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What's Inside?

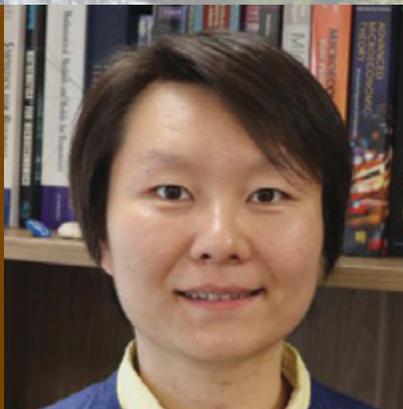
This issue of *FARE Share* shines a spotlight on four of the newest faculty members in the Department of Food, Agricultural and Resource Economics.

Tongzhe Li, S. Kwaku Afesorgbor, Yu Na Lee and Jose G. Nuno-Ledesma are all Assistant Professors for FARE and accomplished researchers. Their contributions to this edition span behavioural economics to foreign direct investment impacts and more.

We are fortunate to have these talented individuals sharing their research and teachings with FARE students and staff.

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The FARE Share Newsletter features research and analysis from faculty and students in the Institute for the Advanced Study of Food and Agricultural Policy in the Department of Food, Agricultural and Resource Economics (FARE).



Changing BMP Adoption Behaviour

By: *Tongzhe Li, Assistant Professor, FARE; Jacob Fooks and Kent Messer, University of Delaware; Paul Ferraro, Johns Hopkins University*

Watersheds throughout the world have been severely polluted by nutrient-laden runoff that comes from agricultural, industrial and residential sources. Nutrient pollution occurs when excess nutrients, mainly nitrogen and phosphorus, are transported to bodies of water and cause excessive growth of algae.

Best management practices (BMPs) commonly refer to environmentally sound practices that are developed to amend soil and water quality as well as to conserve water quantity. To study suburban residents' willingness to adopt landscaping BMPs that reduce runoff from gardens and lawns, a field experiment was conducted in the Delaware River watershed. More than 300 adults participated in a series of random-price auctions that revealed their willingness to pay (WTP) for five products that reduce nutrient runoff.

“Environmental programs can achieve policy-relevant gains in program performance through a series of small changes to the decision environment.”

To study how WTP can be influenced by attributes of the choice architecture, we randomized the starting bid values (anchors) and the way in which the external benefits of the five practices were framed. Compared to a neutral framing, a positive framing (using the product can improve water quality) increased average WTP by about one-third, while the estimated

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About Tongzhe: Her passion is to combine economic theory and behavioural approaches, such as field or laboratory experiments, to understand the economic and political context of a problem. Tongzhe's current projects focus on innovation adoption and consumer behaviour in an agri-food-environment context. She earned her Ph.D. in Economics from Washington State University. Before joining FARE, Tongzhe was an Assistant Professor in the Department of Economics at the University of Windsor.



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Foreign Direct Investment and Emissions

By: *S. Kwaku Afesorgbor, Assistant Professor, FARE; Binyam A. Demena, Post-doc Researcher, Erasmus University Rotterdam*

Foreign direct investment (FDI) has been identified as one of the main engines of economic growth, a potential source of employment, as well as a channel through which advanced technologies can be transferred to host countries. However, one important and frequently raised issue about FDI is its potentially deleterious consequences for the environment. It is possible that the economic gains associated with increase in FDI could be negated by potential environmental costs, as FDI may occur simultaneously with increased environmental emissions.

The FDI-environmental emissions linkage continues to be a controversial topic in the globalization-environmental debate. This controversy is centered around whether increased globalization through the movement of international capital from one country to another is good or bad for the environment. This debate has generated opposing hypotheses that support each line of argument.

The 'pollution haven hypothesis' suggests that increases in FDI would be detrimental for the environment, especially in developing countries. Researchers supporting this side of the argument contend that increased FDI may promote increased production and consumption through the exploitation of the environment and the depletion of natural resources. Conversely, the 'pollution halo hypothesis' argues that FDI could have beneficial environmental effects through the transfer of green, environmentally friendly or energy-efficient technologies that would curb emissions.

These opposing hypotheses have also culminated in myriad empirical studies; however, the empirical evidence has only produced conflicting and contrasting results, thereby further confounding the theoretical ambiguity.

A recently published paper in *Energy Policy* conducts a systematic and rigorous review of the existing literature on the effect of FDI on the environment using the empirical tool of meta-analysis. Meta-analysis helps in achieving two important objectives with regards to the FDI-environment nexus. First, we use the bivariate funnel asymmetric test - precision effect test (FAT-PET) model, in line with the Meta-Analysis for Economic Research Network (MAER-Net) guideline, to derive a combined effect size from the conflicting results of the previous studies. FAT-PET helps to determine whether there is a publication bias and also to obtain the genuine effect of FDI on emissions after correcting for publication bias. Second, we use multivariate meta-regression analysis to explain the heterogeneity in the previous studies. This is necessary in order to determine how differences in the study

characteristics are sensitive to reported estimates of FDI's impact on the environment. The heterogeneity in studies ranges from different data characteristics, econometric techniques, choice of measurement of the FDI variable, environmental pollutants or indicators, and the set of macroeconomic control variables. Altogether, our meta-analysis uses 65 studies that produced 1,006 estimated elasticities of FDI on the environment.

Inferences from our results based on both weighted and unweighted meta-averages show that the underlying effect of FDI on the environment is close to zero. This was also confirmed by the FAT-PET regression as it finds no significant effect of FDI on emissions. In addition, it discounts the presence of any publication bias, in that, the empirical studies have not been influenced by some sort of publication selection pressure in terms of preference for positive or negative statistical significance evidence from journal editors, reviewers or authors.

However, after controlling for publication bias and individual heterogeneity using the multivariate analysis, we find a significant inverse relationship between FDI and emissions. More specifically, an increase in FDI reduces emissions. This result is in favour of the pollution halo hypothesis. Thus, our results indicate that FDI does not only improve economic growth but could also potentially reduce environmental pollution or emissions. Additionally, disaggregating the results for different country categories, we find that the effect of FDI on emissions differs qualitatively and quantitatively for these country groupings. Under our FAT-PET model, we find that FDI has an inverse and a significant effect on emissions for developed countries.

The inverse and significant effect is robust when we account for study heterogeneity using the multivariate meta-regression approach. From our results, we found that the emission-reducing impact of FDI was minimal for CO₂ compared to SO₂. These differences in the results for these pollutants could possibly be due to the fact that SO₂ is a local pollutant in which the adverse effects and health implications are geographically localized. Not surprisingly, countries are more proactive in curbing the emissions of local pollutants as compared to CO₂, which is an international pollutant. Controlling for individual study characteristics, we find a pronounced effect for developed countries compared to developing countries. Similarly, for studies that mixed the developing and developed countries in their samples, we still find an inverse and significant result.

About Kwaku: He brings a global perspective to his research and teaching. Following his undergraduate degree, Kwaku moved from Ghana to The Netherlands for his Master's degree and then to Denmark for his Ph.D. He was a Postdoctoral Researcher at the Tuborg Research Centre for Globalization and Firms of Aarhus University, Denmark, as well as a Max Weber Postdoctoral Fellow at the Robert Schuman Centre for Advanced Studies of European University Institute, Florence, Italy. Kwaku is keen to continue learning in the areas of international trade, political economy, globalization and development, impact evaluation and applied econometrics, food and development.



Participation in Trade Assistance Programs

By: Yu Na Lee, Assistant Professor, FARE; David R. Just and Nancy Chu, Cornell University

The Trade Adjustment Assistance for Farmers (TAAF) was established in 2002 as a measure to assist farmers in the U.S. adversely affected by import competition via technical assistance and cash benefits up to \$10,000 per year. In order for a producer group to be eligible, the price must have declined by more than 20 percent from the previous five-year average and imports must have increased during the most recent 12-month period and demonstrably contributed to the price decline. The TAAF was underused by farmers during 2003-08, spending only about 10 percent of authorized funding. In 2009, the program was redesigned by the American Recovery and Reinvestment Act (ARRA) – a major stimulus package championed by the Obama Administration in response to the Great Recession – which eased and clarified the eligibility criteria and changed the cash benefits from coupled to decoupled payments.

In a paper recently published in *Food Policy*, we examine the following questions that are relevant given the policy and political backdrop: What motivates producer groups to participate in the TAAF program? Do cross-program effects exist between the TAAF and non-TAAF farm support programs? How do these effects differ in periods pre- and post-ARRA? To answer these questions, we constructed a panel data set that encompasses the prices, the imports, and TAAF petitioning activities of 202 field crops and two fishery commodities and both the pre-ARRA (2003-07) and the post-ARRA (2010) periods of the program.

The following takeaways from this study might be useful for a better design of future iterations of the TAAF and related policy. First, the nature of commodity groups such as crop characteristics and producer group organization matters the most when it comes to TAAF petitioning decisions. Our results indicate that time-invariant characteristics embedded in state-commodity fixed effects explain about half the variation in petitioning activities. Indeed, specialty and horticulture commodities and fish and shellfish account for about 70 percent of the TAAF petitions. Imports of fresh fruits and vegetables and fishery commodities account for a significant portion of U.S. agricultural imports, and are likely to increase further in the future. Should the future TAAF program be designed, it will be reasonable to expect that demands for assistance from these commodity groups are likely to continue.

Second, any disagreement between farmers' expectations and actual outcomes from participation in the program need to be addressed. Our results imply that there might have been a gap between farmers' expectations and actual outcomes from

the certification process due to an ambiguity of definitions in the eligibility criteria. Although the eligibility criteria became more transparent after the ARRA, there still may be parts of the investigation procedure that need clarification.

“Specialty and horticulture commodities and fish and shellfish account for about 70 percent of the TAAF petitions.”

Third, regardless of the intended purpose of a program, how the benefits are designed may significantly affect a producer's incentive to participate. We find some evidence that, before the ARRA, incentives to mitigate negative price risk drove participation. A decrease in recent state-level receipts from the non-TAAF farm support programs is significantly related to an increase in TAAF petitions, suggesting substitutability with the non-TAAF farm support programs. Such a relationship is driven by price risk management programs that offered coupled payments that are similar to the TAAF cash assistance. After the ARRA, the cross-program relationship switched its sign, implying a significant change in motivations for participation after the restructuring of the TAAF cash assistance from coupled to decoupled payments.

In a similar vein, it is important to understand where the program stands in the entire mix of policies. Determining which part of the TAAF's role is unique and which is redundant to other programs could guide the future design of the program. For instance, a careful examination of the specialty crop programs that were expanded by the 2018 Farm Bill and the new risk management programs introduced by the 2014 Farm Bill will be necessary.

The future of the TAAF program is currently uncertain due to skepticism on the effectiveness of the TAA programs, budgetary concerns, and discontinued funding. There has been no new program activity since fiscal year 2011 due to the lack of appropriated funds. However, demands for financial and technical assistance to cope with surges in agricultural imports may grow in the future given the uncertainty in the global trade and constant growth of U.S. agricultural imports, which makes this study more relevant.

Our study is limited by a data set that only includes one year of observation after the ARRA. Future research must include a longer time horizon if future TAAF activities continue. Another important area of future research would be a rigorous evaluation of the economic effectiveness of the program based on farm-level data.

About Yu Na: The overarching themes of her research and teaching is how producers, consumers and households make decisions under uncertainty and how agri-food policy affects decision-making and welfare of the economic agents in developed and developing countries. Yu Na studied at Yonsei University in Korea for an undergraduate degree in Business Administration and a Master's degree in International Trade and Finance. After working as a researcher at the Korea Development Institute (KDI) for three years, Yu Na pursued graduate studies in the U.S. She received her M.S. in Agricultural Economics from Cornell University and a Ph.D. from the University of Minnesota.

BMP Adoption

effect of a negative framing (failing to use the product can worsen water quality) was also positive, but smaller and not statistically different from zero. The estimated effect on average WTP from the anchor depends on how bids of \$0 are modeled, but the results imply that higher anchors lead to higher WTP. The results add to the evidence base that environmental programs can achieve policy-relevant gains in program performance through a series of small changes to the decision environment.

Taking these findings as proof-of-concept, we conducted a series of field experiments, including a statistical power analysis based on the results. We also launched a large-scale experiment for replication purposes. To shed light on the effect of long-term behavioural interventions, we tested whether individuals given the information that researchers used anchoring as an instrument to influence behaviour responded differently than those who did not. Finally, we investigated if emotional narratives work better than scientific messages to increase WTP for nutrient runoff BMPs.

Future studies in FARE will test how these behavioural instruments, along with others such as social norm nudges, change BMP adoption behaviour in the agricultural sector in Ontario and across Canada.

Portion Cap Rules vs. Taxes

By: Jose G. Nuno-Ledesma, Assistant Professor, FARE; Steven Y. Wu and Joseph V. Balagtas, Purdue University



How do price-discriminating sellers modify their pricing schemes in the face of regulatory interventions? This article is an excerpt of my dissertation that examines that question from the perspective of a food retailer deciding menu characteristics, such as price and quantity, in the context of a given food policy environment. The policies examined are portion cap rules and taxes, both designed by the policymaker to reduce the consumption of certain foods and ingredients.

We conducted a laboratory experiment that compares the impacts of per-unit taxes and portion cap rules in a single-product market with privately informed buyers. Our experimental design is informed by nonlinear pricing. Holding the quantity-reduction goal for the largest option constant in the regulated treatments, we manipulate the policy environment with the intention of observing whether sellers modify their pricing strategies, and measure how payoffs change across treatments, paying close attention to consumer surplus.

Taxes are among the most popular policy measures to reduce consumption of foods judged to be unhealthy, while portion cap rules are an understudied alternative that has been accused of being particularly harmful to consumers and of reducing choice. The concerns raised against caps are rarely mentioned when discussing specific taxes. Thus, we aim to find whether the ills attributed to caps are found in the data generated by an experiment, and whether these ills also apply to taxes.

In a controlled laboratory experiment, we manipulate the policy environment across three

treatments – a baseline without regulations, one treatment with a tax, and one treatment with a portion cap rule. The tax and the cap rule are designed to reduce the quantity of large options by the same amount. If one policy is more likely to cause our sellers to offer less options compared to the baseline, we argue that the policy reduces consumer choice; similarly, if consumer surplus is negatively impacted by an intervention, then we submit that the measure hurts consumers.

Compared to the baseline, our data suggests that subjects are as likely to offer menus with two options to serve both types of buyers when there is a cap rule, but they are less likely to offer two-option menus when there is a tax. Moreover, we find that consumer surplus is reduced when there is a tax, but not when there is a portion cap rule. This is because as the cap rule reduces the quantity at which the product can be offered, the seller needs to adjust prices down to keep quantity discounts constant, which does not occur in the taxed treatment.

This project is informative to policy makers in charge of regulating consumption in markets where protection of consumer welfare is of primary concern, and where sellers adopt second-degree price discrimination as their main segmentation strategy, which is the case of the food retail industry.

The complete dissertation is available at:



About Jose: His research spans organizational economics, experimental economics, agricultural economics, and their applications to food policy. Jose received his Ph.D. in Agricultural Economics from Purdue University where he specialized in contract theory, experimental economics and computational science. He also holds an M.S. in Applied Economics from the University of Minnesota, and an undergraduate degree in Economics from the Universidad de Guadalajara. Before joining FARE, Jose worked as a Senior Economist for the Central Bank of Mexico.



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