal Commission was urgently called. ‘Climate change’, mentioned 68 times, was credited as a proximal cause of the fires, in the Royal Commission report (RCNDA, 2020). That drought season in eastern Australia saw bushfires erupting and spreading unstoppably through vast reserves of accumulated fuel. Well-focussed and supported national, state, or local adaptation projects are likely to have positive payoffs. ------- Stokes, C., & Howden, M. (eds.) 2010. Adapting Agriculture to Climate Change. CSIRO Publishing. Remenyi et al. (2019), Wine Future–A Climate Atlas. U. Tasmania. ACCC (2021). Murray–Darling Basin water markets inquiry, Final Report. Australian Competition & Consumer Commission. City of Wagga Wagga, FloodFutures (Accessed 1 Nov 2021) RCNDA (2020) Royal Commission into National Natural Disaster Arrangements.

114: The Valuation of Threatened Raptors in Tasmania

Authors: Andrea Magnusson, Mark Tocock, Dugald Tinch, Darla Hatton MacDonald

Presenter: Mark Tocock - University of Tasmania

Abstract

The Wedge-tailed Eagle (Aquila audax) and Australian Masked Owl (Tyto novaehollandiae) are birds of prey with endangered Tasmanian subspecies that are estimated to be in decline. The key threats to these birds are habitat loss and breeding disturbance, particularly from the forestry industry, and rodenticide poisoning. In this paper we estimate the willingness to pay (WTP) of Australians in different states for management options aimed at conserving these species in Tasmania. Data for this analysis were obtained from a discrete choice experiment (DCE) designed to elicit preferences for habitat reservation, nest site preservation, and rodenticide management, which directly correspond to key threats for the species using a split-sample approach. The DCE was administered in four Australian states to allow for testing of proximity effects. Additionally, the DCE focused on Wedge-tailed Eagles was split into two treatment groups, each of which received different information about the differences or similarities between Tasmanian and mainland eagles. Preferences between these groups were tested for information effects. Data from the DCE were analysed using a mixed multinomial logit estimated in willingness to pay space. Results from this model indicate that Australians have a positive WTP for management of both species in Tasmania. Testing based on respondent location indicates a significant negative proximity effect for Wedge-tailed Eagles, but not Masked Owls. Testing between treatment groups shows no information effect, indicating that subspecies status does not influence preferences for conservation. These results indicate that raptor conservation is important for Australians in the states sampled, and these preferences should be considered when evaluating future management policies.

116: Impacts of biotech corn adoption among farmers in Pampanga, Philippines: Analyzing farmer decision-making in connection with their self-concept and social identity

Authors: Clarisse M. Gonzalvo, Wilson Jr. F. Aala, Keshav Lall Maharjan

Presenter: Clarisse M. Gonzalvo - Ph.D. Student, Hiroshima University, Japan

Abstract

The Philippines is the first country in Southeast Asia to approve the commercial cultivation of biotech corn; moreover, biotech eggplant and golden rice were also approved for propagation in 2021. Aside from the various technical data focusing on biotech crop production – which has been ongoing for almost two decades now – it is also critical to understand how biotech farmers understand their self-concept and the identity they take part in society, since these influence their behavior, resilience in times of uncertainty, and farming decisions. This study therefore analyzed the decision-making process of 146 biotech corn farmers in the province of Pampanga, Philippines, of which a majority are long-term adopters, to understand the impacts of biotech corn to their lives in connection with their self-concept and social identity. Results of the stepwise regression and decision trees generated through machine learning showed that the market situation of biotech corn and farmers' own opinions in planting biotech corn were the top predictors influencing their knowledge and willingness to sell biotech corn, respectively. This result indicated that underlying themes of self-concept are indeed critical factors for biotech corn farmers. Thematic analysis showed that farmers identify themselves as highly knowledgeable with the biotech crop they are adopting, and how biotech corn has improved their lives due to increase in yield and income, and reduction in labor. Indeed, Spearman correlation showed that capital and usage of income from planting biotech corn positively affect farmers' mode of adoption. Increase in emotional status was also observed, with the farmers saying that ever since becoming a biotech corn farmer, they became happier, experienced peace of mind, were able to pay off their debts, and supported their family more, as compared to the times when majority of their conventional corn is being destroyed by pest. On the other hand, the major theme that surfaced for farmers' social identity is how they see themselves as a part of a united community, wherein they highly value their camaraderie with other biotech farmers. They emphasized that their co-farmers had the same experience of earning more and having better lives due to biotech corn. Moreover, in times of uncertainty, they help uplift each other's lives by sharing resources and valuable pieces of information, such as new farming techniques and advice on farming problems. Meanwhile, five major dimensions emerged in the factor analysis (i.e., farming resources, own experiences in planting biotech corn, community perception, family effects, and knowledge of biotech corn) which highly corresponded with the results of the thematic analyses. This study showed the micro and macro social impacts of agribiotech towards the biotech corn farming community, which can contribute to better policy planning and development of future agricultural technologies.

117: An Input-output framework strengthens resilient economies and societies through improved water management plans in water-scarce coastal districts in India.

Authors: Geetha Mohan, Saroj Kumar Chapagain, Kensuke Fukushi, M. Prasada Rao, Peddada Jagadeeswara Rao

Presenter: Geetha Mohan - United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS), Tokyo, Japan.

Abstract

Rapid urbanization and climate change are intensifying water shortages where the freshwater resources are limited and insufficient to meet economic development and domestic purposes in many coastal cities/districts like Visakhapatnam, India, and other parts of the world. We adopted an input-output model to examine the association between economic sectors and water use (direct), including intersectoral (indirect) relationships. In addition, we developed a district-level input-output 2015 table, quantified additional water use and added value of demanded economics sectors for future scenarios year 2030, and explored potential solutions and plans for resilient economic industries and societies. The results confirmed that the agricultural sectors, including forestry & logging, sugarcane, paddy, other crops (cashew nut, turmeric, dry chilies); fishing & logging, fruits (mango and banana), and other oilseeds (palm oil), consume 87.8 percent of the highest portion of total water consumption. Nevertheless, indirect water consumption emerges to contain a vital share of total water resources. Sectors like coke, refined petroleum industry; chemical and chemical industry; rubber and plastic industry; paper, paper products, newsprint industry; primary minerals industry; livestock; other crops have the highest indirect water consumption. Further, the future scenario's consequences of increasing demand of 25 percent of sugarcane sector; and drugs and medicine industries found that an additional water use of 2.4 percent (27 million m3/year) and 2.2 percent (24 million m3/year) required to meet the demand of these two sectors with an additional cost of 903 million Indian rupees; and 48,99 million Indian rupees. Moreover, our direct and indirect water consumption results highlight the framework's importance for water scarcity coastal districts in India to improve sustainable water-saving policies and plan to expand the district economy. The same framework can be applicable for similar coastal cities/districts for other countries. Finally, building resilient societies and maintaining sustainable water utilization of freshwater resources among vital economic sectors in limited water resources districts need to improve water use efficiency in the agriculture sector by promoting rain harvest structure and adopting water-saving technologies. For manufacturing sectors, constructing their water storage tanks to regenerate groundwater resources and the concerned government making strict regulations on the overuse of groundwater resources may help tackle water scarcity situations.

120: Identifying opportunities and barriers for adaptive management of Phewa lake basin, Nepal using Ostrom's design principles

Authors: Deepa Basnet, Ram Pandit, Abbie Rogers

Presenter: Deepa Basnet - University of Western Australia

Abstract

The commons theory has well-recognized the strength of Elinor Ostrom's design principles for the collective action. These principles can guide policies towards the adaptive co-management of environmental services. This study intends to identify the drivers and barriers for the adaptive co-management to improve water quality in the Phewa lake, a Ramsar site in Nepal. We employ a conceptual framework of Ostrom's design principles to analyse the cooperation between the government agencies, tourism entrepreneurs, and local communities (non-entrepreneurs) to protect the lake and improve its water quality from natural and anthropogenic factors, especially from siltation and pollution. The Phewa lake was investigated on the basis of qualitative data collected with key stakeholders at the local and watershed level from May to September 2021. Four focus group discussions and 16 formal and informal key informant interviews with the experts, policy makers, development practitioners, and the local people involving 42 men and 8 women were conducted. The results shows that more than half of the outcomes from existing practice of the Phewa lake management did not meet the criteria of Ostrom's eight principles. The barriers include: unclear boundaries between legitimate users and nonusers, conflicts of locals with government, absence of monitoring and rule enforcement, incongruence between local rules and conditions, absence of nested enterprises and disproportionate sharing of costs and benefits for the co-management of lake water. A few of the strengths of existing practice are: partial collective choice arrangements, graduated sanctions, limited conflict resolution mechanism and minimum recognition of rights to organize. The forthcoming initiative of government to demarcate the lake boundary shows the potential to improve compliance with Ostrom's principle. Nonetheless, the stakeholders' preference analysis for lake water quality revealed an interest in excavating solid wastes and silts from floor of the lake. Also, demarcation of the lake area for limiting access to buffer distance is a major concern to the stakeholders. From the analysis of drivers and barriers, we draw a set of propositions that serve to improve the drivers and address the barriers. These include co-management of lake, initiate incentive mechanism between tourism entrepreneurs, local community and tourists; and strict law enforcement for pollution control, which are initiatives likely to be supported by the stakeholders. This set of propositions, if implemented, can be predicted to significantly improve the governance mechanism of the watershed and, in turn, improve lake water quality.

122: Accounting for non-attendance and preference heterogeneity underlying the price parameter in choice models

Authors: Curtis Rollins, Michael Burton, David Pannell

Presenter: Curtis Rollins - University of Western Australia

Abstract

We examine different approaches to modelling unobserved preference heterogeneity underlying the cost parameter in choice models. As willingness to pay (WTP) for a choice attribute is typically calculated as the ratio of the attribute parameter over the cost parameter, authors have argued that the cost parameter should follow a lognormal distribution so that the distribution may not include zero, as WTP will be undefined at the point where the denominator is zero. The lognormal distribution solves this problem because the cost parameter can only asymptotically approach but never reach zero. However, another stream of research has focused on cost non-attendance to identify and account for individuals who ignore the cost or price attribute in a choice experiment, noting that up to half of respondents may not attend to hypothetical prices attached to stated preference exercises. Thus, while restricting the cost parameter to a lognormal distribution may ensure the entire WTP distribution is defined, it might be an unreasonable restriction to place on the data. To incorporate recommendations from both streams of research, we estimate a latent class choice model, in which the only parameter that differs between classes is the cost parameter. The cost parameter follows a lognormal distribution in one class, which allows for unobserved preference heterogeneity within those who attended to cost, and is restricted to zero in the other class to allow for cost non-attendance. Using survey responses from choice experiments on public park preferences (n = 1500) and natural hazard mitigation policy (n = 1000) in Western Australia, we compare different options for modelling preferences for the price attribute. These options include assuming there is no preference heterogeneity for price, single-class normal and lognormal distributions of heterogeneity, and our proposed approach of allowing for heterogeneity that follows a lognormal distribution along with a class of respondents who price parameter is fixed at zero. In both data sets, model fit is best using our proposed approach that combines a lognormal distribution with a latent class to capture cost non-attenders. The model results imply that one-third of respondents did not respond to prices in both studies. If it is assumed that those who did not attend to prices did not provide valid responses to the choice experiment, resulting WTP estimates drop dramatically. These results suggest that a significant portion of respondents do not attend to price, and that imposing a lognormal distribution for preference heterogeneity of the price attribute may be an unreasonable restriction to place on the entire sample.

123: How to improve context saliency in economic experiments using immersive features of virtual reality tools?

Authors: Shu-Wing Chan

Presenter: Shu-Wing Chan - UWA

Abstract

Decision making under uncertainty and risk is an essential topic in economics that apply to many contexts. It is a challenge for people to decide in any uncertain and risky situation. Their choice can create benefit or harm. People often have to decide at a different level of urgency depending on the nature of an uncertain and risky situation. Urgency might trigger emotions which also has an impact on decision-making. An Australian bushfire is chosen as the context situation to study the problem of decision-making under uncertainty and risk with urgency and its possible effects on emotions. It is selected as a familiar situation to most people and a common threat to most States and Territories in Australia regarding environmental and economic damages. Three urgency levels are used to test its impact on emotions on decision making. Virtual Reality (VR) using low-cost Head-Mounted Display (HMD) is used as a tool for this study. It can create realism for any context that clarifies and immerse a person into a naturalistic 3D environment. It has authenticity in a field experiment, and the experimenter's control in a lab experiment HMD allows participants to experience a highly immersive virtual environment. Highly immersive virtual environments using HMD provide a new means of conveying information. VR might improve context saliency, making the context more prominent or noticeable to the subjects in an experiment. By shifting one's attention to a focus point, saliency might influence the process of visual information and human behaviour as well. Bushfire response will be used as the focus experiment to compare different experimental instruction methods in comparison with VR. In particular, the investigations will assess the effects of immersive VR technology on decision saliency and urgency. This study will contribute to applying VR to decision making with different urgency levels in economic experiments.

124: The Relative Importance of Global Agricultural Subsidies and Tariffs, Revisited

Authors: Kym Anderson, Erwin Corong, Anna Strutt, Ernesto Valenzuela

Presenter: Kym Anderson - University of Adelaide and Australian National University

Abstract

Agricultural price and trade policies were highly distortive of world food, feed and fibre markets in the latter half of the 20th century, but many trade reforms began in the 1980s and continued following the 1995-2004 implementation of the GATT/WTO Uruguay Round Agreement on Agriculture. By then, import tariffs were responsible for 93% of the global economic welfare cost of distortions to farmer incentives, the rest due to domestic subsidies (5%) and export subsidies (2%), according to GTAP modelling by Anderson, Martin and Valenzuela (World Trade Review 5(3): 357-76, 2006). Some import tariffs have since come down further, and export subsidies were outlawed by WTO members in 2015. However, domestic support measures have replaced some of the assistance previously provided to farmers by tariffs and have more than doubled in OECD countries this century, including recent additions by populist governments. For example, subsidies rose from 8% to 14% of gross farm income in the United States between 2017 and 2019 (OECD 2021). This has prompting WTO members to place domestic support on its agricultural committee's agenda, including for the next biennial WTO Trade Ministerial meeting to begin in late November 2021. The present study provides new estimates of the national economic impacts of global agricultural tariffs and domestic supports. It does so by calibrating the database of the global economywide GTAP (Global Trade Analysis Project) model to 2019 and then simulating the removal of food and agricultural domestic supports without and then also with tariff removal. Globally removing just domestic support is of course negative for the most supported farmers, who are primarily in Western Europe, Northeast Asia, but all other farmers would gain from higher output prices, including those in supporting countries who currently receive little or no support. The global economic gains from removing all domestic support to farmers is conservatively estimated to be US$5 billion per year, but that rises to $59 billion when tariffs also are removed. That is, domestic support is estimated to contribute 8% of the global cost of farm price and trade policies, up from 5% in 2001. A side benefit of removing market-distorting domestic subsidies is that it would boost government budgets in reforming countries, allowing society to re-purpose that spending to achieve more socially desirable objectives. Examples of the latter include investing in growth-enhancing rural public goods such as education, health, agricultural research, and transport and communication infrastructure. It could also include paying farmers for their provision of ecosystem services. Targeted income supplements fully decoupled from production, via generic social safety nets/trampolines, are another possible use of savings from such reform, which could be aimed directly at reducing poverty and income inequality.

125: Achieving better value for money when purchasing Natural Resource Management services

Authors: Sandra Walpole, Neil Bensley

Presenter: Sandra Walpole - Department of Agriculture, Water and the Environment

Abstract

Regional Land Partnerships (RLP) is the $450 million flagship program of the Australian Government's National Landcare Program Phase Two (NLP2), being delivered over five years from July 2018 to June 2023, by the Department of Agriculture, Water and the Environment (DAWE). The RLP represents the first instance where the Australian Government is delivering a significant Natural Resource Management (NRM) program through an open tender procurement rather than a grant process. Individual projects funded through RLP are designed around the payment and delivery of specific project services required to achieve both project and program outcomes. Project services are a combination of services, functions and responsibilities that contribute to the effective and efficient delivery of the project. As part of a mid-term review of the RLP, a cost-effectiveness analysis was undertaken for a selection of project services. The analysis aimed to gain insights into how individual NRM service providers approached the project service unit cost determination by examining variations in the cost of delivering each project service, and whether value for money was being achieved. The analysis has found that unit costs vary considerably between projects and regions. Some variations can be explained by differences in approaches to project design and implementation across the geographically diverse RLP Service Providers, while other variations are large enough to require more detailed examination. The design and implementation of the next NRM program will benefit from the identification of factors driving variations in project service costs, and key success factors that will deliver greater value for money and achievement of outcomes.

128: Study on Impact of Corn Collection and Storage System Reform on Farmers' Productivity -Evidence from National Fixed Point Survey

Authors: Feng YE, Gucheng LI, Ting TONG

Presenter: Feng YE - School of Economics and Management, Huazhong Agricultural University, Wuhan Hubei 430070

Abstract

The purpose of the reform of corn collection and storage system is to remove inventory, adjust structure and promote reform. At the same time, it will also have an impact on corn productivity. Using Natinal Fixed Point panel data from 2010 to 2017, based on the research design of propensity score matching and difference-in-difference model (psm-did), this paper analyzes the static and dynamic effects of corn collection and storage system reform on farmers' corn productivity, and further discusses its impact mechanism. The research shows that, on average, the reform of corn collection and storage system can significantly improve farmers' corn productivity, and the result is very robust; There is significant time heterogeneity in the impact of the reform of corn collection and storage system on Farmers' corn productivity. The implementation effect of producer subsidies is due to the cancellation of temporary storage system; For large-scale farmers and farmers with low degree of part-time employment, the reform of corn collection and storage system can better improve their productivity; In addition, the reform of corn collection and storage system can improve farmers' corn productivity by increasing farmers' productive investment and improving the degree of land mismatch. Based on the above research conclusions, this paper puts forward some policy suggestions to further promote the high-quality development of corn, such as adhering to the reform of market-oriented food support system, improving the rationality of existing subsidies and making up for the shortcomings in the reform of corn collection and storage system.

129: Rethinking 'gender in agriculture and climate change' in the context of funding ecosystems

Authors: Dr. Sujata Ganguly, David Lefor

Presenter: David Lefor - Includovate

Abstract

Progress towards gender equality is slow, multifaceted and complicated, and often includes influencing norms and attitudinal changes. According to the OECD/DAC Network on Gender Equality, aid integrating gender equality is increasing overall, but funding for dedicated gender equality programmes is lagging behind. At the same time, donor agencies are working to strengthen their capacity to address gender equality and women's empowerment explicitly. Reflective and innovative approaches are therefore needed to bring about a transformational change. The objective of the paper is to rethink 'gender in agriculture and climate change' in the context of funding ecosystems and donor priorities in Asia and Africa. To attain the objective, the chapter draws from the experiences of 30 gender experts in the field of agriculture and climate change in Asia and Africa alongside desk review while incorporating the interfaces of the Water of Systems Change model with the socio-ecological model to build arguments and draw inferences. Results: Women's roles and responsibilities in agriculture are complex, diverse and multifaceted. Despite this, the title of 'farmer' is culturally and normatively ingrained into most societies as being a typically male profession and women are either considered 'farmers' wives' or just 'helpers'. However, organisations have started to engage women farmers e.g. in innovation in rice/wheat agriculture systems in eastern India through strategic partnerships and livelihood institutions. Realising that women farmers have limited access to new technologies and information due to the challenges that traditional extension systems face in reaching out to women, the projects described by the respondents intervened alternative models of combining research and extension activities making them more gender inclusive. However, the most difficult reported challenges are to leverage the change in power required at all levels, among all types of actors and organisations, to institutionalise accountability for outcomes that improve gender equality. Conclusion: The funding ecosystem tends to get diluted and diverted due to focus on 'economic growth' and 'return on investment' rather than a rights-based perspective across Asia and Africa. The impacts of climate change and the consequent lack of access to water affect people at all scales. These impacts are unequal and intersectional; identities like gender and socioeconomic status interact with systems of power to determine how people can adapt to these changes at all levels. By involving farmers from the conceptual design phase into gender-focused programming (through including the voices of marginal farmers, irrespective of their gender identities), an increased availability of robust data can be used by policy makers and organisations to design interventions which result in stronger equality and empowerment, leading to transformative change.

130: Deriving monetary values from Case 1 Best Worst Scaling - using multiple anchors

Authors: michael burton

Presenter: Michael Burton - university of western australia

Abstract

Case 1 Best Worst Scaling (BWS) is emerging as a preferred method of obtaining comparative ratings of objects, especially where there are a large number of objects. A recognised issue with the approach is that it can only give relative ratings across objects, because of the forced choice nature of the questions asked (respondents have to identify best/worst, without any consideration of the absolute level of preference). Anchored BWS has been introduced, to enable one to identify an absolute level/cutoff within the ratings i.e. to identify which of a set of products meets a minimum level of acceptability for use. The anchor then separates the set of products that meet the acceptability criteria, and those that do not, while maintaining the rating of the objects. However, the anchored ratings still have no absolute interpretation, beyond some utility score. However, introducing two anchors, defined in monetary terms, does allow one to identify the monetary value of the objects, in a manner analogous to a WTP estimate. This paper will explain how the two anchor methods works, with some simulation examples, an applied example from conservation management, and some preliminary insights into whether this is a better method than simply conducting double bounded CV studies for each of the objects.

131: Reimagining Women's Role in Agriculture - Evidence from India

Authors: Sujana Adapa, Subba Reddy Yarram

Presenter: Sujana Adapa - UNE

Abstract

This extended abstract sets out to understand women's role in agriculture in India, how it has changed more recently and the relevance attributed to the attainment of sustainable development goals (SDGs). Over 75% of women in India are in agriculture either as cultivators (37.3%) or as agricultural labourers (62.7%). However, women's role in agriculture has been traditionally discounted due to entrenched gender norms, prevailing societal regulations and stereotypical views. Lately, public and private sector reports published in the Indian context acknowledge women's role in agriculture and their contributions to sustainable farming practices. This study analyses the in-depth interviews of women in agriculture in India (n = 25) and how they have created unique identities to navigate through several challenges presented to them in a male-dominated society. Results indicate that women in contemporary agriculture in India represent both literate and illiterate with a shared common goal of creating an empowered ecosystem of best practice around them. In order to achieve this goal, women have adopted various means such as sustainable farming, digital technologies, inclusive leadership, innovative ideas, entrepreneurial mindset, smart farming, value addition and sustained activism. Women's opportunities in agriculture in India were limited by historical, institutional, social, spatial, temporal and societal dimensions thus, favouring their counterparts. In creating those fruitful empowered ecosystems of practice, women developed multi stakeholder partnerships and actively promoted other women's livelihoods, safety, health, education and training. The generation of multi stakeholder partnerships included farmers, government, companies and society working collectively towards achieving a holistic outcome with an impact that is greater than the sum of its parts. The benefits associated with the creation of multi stakeholder partnerships are manifold with increased human, financial and technical resources; knowledge, skills and capabilities leading to experience and expertise; creative business ideation and collaboration; informed institutional strategies; and transformational leadership practices. Public private partnerships further enhanced the economic, social, technological, societal and environmental outcomes for women in agriculture in India as access to finance has increased. The success recorded by women in agriculture in the Indian context challenges the worldviews of knowledge construction of gender identities based upon biological, psychological and cultural perspectives. Thus, the reimagined women's role in agriculture contributes to the attainment of SDG 5 (Gender Equality), SDG 8 (Economic Growth) and SDG 17 (Partnerships).

132: Research for the region, by the region: an analysis of author affiliations for the Namoi Unlimited Region in the field of agriculture.

Authors: Edward Lefley, Shawn Leu, Neil Argent, Brian Dollery

Presenter: Edward Lefley - University of New England, Armidale, NSW, Australia

Abstract

We examine the research output from the LGAs that are involved in the Namoi Unlimited Joint Organisation highlights the range of research activity that occurs with authors from private organisations, government agencies and universities. Furthermore, many of these papers represent co-authorship across differing research organisation types and across the country. These co-authorship links represent knowledge transfer between researchers and users. The Namoi Unlimited Joint Organisation was established to further the development of the region, comprising five local government areas in Northern Inland NSW. Home to agricultural and supporting industries, the region covers agricultural activity from sheep and wool enterprises, feedlots, and irrigated broadacre enterprises. Industrially, these are large food processors and extractive industries. Using data from the Web of Science database of publications for the period 2006 to 2013, 277,000 records were identified that had at least one author from an address in New South Wales. Within the NSW set, a subset has been identified for the area covered by the Namoi Unlimited Joint Organisation. This is used to identify and map the research connections between organisations within a location. Analysis of the Web of Science data has focused upon the identification of the type of organisation, university, government, industry or community. This has been used to develop an indicator of the research networks that exist within and outside the regional area. What can be seen is that there is consolidation and clustering of research organisations with the existing industries they are involved in. Industry specialisation expressed as a location quotient – derived from Australian Bureau of Statistics Census data – is used to identify this consolidation and clustering. The focus of the Namoi Unlimited Joint Organisation is upon diversifying the industry mix within the region. Enabling this are opportunities from major infrastructure work, such as the inland rail project and the associated special activation project.

133: How does outcome uncertainty affect the regulator's incentive strategy when paying landholders for conservation works?

Authors: Steven Schilizzi, Md Sayed Iftekhar

Presenter: Steven Schilizzi - The University of Western Australia

Abstract

In the field of payments for environmental services, contracts for conservation activities can be allocated through a competitive tender or auction system, where the regulator (e.g. a government agency) ranks landholders' bids using some value-for-money metric. A challenge for the success of such schemes lies in the uncertainty of conservation outcomes due to uncontrollable environmental factors, such as droughts, fires, pest attacks, or diseases. A number of studies have examined how such uncertainty may affect landholders' participation to the program and bidding behaviour, but few, if any, have examined the problem from the regulator's point of view. A key decision for the regulator is how to incentivize landholders so that they accept to participate in the program and if they do put in sufficient effort, which the regulator cannot observe. Payments are more incentive-based if a greater proportion is tied to the achievement of the uncertain outcome rather than made up front. Controlled lab experiments with several variants simulated this problem by first examining how subjects-as-landholders responded to different levels of outcome uncertainty, which directly affected their payments. As expected, too small an incentive led to insufficient effort input while too high an incentive led to low participation, thereby indicating there must exist an optimal incentive level. Their responses to the different levels of uncertainty were then used to run another experiment simulating the incentive decisions of subjects-as-regulators, each acting separately. Different policy goals (objective functions) were interacted with uncertainty levels to define 18 scenarios: for each one, an optimal level of incentive was computer-simulated and then compared to the observed incentive choices. Results show that incentive decisions were indeed sensitive to both outcome uncertainty and policy goal, as well as their interaction. Analysing the bids submitted by the subjects and their responses to a detailed post-experiment questionnaire allowed us to identify a set of strategies adopted by subjects-as-regulators. A preliminary analysis indicates that uncertainty levels and policy goals affected by how much observed strategies differed from the simulated optimum.

134: The Impacts of Disputed Exclusive Economic Zones on Fisheries in the South China Sea

Authors: Himaushu Hardikar, Satoshi Yamazaki, Yifan Lu

Presenter: Himaushu Hardikar - University of Tasmania

Abstract

Conflict over territorial waters in the South China Sea in recent years presents risks for food security, economic stability and regional cooperation. It has also obfuscated data regarding fisheries and resource management in the region . Fishing activity around Exclusive Economic Zones (EEZs) in particular reveals important information about the management of marine resources by coastal nations. This paper uses satellite-based detection to track light emitted by fishing boats to track vessels in the ocean. Applying a quasi-experimental approach enables causal inferences to be made based on such data. Specifically, by analysing the difference between datapoints observed on two sides of a threshold value, the regression discontinuity design (RDD) isolates the effect of a treatment applied to units beyond the threshold. By extrapolating this concept to a spatial context this paper reveals vessel behaviour around the disputed EEZ boundaries. The results display continuity in vessel numbers on both sides of the boundary, departing from literature. These trends reveal the key implications of conflict and international competition for fisheries around disputed maritime boundaries. Using this information, the paper will contribute to further research into marine resource use and the implementation of resource management strategies for the South China Sea, and disputed maritime boundaries more broadly.

135: Reducing consumption of single-use plastics by hospitality businesses and customers

Authors: Steven Schilizzi, Marit Kragt, Md Sayed Iftekhar, Christine Parfitt

Presenter: Christine Parfitt - The University of Western Australia

Abstract

Plastic pollution is a global issue affecting the environment, industry and human health. Nearly half the plastic produced globally each year is plastic packaging, which is used once and then thrown away. To reduce the end-of-life environmental impacts of plastic, packaging companies have developed compostable plastics which meet Australian standards. These plastics degrade in six months in industrial composting facilities, and have a favourable public perception. In Western Australia, however, these plastics are not widely accepted in composting facilities, they contaminate recycling, produce more methane in landfill and do not degrade in the ocean. A case can thus be made for reducing consumption of plastics more generally. This can be achieved through behavioural and/or policy tools including bans, levies and voluntary reduction schemes. The Western Australian government has recently announced one of the world's most ambitious bans on single-use plastics to be implemented in December 2021 and 2022. This ban includes many, but not all, types of compostable plastics. The ban will cause a shift in consumer and hospitality business behaviours towards either compostable or reusable alternatives to single-use plastics. However, it is currently unknown which option will be preferred by each consumer group. It is hypothesised that hospitality businesses will switch to compostable alternatives resulting in little end-of-life environmental benefit. Here we present preliminary findings from a series of interviews conducted with café owners and customers in both coastal and inland, and higher and lower socio-economic areas of Metropolitan Western Australia. The interviews explored alternatives to single-use plastic that have been tried by each consumer group including circular economy solutions, their perceptions of compostable alternatives, and their views of the upcoming ban. The goal of these interviews was to better understand the impact of the upcoming ban on their behaviour and whether there are ways to encourage waste avoidance behaviours. Subsequent research with a representative sample will quantify these findings and identify potential behavioural interventions that could support this ban.

137: Social Desirability Bias in People's Willingness to Participate in Payments for Forest Ecosystem Services (PFES) Schemes in Vietnam: An Inferred Valuation Approach

Authors: Chi Nguyen, Hang Thi Thuy Nguyen, Uwe Latacz-Lohmann

Presenter: Chi Nguyen - Department of Agricultural Economics, Kiel University, Germany

Abstract

Payments for Forest Ecosystems Services (PFES) have been adopted as an incentive-based instrument aiming to remunerate rural communities for conservation actions of the public forests in Vietnam. However, after ten years of implementation, the problem of deforestation is far from being averted. The current designs of PFES have been criticized for ill-defined management requirements, lack of stringent monitoring and evaluation process, poor grievance-handling mechanisms, and lack of incentive mechanisms to link payments and environmental outcomes. Re-designing PFES that can address the above issues and align with local communities' desirability is of critical importance to enhance the effectiveness of PFES schemes. The usefulness of Discrete Choice Experiment (DCE) in giving analyst the flexibility to vary the design of payment for ecosystem services schemes and in tracking the respondents' behavioral response has been widely acknowledged in the literature. However, the DCE might suffer from hypothetical bias due to the hypothetical nature of experiment and strategic behavior of the respondents. In order to mitigate hypothetical bias and obtain robust preference and welfare estimates, we carried out a choice experiment with 320 respondents in Central Vietnam using both conventional direct valuation (DV) and inferred valuation (IV) approach. While the former asks respondents' preferences, the latter asks respondents to predict others' preferences. The examined PFES design features include number of patrolling days, grievance-handling mechanisms, monitoring and evaluation, payment conditionality on forest cover, collective bonus, and expected payment. The study aims to examine the extent to which people's own preferences for different PFES design features vary from the preferences they infer about others in their communities, to compare people's own and inferred rankings of the design features, and to identify the driving factors affecting people's preferences and the disparities/similarities between the estimates derived from the two approaches. Random Parameter Logit Model was employed to analyze the data. The results suggest no difference in the signs of preference estimates obtained from the two approaches. However, there is a large difference in the design features' importance rankings between respondents' own preferences and others' preferences regarding expected payment and grievance-handling mechanism. We found evidence of social desirability bias with respect to number of patrolling days and payment conditionality on forest cover. Respondents believed that others would ask for more payment for the increase in number of patrolling days and for the existence of payment conditionality on forest cover. Social norms, environmental attitudes, and risk preferences were found to be the driving factors influencing respondents' preferences and the disparities between the estimates of the DV and IV approaches.

138: Plans for Assessing Australian Business Vulnerability to Natural Disasters using BLADE

Authors: Franklin Soriano, Sean Malcolm

Presenter: Franklin Soriano - Principal Mathematical Statistics Specialist, Modelling, Analysis and Visualisation Section, Methodology Transformation Branch, Methodology Division, Australian Bureau of Statistics

Abstract

Determining the resilience of small and medium businesses particularly in the agriculture sector is important for the preparation of community programs in regional areas of Australia. This presentation describes a plan for assessing the vulnerability of agricultural businesses to natural disasters using integrated micro level data from the ABS Business Longitudinal Analysis Data Environment (BLADE). Businesses' vulnerability can be measured using profitability, productivity, liquidity, solvency, and financial distress indicators that can be derived from the data.

To date, most of business location-related analyses using the ABS BLADE are limited to postcode, state and state of operation information as location identifiers. In this presentation, we will describe plans for using the recently released experimental BLADE core location data at the meshblock (i.e. LGA, SA1-SA4) levels in analysing business vulnerability. At the time of this presentation, there aren't empirical results to be shown yet, but by presenting our planned approach and the data to be used, we can hopefully demonstrate how the business location information in BLADE can strengthen the capacity of researchers and policy makers to analyse areas of high disaster risk, thereby helping regions, communities and industries prepare appropriate recovery, risk management and sustainability programs. This work may also lead to future assessments of the COVID19 impacts on businesses at various locations in Australia.

139: Consumer preferences in China for imported fresh produce and its attributes: Application of a discrete choice experiment

Authors: Azad Rahman, John Rolfe, Delwar Akbar

Presenter: Azad Rahman - Central Queensland University

Abstract

Demands for quality fresh agricultural produce has been increasing in China due to the rise of the middle-class population, leading to increased imports from many countries, including Australia and New Zealand. However, there is limited information about the product characteristics important to Chinese consumers, with only a few studies assessing willingness to pay for fresh produce from Australia and New Zealand. Therefore, this study aimed to determine Chinese consumers' willingness to pay (WTP) and preferences towards the key quality attributes of imported fruits and vegetables. A discrete choice experiment was utilized, with data collected through an online survey in 13 selected provinces from southern China. In total, 924 qualified responses were collected and analysed. The choice experiment was framed with four attributes, including price, appearance, level of environmental certification and food safety. A high percentage (93%) of respondents had purchased imported fresh produce, which implied that imported fruits and vegetables are well accepted in China. A latent class model employing total payment was used for data analysis. The model found that 76 per cent of respondents preferred excellent appearance and both organic and environmental certification labels as preferred attributes for imported produce. However, there was less interest in nutritional information and food safety as preferred attributes. The analysis indicated that consumers would pay a higher premium for organic produce but were unlikely to pay a higher price for products with a food safety label. This study also revealed that the Chinese consumer would pay about ¥ 2,170 (i.e., about AUD 454) annually for organic certified produce. These results indicate that exporting countries like Australia and New Zealand should focus on appearance, organic and environmental certification levels in promoting their export supply chain for fresh produce.

140: Risk and Uncertainty - the challenges and implications of incorporating future climate risk into agricultural decision-making

Authors: Paul Deane, Prof.. Bill Malcolm

Presenter: Paul Deane - The University of Melbourne

Abstract

In this paper we review some of the challenges in agricultural risk analysis when using subjective probabilities on future climate variables (and Australian wheat yields) and some of the potential implications for risk research. Inherent in any future decision in agriculture lies an uncertainty about the range, frequency and consequences of an outcome. Combined, the decision-maker is left facing a risky choice. When interpreting risk in the future, the known variable with randomness can be described by a subjective probability distribution with a reasonable degree of certainty as to the range of possibilities and probabilities. This is how climate risk has typically been viewed, with measurements allowing risk to be quantified and the future mostly resembling the past. An essential concept in managing risk is the distinction between risk and uncertainty. Uncertainty can be best described where the event or variable is hidden in the future surrounded by a veil of vagueness, with no precedent available. With no inclination that the risk even exists, there is no knowledge and no learning possible. Uncertainty refers to the variation in possible values caused by a lack of information. Future climate risk in farm economic modelling may be closer towards uncertainty than anticipated given future climate is fraught with incomplete knowledge. As a start, what timeframe is relevant for the development of historical, objective climate risk, for use as the basis for subjective probabilities of future climate (before we even consider human-induced global warming)? When looking at historical distributions as a guide for potential climate outcomes, there are potential limitations in relying on a shorter instrumental observation period, with the risk particular climate phenomena are under estimated. Equally, a reliance on near-term climate data over recent decades in Australia could over-weight negative climate risks. Further, even if the current instrument period is long enough, not all climate data is of the same quality. Older data can have greater observational errors. There are also recognised longer term (lower frequency) patterns influencing climate. Low frequency oscillations of climate in modulating rainfall may have implications for temporal correlations in crop wheat yields. A study in China has found that winter wheat yields had inter-annual variability (4, 8 and >20 year periods). When considering future climate, how temporal correlations change may be just as important as understand how the characteristics of a probability distribution differ. However temporal correlation of climate drivers is a relatively newer area of climate research and is not always well understood. Yet it is temporal correlations of key business or financial risk which are integral in portfolio and strategic decisions for a farm business. The failure to manage temporal risk in the 1980s resulted in one of the most dramatic level of US farm failures.

141: Technology choice, output mix and farm performance in the Indo Gangetic Plains of India: A directional distance function analysis

Authors: Sofina Maharjan, Atakelty Hailu, Maria Fay Rola-Rubzen, Ram Pandit

Presenter: Sofina Maharjan - University of Western Australia

Abstract

Indo Gangetic Plains (IGP) of India is a major wheat, rice, and cotton producing part of India. With the success of the Green Revolution, agricultural production in IGP became more advanced benefitting from high levels of mechanization, well-developed groundwater irrigation systems, free groundwater, and subsidized or free electricity for agricultural purposes. Around 90 % of freshwater drawn from the ground is used for agricultural production, including irrigated crops and livestock production, leading to severe groundwater table depletion in the region. One of the sustainable water management strategies currently pursued aims to improve water use efficiency by minimizing water loss in irrigation. An unlevelled farming land causes losses in irrigation water and nutrients due to runoff, resulting in increased groundwater withdrawal, longer irrigation times, and poor performance of fertilizers applied. To mitigate this problem, the government of India is promoting laser land levelers (LLL), a water-saving technology that is being widely adopted by farmers. The technology is expected to generate benefits in the current and subsequent productions years. These benefits have not been studied well. There has also been limited or no research on the implications for productivity and revenue efficiency of the cereal and other output mixes that farmers decide to produce. Previous studies examined production efficiency by aggregating multiple outputs as output revenue and used frontier or other models that do not capture the true nature of the production technology. These studies have also ignored the impact of output mix choices on efficiency and revenue. This study aims to address these shortcomings. We use the directional distance functions and data from a cross-sectional household survey of 1,000 farm households from three states of India: Haryana, Punjab, and Uttar Pradesh. The analysis is done at the household level. The results suggest that farming in the IGP is characterized by a substantial level of inefficiency. The farm household adopting LLL exhibits lower inefficiency levels than nonadopters, implying that the efficiency of nonadopters could be improved substantially by using good farm management practices and adopting technologies that conserve water and nutrients.

142: Anonymous tolls and the value of insight.

Authors: Matthew Wysel, Derek Baker

Presenter: Matthew Wysel - UNE Centre for Agribusiness, University of New England, Australia

Abstract

How do you incentivise the production of positive externalities when designing a data marketplace? Production of phenetic livestock data encumbers breeders with significant measurement costs. However, once generated and shared, this data can be enriched by industry laboratories who return valuable insight to the breeder and reuse the raw data to maintain genetic libraries for the breed society. These libraries are data assets and therefore a form of club good: access to them may be restricted but utility is not characterised by rivalry. Conversely, breeders can choose to generate genetic data from their herds. As before, data shared with industry permits a comparable level of insight for the breeder. However, genetic data alone does not permit the libraries to be maintained. In response, the industry sets a price structure to avoid market failure. We analyse the efficiency of three potential strategies in managing the value of the breed society's genetic library: a surcharge based on usage, a levy based on the type of data shared, and a levy based on the change in residual value of the genetic library. The first two levies are forms of non-anonymous tolls, while the latter is anonymous, and permits the owner of the data sharing platform to maintain the value of their data asset without measuring externalities. Using data from existing phenotype and genetic markets we estimate the value created by breeders as they contribute different amounts and different types of data to a genetic library. We characterise the industry's effect on the value of data using a Cobb-Douglas production function and compare their net yield with the value of the different types of data inputs. We demonstrate the application of a new method for maintaining value in a dataset. The proposed model characterises the relative values of the contribution of new data to a data sharing platform versus effort spent by the platform on improving the quality of existing data. Managers of data sharing platforms may now derive strategies that evaluate the book value of data assets rather than imputing it from potential market value. Owners of data sharing platforms can set price structures that maintain residual value in data assets through anonymous tolls.

144: Determinants of return migration and occupational choice of the return migrants in Nepal

Authors: Dinesh Babu Thapa Magar, Maria Fay Rola-Rubzen, Ram Pandit

Presenter: Dinesh Babu Thapa Magar - The University of Western Australia

Abstract

Return migration including the human, financial and social capital acquired by return migrants in destination countries is increasingly acknowledged to have an important role in economic development in labour exporting countries. Understanding the factors that influence labour migrants to return and choose occupations at home have policy implications for governments in regulating return migration as well as successful reintegration of the return migrants. However, studies providing evidence and insights on return migration and migrants in a developing country like Nepal, which has witnessed an unprecedented rise in overseas migration for employment opportunities in the recent decades are very limited. Using survey data of a total of 504 individuals that include 296 current overseas migrants and 208 return migrants from a total of 442 farm households from diverse agro-ecological and socio-economic settings, we examine the factors influencing return migration using the probit model. We also employ the multinomial logit model to examine the factors affecting the occupational choice of return migrants in Nepal. The results suggest that those migrants that are married, heads of household, have made productive investments at home, have a higher number of dependent members in the household, have larger farms, and have returnee relatives are more likely to return home. On the other hand, the results show that migrants who are more educated, have previous migration experience, have a longer duration of stay in the destinations, have higher salaries in the destinations including those individuals that are engaged in skilled and other labour jobs compared to construction-manufacturing labour jobs are less likely to return home. Furthermore, the results suggest that return migrants with more education and those returning home because of the poor work environment in the destinations including those who return with confidence and perception of having better opportunities at home, return home permanently, have acquired skills abroad, have a higher number of dependents at home, and have a longer duration at home after return are more likely to become an entrepreneur after return from destinations. Similarly, results show that those who are heads of the households, who have acquired skills abroad, have a higher number of dependents at home, and have access to credit are more likely to become self-employed after return.

145: Rice production and productive efficiency in the upland areas of Vietnam

Authors: Le Van Cuong, Atakelty Hailu, Chunbo Ma

Presenter: Le Van Cuong - The UWA School of Agriculture and Environment M087, University of Western Australia, Perth, Australia

Abstract

Upland rice production in Vietnam is a vital source of food security for a substantial proportion of the mountainous population. Rice production is also a critical part of a remarkably diversified farming system where essential cash crops and export-oriented products are mainly cultivated. Improvements in upland rice production efficiency and productivity would make the system more productive and more beneficial in terms of both food security and foreign currency earnings. The production environments in lowland and upland areas are significantly different. The former exhibits high output elasticity with respect to improved rice variety choices, chemical fertilizer use, irrigation water, and pesticide use. In contrast, the upland rice's output is dependent on drought-tolerant traditional varieties, less fertile land, poor irrigation systems, and requires higher labour use intensity. There have been numerous studies on farm efficiency in lowland rice production systems, but very little is known about rice productivity and efficiency in upland areas. This study estimated a stochastic translog production frontier using primary cross-sectional data to measure technical efficiency and identify factors that help explain the variations in technical efficiency of rice farmers in two important upland regions in Vietnam. The results reveal that farmers in the central highlands are more efficient than those in the northern uplands. The technical efficiency of rice farmers in both regions is slightly lower than those in the lowland rice production. Furthermore, there is a wide variation in productive performance with farm-level efficiency ranging from a low level of 0.40 to 0.98. The difference in efficiency between the two areas is significantly related to labor use intensity and biophysical and environmental factors, including soil quality, land fragmentation, and production risks. Factors that significantly affect efficiency include age, gender, ethnic group membership, income status of the farm family, and its size. The results suggest that local extension agencies could introduce suitable improved rice varieties and well-tailored practical extension services (pest control, timely transplanting) to the upland regions to reduce the performance gap in Vietnam. Furthermore, local governments should invest more in improving irrigation systems in the upland areas to assist rice producers in mitigating production risks associated with rainfall.

146: Behavioural insights on farmers reservations in adopting Conservation Agriculture-based Sustainable Intensification technologies in Bihar, India

Authors: S M Rahaman, Ram Datt, Maria Fay Rola-Rubzen, Roy Murray-Prior, Nitu Kumari, Ranvir Kumar, Sanjay Kumar, Nirala Kumar

Presenter: S M Rahaman - Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India-813210

Abstract

The study examined farmers decision-making behaviour in adoption of Conservation Agriculture-Based Sustainable Intensification (CASI) technologies. The objective was to use the learnings in devising strategies to counter decision inertia and improve adoption of CASI technology. A total of 7 focus group discussions (FGDs) and 125 in-depth interviews were conducted and qualitative data collected in the Purnea district of Bihar, India. Several behavioural principles such as bounded rationality, endowment effect and cognitive limitations were observed to come into play. For instance, some farmers were resistant to change their traditional practice of cultivating crops, thinking that it will be a miracle to sow crops without ploughing. Disadopters and non-adopters also displayed endowment effect and cognitive limitations which influenced their adoption decision. The farmers voiced conflicting reactions on the adoption of DSR, i.e., although they were concerned about the problem of crop establishment and heavy weed infestation, the potential for cost saving and unavailability of labour during peak season led some farmers to adopt. The competency of service providers, lack of trained drivers and lack of expertise in machine calibration and repair acted as barriers in the adoption of CASI technology in the study area. The initial field demonstration and incentives on adoption helped in the gradual adoption of CASI technology. However, when the same incentives were withdrawn, the adoption waned, leading to disadoption and non-adoption. Thus, tailor-made interventions and experiments were needed to further explore the reasons for disadoption and non-adoption to counter the decision inertia of farmers for inclusive adoption and scaling out of CASI technologies.

147: Can behavioural factors better explain the adoption of zero tillage technology in wheat farming?: Evidence from Nepal

Authors: Krishna P. Timsina, Surya P. Adhikari, Meena Kharel, Yuga N. Ghimire, Bibek Sapkota, Maria Fay Rola-Rubzen, Renato Andrin Villano, Roy Murray-Prior

Presenter: Krishna P. Timsina - Nepal Agricultural Research Council (NARC), Kathmandu, Nepal

Abstract

Labor scarcity, rain-fed farming conditions, inappropriate use of inputs, high production costs, and low productivity are the major challenges to Nepalese Agriculture. Zero tillage (ZT) technology is an option to reduce production costs and improve yield. However, its adoption by Nepalese farmers is very low. The traditional extension approaches, which often ignores behavioural factors, have not been effective in up-scaling ZT technology. This study identified various behavioural drivers of ZT adoption in wheat farming. The study involved 343 randomly selected households from four locations in the Sunsari district of Nepal. A probit model was used to identify the factors affecting the adoption of ZT in wheat farming. The model included both socioeconomic and behavioural variables to explain adoption. The behavioural factors included variables in relation to self-efficacy, collective efficacy, social support, theory of planned behavior, dual systems theory and social identity. We found that younger farmers are more likely to adopt the technology compared to older farmers. Similarly, male farmers are more likely to adopt ZT technology than female farmers. Likewise, smaller households are more likely to adopt ZT technology than larger households. Moreover, farmers who save money for agricultural purposes are 10% more likely to adopt the technology than farmers who do not. Lastly, households with higher income are more likely to adopt than lower-income households. Among the 17 behavioural variables included in the model, eight were found to have affected ZT technology adoption. Results showed that farmers who can contract service providers on the date of seeding are 28% more likely to adopt the technology than those who are not able to do so. Similarly, farmers who can form a group have a 17% more probability of adopting the technology than those who cannot form a group. Likewise, difficulty in obtaining a ZT machine in a timely manner negatively affects adoption. Farmers who are willing to try new practices and approaches are more likely to adopt ZT wheat than those who are reluctant to try new practices. Moreover, farmers who think they are extroverts, enthusiastic and outgoing are 15% more likely to adopt the technology than others. Furthermore, farmers who think they are sympathetic, warm and friendly have a 45% more probability of adopting the technology than other farmers. Lastly, calm and relaxed farmers have about 29% less probability of adopting ZT technology than other farmers. The results suggest that focusing on young farmers, promoting the technology through a group approach and ensuring timely availability of agriculture credit, machinery and mechanization services will improve the adoption of ZT technology. These findings can aid in designing better agricultural extension programs geared towards wider up-scaling of ZT technology.

149: Economic Impacts of National Forest Conservation Program in China

Authors: Wen Wang

Presenter: Wen Wang - Professor

Abstract

Conserving and restoring forests are critical and pervasive strategies to fight global warming. Many countries, including China, have been implementing national reforestation policies. While numerous studies work on the effectiveness of these policies on afforestation, there is limited research investigating the economic impacts of these policies on rural families (including adults and children) considering policy-induced land transition and labor migration. This paper attempts to explain how the socioeconomic changes from reforestation programs, including income and migration, impact children's long-term educational attainment and how they distribute their welfare impacts across different groups. The findings from these analyses have important policy implications for both reforestation policies and other poverty alleviation and inequality mitigation programs. China implemented one of the most extensive forest conservation and restoration programs — the Natural Forest Conservation Program (NFCP) since 2000. Combined with Payments for Environmental Services (PES) such as Grain for Green Program (GFG) and the EcologicalWelfare Forest Program (EWFP), these programs ban logging in natural forests and transform rural farmland to forestland by compensating households for the conversion. Forest transition follows with socio-demographic changes resulting from changes in land use and labor allocation. Off-farm labor migrate to urban areas searching for non-agricultural jobs. Parental migration causes parental absences for children due to China's restrictive household registration system and high education costs. Coinciding with such changes, investigating the programs' distributional effects are necessary, especially for impoverished people and voluntary groups such as Left Behind Children. To study these issues, we assess the reforestation in north-western China between 2000 and 2015 using MODIS Normalized Difference Vegetation Index (NDVI) data. Census data and longitudinal multi-level survey data recording 2000 children's educational outcomes and family conditions over 15 years allow us to follow Left-Behind Children in the sample. Applying the triple difference approach and the instrumental variable approach, we estimate parental migration's impacts on Left-Behind Children's education outcome and evaluate reforestation policies' distributional impacts on residential welfare. The project extends reforestation studies in three dimensions: characterizing its effects on income and off-farm migration, estimating its spillover effects on Left Behind Children, and evaluating its distributional welfare effects.

151: Estimating climate effects on Robusta coffee production in the Central Highlands of Vietnam: a panel household data analysis

Authors: Thi Tam Ninh Nguyen, Oscar Cacho, Paul Kristiansen

Presenter: Thi Tam Ninh Nguyen - University of New England, Australia

Abstract

Coffee is among the most traded commodities globally, just after oil, and is the key livelihood of of more than 120 million people worldwide. As a crop, coffee has already been experiencing negative impacts due to the changing climate. This impact is projected to be significant in the Central Highlands of Vietnam where the production of Robusta coffee is the largest in the world. Coffee has proven to be sensitive to climate variability. Recent studies in South East Asia have showed strong relationship between heat stress and coffee yields as well as bean quality. Similarly, modelling studies that were largely based on assumptions about increasing temperature and changing rainfall patterns have projected marked reductions on coffee suitable areas and bean yield. Yet, there is also increasing evidence about heat-tolerance of Robusta coffee plants. This second major coffee genotype in the world is believed to have some relative advantage over Arabica coffee as global warming occurs, offering important opportunities for climate adaptation policy, such as intercropping with shade trees or shifting to higher altitude locations. Understanding the extent to which climate affects Robusta coffee production would provide important information in helping smallholder farmers to deal with increasing risks. This can be done through weather index-based insurance and other risk management strategies. This study aims to investigate the climate effects on Robusta coffee production in the Central Highlands of Vietnam. Our analysis is based on an unbalanced longitudinal panel data of 980 observations over the period 2006 to 2016. To account for differential seasonal effects, we separate the analysis by main phenological stages of the coffee plant, including flowering, fruit formation and fruit maturation. In addition, by transforming daily temperature values into temperature-day bins, we capture not only the level but also the intensity of this variable. We apply the Hsiao two-stage technique to differentiate the impacts of time-variant and time-invariant variables on the outcome variable. By introducing a non-linear relationship model, we estimate the tipping point of temperature effects on Robusta coffee productivity in Vietnam under different rainfall conditions. Our study finds an inverse relationship between coffee farm size and productivity but ambiguous impacts of altitude on coffee outcome. Our findings support earlier studies that Robusta coffee grows more suitably in the range from 22–28°C and starts to suffer detrimental effects if the temperature is beyond 30°C.

152: Investigating the environmental and amenity values of the Great Barrier Reef using discrete choice experiments

Authors: Jeremy De Valck, John Rolfe

Presenter: Jeremy De Valck - Central Queensland University

Abstract

It is important to measure values for the protection of iconic environmental assets, such as the Great Barrier Reef (GBR), so as to justify major protection and expenditure programs. In the GBR case, there has been substantial focus on the benefits generated to users, such as for recreation and tourism, as well as on the non-use values held by the wider Australian population. Estimates of values are typically added to generate overall benefits for extra protection. However such a simple categorisation may not be appropriate, as people who have visited in the past, or plan to in the future, may potentially have higher protection values than those who are strictly non-users. The Total Economic Value framework provides the scaffolding that economists often employ to sum up value estimates, where use and non-use values are treated as independent and additive value categories. This framework includes extractive and non-extractive direct uses, indirect use values and non-use values, with the latter including bequest, existence and option values. In the GBR case, there may be some potential relationships in values between users of the reef for amenity purposes (recreation and tourism) and the values that those people hold for reef protection, which are typically assessed as non-use values. To test these issues, this study was designed to assess the non-use values that different Queensland populations held for both environmental and amenity aspects of the GBR. A discrete choice experiment was constructed where the environmental aspects were described in terms of future changes in coral and seagrass covers, and the amenity aspects were described in terms of future recreational and tourism opportunities. The sample contained 1262 respondents, selected from both Brisbane, the head city of Queensland, and from all regions along the GBR. Our results show that respondents are generally supportive of environmental policies that would expand total coral cover or total seagrass cover. Respondents also support further tourism opportunities. However, the provision of further recreational opportunities for local residents does not come up significant. Non-use values like moral duty/bequest and insurance/non-use option values significantly increase preferences for the proposed policy scenarios. By contrast, direct use motivations do not appear to be a major driver for protection values. Socio-demographic characteristics like people's income, propensity to donate to charities and prior visits to the GBR also contribute to supporting the proposed scenarios. These results demonstrate that Australians largely value GBR conservation for non-use reasons.

153: Non-tariff measures: An applied methodology for the quantification of bilateral trade effects of policy measures at a commodity level

Authors: James Fell, Andrew Duver

Presenter: James Fell - ABARES

Abstract

As bilateral tariffs in Australia's major trading partners have fallen, trade negotiators are increasingly focussed on the non-tariff benefits of trade agreements. Negotiators are faced with the policy challenge of determining what non-tariff measures (NTMs) and commodities to focus on in bilateral and multilateral negotiations. This means that the qualitative and quantitative trade effects of different measures need to be understood on a bilateral commodity-level to enable a non-subjective, priority-based allocation of scarce negotiating resources. The methodology used to quantify those effects must be defensible in international forums and negotiations. However, despite well-established methods for the quantification of trade policies at an aggregate bilateral trade level, the commodity-level literature demonstrates a misapplication of foundational theory about the optimising behaviour of consumers and producers. Additionally, as outlined by Fell (2019 AARES Annual Conference), cross-sectional econometric quantification of the bilateral trade effects of NTMs at a commodity-level suffers from technical econometric issues. As a result of misapplication of the theory and challenges in the econometric estimation, the methods used in existing applications are not defensible. This paper outlines an appropriate application of theory with application to grains markets. This enables the estimation of bilateral commodity-level trade effects of non-tariff measures that are defensible.

154: Women's Contributions to Pulses Value Chain and Household Food and Nutrition Security in Pakistan

Authors: Shahzad Kouser, Rajendra Adhikari, Kuntala Lahiri-Dutt

Presenter: Shahzad Kouser - COMSATS University Islamabad, Pakistan

Abstract

Time use studies have proven somewhat effective in capturing the immense contributions that rural women make to crop production and household reproduction. Consequently, women's mediating role in agriculture-nutrition pathway often remains invisible. Adopting a Value Chain approach, this study assesses rural women's time allocation to pulses value chain (PVC) and then estimates the net impact of women's time contributions to PVC on household food and nutrition security. The study is carried out in three major pulse growing tehsils - Lawa, Talagang, and Chakwal - of district Chakwal, which is the main pulse growing rainfed region in the Punjab province of Pakistan. In these tehsils, the research team interviewed 120 women involved in PVC, based on a pre-tested and structured questionnaire comprising a 24-hour time use diary and a seven-day recall of food consumption. To correct endogeneity of women's time use in PVC, we use three unique instruments: women's body mass index, number of PVC tasks performed, and household's types of farming (subsistence versus commercial), in the instrumental variable regression (IVR). The results of first stage of IVR shows that 1 kg/m2 increase in women's body mass index decreases their allocation of time in PVC activities, while the number of PVC tasks and household's way of subsistence farming increase their involvement in PVC. Similarly, the results of second stage of IVR indicate that one hour increase in women's allocation of time to PVC activities increases food consumption by 74 kcal per adult equivalent per day and household dietary diversity by 0.33 score. Moreover, the net impact of women's time to PVC on household food and nutrition security was about three times larger than that of their reproductive time. The paper concludes that women's time use in PVC activities improves household's ability to access nutritious food, and suggests that policy-makers need to compensate women's increased labour contributions.

155: Nitrogen Stock, Pesticide Use and Farmer's Behavior under Rice Policy Change: Estimation of Translog Cost Function for Japanese Rice Production

Authors: Hiroki Kiriyama, Hirotaka Matsuda, Yoshiaki Kamiji

Presenter: Hiroki Kiriyama - Graduate School of Agriculture, Tokyo University of Agriculture

Abstract

Objective

The objective of this study is to clarify the contribution of nitrogen fertilizer, nitrogen stock which is accumulated nitrogen in the soil, and pesticide which is commonly used to save labor input by estimating the translog cost function of Japanese rice production. This study contributes to achieve the social optimum level of them by analyzing the substitution relationship between nitrogen stock, pesticides, labor and other factors of production.

Background

As indicated in the Planetary Boundary Concept (Steffen et al. 2015), the environmental impact from agricultural production on the earth system has reached a threshold of it. Achieving the stable food supply and mitigating the environmental impact by proper nitrogen fertilizer input and pesticide use are major challenges for agricultural production.

Nitrogen fertilizer input and pesticide use are determined by a farmer's behavior based on economic incentives. However, they do not always correspond to the social optimum level under the circumstance. Clarifying the substitution relationships among factors of production are indispensable to achieve social optimum level of them. Kiriyama et al. (2021) finds that nitrogen stock in Japanese rice production has been decreased after 1990s as a result of famer's behavior which respect to response to the policy change. In case of pesticide, it mainly reduces labor input. In order to identify farmer's behavior about nitrogen fertilizer input and pesticide use, it is necessary to analyze substitution relationship among factors of production. However, in the existing studies, nitrogen stock and pesticide are rarely considered as a factor of production and the relationship between nitrogen stock, pesticides, labor and other factors of production is not clear.

Methodology and Data

In this study, the translog cost function which doesn't make prior assumption of substitution relationship in Japanese rice production from 1961 to 2006 is estimated. The considered factors of production are machinery, labor, land, pesticides, nitrogen fertilizer, nitrogen stock and others. The data of production cost and yield are obtained from "Rice Cost Statistics". Data of nitrogen stock is obtained from Kiriyama et al. (2021).

Results and Discussion

Substitution relationship of pesticide and labor after 1990 is smaller than before 1990. Since the 1990s, farmers have tendency to maintain the pesticide expenditure. Under the conditions of progressive of ageing and farm exit, Japanese rice production cannot avoid increasing pesticide expenditure per

farmer. According to the estimation result, there are substitution relationship between nitrogen fertilizer and nitrogen stock after 1990. Decreasing expenditure of nitrogen fertilizer is due to decrease nitrogen fertilizer input, while price of nitrogen fertilizer has maintained. It is inferred that nitrogen fertilizer input is not determined by the price of nitrogen fertilizer.

This study contributes to achieving socially optimum level of nitrogen fertilizer input and pesticide use. Without considering nitrogen stock, the agricultural production is a possibility of excess of nitrogen fertilizer input. Progressive aging in Japanese agriculture, which can be found at many countries, may cause the labor supply declines and pesticide use increases.

References

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156: Balancing Support versus Severity for Household-Level Environmental Restrictions: An Illustration for Residential Fertilizer Use

Authors: Tom Ndebele, Robert J. Johnston, David A. Newburn

Presenter: Tom Ndebele - George Perkins Marsh Institute, Clark University, Worcester, MA

Abstract

Changes in household behavior, such as reductions in residential fertilizer use, are increasingly viewed as critical components of compliance with environmental regulations, such as nonpoint source pollution reductions required under the Clean Water Act. Appeals to voluntary action are often ineffective in such cases, leading to calls for binding restrictions or incentives that affect household behaviors. Proposals of this type often face a "support versus severity" tradeoff. Restrictions or incentives that have greater efficacy may be viewed as too severe by households, and are hence less likely to gain sufficient public support for implementation. Less restrictive policies may gain broader support, but have lower impact on households' behavior. Tradeoffs of this type are often considered informally within the policy process, but are rarely considered formally within economic analyses of regulations on individual households. This paper develops an empirical model to identify preference classes for binding restrictions, incentives and environmental outcomes. We estimate a latent class model using a revealed-stated choice dataset of residential fertilizer use and restrictions. The choice dataset is generated using an online survey of single-family homeowners in Connecticut coastal counties and municipalities in New York that overlap the Long Island Sound watershed. The model assumes that homeowners' preferences follow a discrete distribution and that homeowners belonging to different preference classes would support policies with different degrees and types of restrictiveness, and incentives considering the cost and expected environmental outcomes conditional on program implementation. Results indicate the presence of two preference classes with clearly distinct preferences for fertilizer application restrictions, incentives and environmental outcomes. These results provide insights that could inform household-level environmental management in the Long Island Sound watershed.

158: Linking innovation capability to the business performance of rural-based women entrepreneurs

Authors: Maria Cresilda M. Caning

Presenter: Maria Cresilda M. Caning - College of Economics and Management, Central Bicol State University of Agriculture

Abstract

If innovation is perceived as important to business growth then it is imperative for businesses to foster the capability to innovate. With this premise, this research explored the relationship between the different aspects of innovation capability to an enterprise's strategic capability, as indicated by their marketing and organizational innovation practices, and of strategic capability to the business performance of the Bicolana pili processors. It empirically tested the resource-based view and extended Saunila's innovation capability framework in examining the relationship of the different aspects of innovation capability to the strategic capability and to the financial and operational performances of 92 rural-based pili processors. Using the sequential mixed method, the research found that of the different innovation capability aspect, it was only participatory leadership culture that consistently showed significant and positive relationship with the development of an enterprise's strategic capability. Moreover, based on the stories of the women entrepreneurs, two themes emerged providing support to the practice of a participatory leadership culture: having a people-centric leadership and encouraging open-and-constant dialogue. Given the findings of the study, it is evident that the women entrepreneurs exercised participatory leadership culture in their businesses to encourage their workers to be more creative in developing new products and generating new ideas to improve either their marketing or organizational innovation practices. Hence, it is suggested that women entrepreneurs should provide the needed organizational support for innovation to have a positive impact on their employees' creativity and innovation. Further, result of the stepwise regression analysis revealed that marketing innovation has significant relationship to increase in profit, innovation in product and services, and innovation in process. For the organizational innovation capability of the women entrepreneurs, results showed that it has significant relationship to adoption of new business practice, an operational performance indicator. Considering the result of the study, the research recommends that further study on other factors not considered in the model be done. Further, given the geographical context of the study, there might be other cultural variables not examined, that can influence conditions within the organization be studied. It is further suggested that the government should continue providing the necessary marketing support i.e. design and packaging to entrepreneurs and organizational support such as the provision of the necessary equipment, especially to the start-ups

159: Rural mothers' experiences of caring for a child with a chronic health condition: Implications for public policy

Authors: Sally Bristow

Presenter: Sally Bristow - University of New England, School of Health

Abstract

Globally there is an increase in children living with a chronic health condition (CHC) (Sodi and Kgopa, 2016; Strickland et al. 2015). Taking care of children with CHC generates many challenges for families, communities, and mothers who tend to be the ones who take on the responsibility for providing the day-to-day care (Bar, Shelef and Bart, 2016). Evidence suggests individuals in rural areas experience difficulties accessing social and health care resources; mainly specialist services. It is known that caregiving reduces economic well-being as carers often cease paid employment to provide care, often at a time when expenditure related to social and health care resourcing increases (Murphy et al 2007). For women on farms, the difficulties may be even more pronounced.

In this paper, findings from a study on rural mothers' experiences of caring for a child with a CHC in Australia are presented. Semi-structured interviews were conducted with 17 maternal caregivers in rural New South Wales, Australia, who had at least one child with a chronic health condition aged between 2–18 years. Data were collected from March to June 2018. Analysis revealed that these mothers experienced emotional and physical isolation resulting in an overall theme reported within this article: "Alone in the Outback": isolation, capturing rural mother's feelings of isolation; comprising three subthemes: On the fringe; There is no shelter; and Choosing their own direction. The policy implications of these findings at the micro and macro level are considered. At the micro level, their experiences of caring highlights the need for additional local carer support services and resources. Nurses can assist in supporting rural mothers through facilitating local social support networks enabling women to connect with others in similar caregiving situations. At the macro level, we explore how making visible this (largely invisible) work may be considered in wider policy making.

160: Discount rates and the treatment of risk in the economic analysis of agricultural projects

Authors: Simon Hone, Ahmed Hafi, Peter Gooday, Jared Greenville

Presenter: Simon Hone - ABARES

Abstract

There is considerable debate around discount rates and the treatment of risk in economic analysis. Since the 1980s, most government economic appraisal guidelines in Australia have adopted a consistent approach based around a recommended 'central case' discount rate of 7 per cent. However, support for this position has eroded over time. Critics have pointed out that the discount rate should be updated to reflect changing economic conditions and suggested that the theoretical basis of the standard approach is flawed. These criticisms imply that in many cases we are likely to be underestimating the merits of long-term projects versus short term projects and the merits of projects that reduce risk versus projects that increase risk, with implications for the quality of investment decisions. This paper explores both sides of the debate to provide rigorous and practical guidance on how economists should approach discount rates and the treatment of risk in the economic analysis of agricultural projects. It includes an empirical biosecurity application to demonstrate the feasibility and show the implications of our proposed approach.

161: Recognising and building on the systems' attributes of the Australian Agricultural Forecasting System

Authors: Rohan Nelson, Andrew Cameron, Charley Xia

Presenter: Rohan Nelson - ABARES

Abstract

This presentation locates ABARES approach to agricultural forecasting within the global literatures of systems and mixed-method modelling to reveal principles for its future management and development. Despite the ubiquitous policy and commercial application of ABARES forecasts over more than seven decades the Australian Agricultural Forecasting System (AAFS) is only now being documented for peer review. This is partly because AAFS has been a surprisingly difficult forecasting system to characterise both by those developing it and by external observers. This seems to have been partly related to a difficulty in understanding and accepting the role that balance sheets play in agricultural forecasting, especially during periods when structural models were being explored. A persistent issue has been low recognition of the system attributes of AAFS, and a tendency to revert to hierarchical modes of management that have adverse consequences for innovation and methodological development. Accepting mixed quantitative/qualitative approaches such as triangulation as a valid and useful methodological approach has proven essential for recognising the legitimacy and utility of balance sheets as a forecasting methodology. Recognising the need to match the attributes of AAFS as a system with appropriate management approaches enables the transfer of learning from extensive literatures and practice in the management of information and complex systems.

162: Defining drought from the perspective of Australian farmers

Authors: Neal Hughes, Wei Ying Soh, Chris Boult, Kenton Lawson

Presenter: Neal Hughes - ABARES

Abstract

This study examines drought from the perspective of farm businesses, in order to develop new farm outcome-based drought indicators. An empirical analysis of Australian farms is presented drawing on data from the Australian Agricultural and Grazing Industry Survey and the related farmpredict micro-simulation model. Farmer drought self-assessment data are used to identify factors influencing farmer perceptions of drought beyond seasonal weather conditions. The results suggest farmers have updated their perception of drought over time to account for long-term shifts in the Australian climate. While instructive, farmer self-assessments cannot be used as drought indicators in practice due to moral hazard issues. In this study, the farmpredict model is applied to develop an objective outcome-based drought indicator for Australian farms. This indicator measures the effects of seasonal weather conditions on farm profits accounting for both production and price impacts. Compared with simple meteorological drought indexes, this new indicator is more strongly correlated both with actual farm outcomes and with farmers' own drought assessments. In future, this farm drought indicator could help to address asymmetric information (moral hazard and adverse selection) problems which constrain both government drought programs and private drought insurance markets.

163: Economic assessment of planning restrictions to decrease flood risk in Queensland, Australia

Authors: Rayen Gho-Inzunza, Veronique Florec, Natasha Pauli

Presenter: Rayen Gho-Inzunza - The University of Western Australia

Abstract

Flood impacts can be decreased by preventing developments within the floodplain, and consequently, reducing exposure. For several decades, studies have suggested that planning restrictions can be an effective strategy for reducing flood impacts, but its implementation is often avoided, as it is politically unappealing, and we lack the evidence in the form of estimates of benefits and costs. In this study, an illustrative case of forward-looking flood planning restrictions is investigated in Bundaberg (Queensland, Australia), which was affected by a 100-years flood event in 2013 causing substantial economic losses and social disruption. The current planning scheme of Bundaberg has defined new residential areas in the floodplain, that have been historically occupied by agricultural land. A planning restrictions strategy was assessed using a benefit-cost analysis to determine whether it is a cost-effective strategy to reduce flood losses in Bundaberg. The economic assessment considered the potential avoided social, environmental, and structural damages (benefits), both market and non-market, and the foregone benefits experienced by different stakeholders (opportunity costs) associated with the strategy. Additionally, the effects of climate change were tested through a predictive uncertainty analysis. The overall results show that the benefits exceed the costs, indicating that the strategy would be an effective way to reduce future potential flood impacts in Bundaberg. Our results highlighted the importance of considering social values, such as human health and amenities, as these were a significant part of the benefits and costs of implementing the strategy. Climate change, and its associated increase in the frequency of flood events, significantly increase the cost-effectiveness of planning restrictions.

164: Aiming for eco-viability in multispecies fisheries under catch regulation

Authors: Florence Briton, Caleb Gardner, Richard L. Little, Claire Macher, Mathieu Merzeréaud, Mobsby David, Olivier Thébaud

Presenter: Florence Briton - Winner of Postgraduate Thesis Award. Ifremer; Univ Brest, France; CSIRO-UTAS Quantitative Marine Science Program, Australia

Abstract

Ecosystem-Based Fisheries Management (EBFM) aims to embrace the four dimensions of sustainable development, namely ecological, economic, social and institutional, when managing fisheries. However, progress in EBFM has so far been biased towards its ecological aspects, resulting in its human dimensions being generally treated in an ad-hoc manner in management decisions. Approaches that allow for the consideration and reconciliation of multiple objectives are therefore needed to assist decision-makers in meeting the ambitions of EBFM. This talk will present how the eco-viability framework can be used to account for the variety of sustainability requirements faced by a socio-ecosystem, by identifying management scenarios maintaining the system within a viable space. Specifically, we use bio-economic simulations to identify catch levels that simultaneously meet a set of acceptability constraints for the fishery, namely not threaten the biological viability of the stocks, ensure the fleets' short and long-term economic viability, guarantee fishing crews a minimal wage and ensure affordable fish supply to consumers. This talk will present conclusions drawn from the application of the framework to two study cases: the Bay of Biscay French demersal fishery (BoB) and the Australian Southern and Eastern Scalefish and Shark Fishery (SESSF). Trade-offs associated with various management objectives are highlighted in both study cases. In the BoB, we for instance point to a trade-off between the long-term economic viability of fishing fleets and their ability to retain crews. In the SESSF, we show that maximizing the economic returns to vessel owners, which is the current management target in the fishery, does not maximize benefits to the society as it impedes the surplus of fishing crews as well as that of consumers.

Our work focuses on multispecies fisheries where various species are simultaneously caught during unselective fishing operations. By explicitly modelling the technical and economic interactions among multiple stocks, our work progresses the science feeding into the advice used to set Total Allowable Catches (TACs) in multispecies fisheries.