Topics Available for Thesis Research in
Agricultural Economics

Purdue University

2010-2011
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**Stabilization Policy in Developing Countries after the 2007-08 Food Crisis**

During the 2007-08 food crisis very high and volatile world grain prices brought stabilizing policy responses by many developing country governments. The isolationist policies pursued contradicted “best practices” risk management strategies that focus on long run agricultural development, trade liberalization, safety nets and private market solutions to risk. Some have criticized those recommendations in the wake of the food crisis, as countries that opened their borders were vulnerable to high import costs and pass-through to high consumer prices. Domestic market outcomes were conditioned to varying degrees by lagged price transmission, transactions costs and weak market integration in addition to policy responses. Stabilization of domestic markets also spilled over into greater international market instability. If world price spikes like those observed in 2008 are an infrequent but real event, policy recommendations need to take into account this more realistic characterization of world price distributions. Various questions related to food policy in developing countries are being pursued that emphasize the potential role of trade in determining food security in the wake of the 2007-08 food crisis.

**Market Institutions and Economic Development in Vietnam**

Past research in Vietnam has led to the development of a new, stylized dynamic CGE model evaluating linkages between trade and development in Vietnam. That research was initially enabled by acquisition of a data set on investment by sector of origin for 112 economic sectors, disaggregated by firm type (foreign invested, state owned, or private) from 2000 to 2005. The research therefore focused on investment mechanisms that influence trade outcomes, and how those linkages may be affected by bilateral trade agreements and Vietnam’s WTO accession in 2007. That research has also examined the role of the state in directing investment as an important factor contributing to Vietnam’s rapid economic growth and success at reducing poverty. Ongoing research investigates the roles of public and foreign investment in economic development, implications for labor demand and income distribution as an economy grows, and how this is affected by structural transformation reducing the role of agriculture in the economy.
Currently, corn rootworm management consists primarily of controlling larvae using crop rotation and soil insecticides. In the mid 1990s, the use of insecticides on corn after soybeans has increased dramatically, from 10% in Indiana in 1994, to 65% in 1996. This is an interdisciplinary project with entomology and weed science. The economic portion has two components. First, a cost-benefit analysis will be used to identify the maximum potential benefit from the transgenic corn. The economists will collaborate with the entomologists, weed scientists and growers to identify the cost differences both in terms of materials, and changes in labor costs. Second, a survey will be used to identify those growers who are most likely to adopt this transgenic corn, taking into account corn rootworm pressure, current control methods, and marketing opportunities.
This research follows from a study that was done in 2009 regarding confined animal feeding operations and their impacts in rural communities. Research indicates that rural community growth and well-being are heavily influenced by levels of perceptions, trust, relationships, and community involvement of residents. This research aims to examine how these factors relate to local agricultural operations and the community. The literature search is completed and a questionnaire has been developed. The survey will be distributed in early fall 2010. After several follow-up attempts to ensure a high response rate, data will be entered and analyzed during the winter 2010 and publications will be written in early 2011.
TIMOTHY G. BAKER

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**Risk Management**

This project is to provide the background research for the department's risk management extension work. Essentially risk management alternatives are to be identified (marketing alternatives, hedging, crop insurance, diversification, revenue insurance, etc.), then the probability distribution of returns under the various alternatives will be determined.

**Financing and Hog Contracting**

This is a joint project with the University of Illinois. A survey of lenders attitude toward lending for contract vs. independent production has been completed and a simulation model is being built. There is the possibility that a student could define a thesis topic that would complement the work under way.

**Stochastic Dominance**

The literature on stochastic dominance includes the work by Jack Meyer on stochastic dominance with respect to a range of risk aversion. Meyer's procedure uses a range of coefficients of absolute risk aversion. There is little agreement in the literature on the relevant range of absolute risk aversion, and many times stochastic dominance is performed on returns per acre and returns per dollar invested. This research is to rework the method of Meyer to use relative risk aversion. There is much less controversy regarding the range of relative risk aversion, and some of the problems associated with multiplicative gambles are alleviated.

**Machinery Cost**

This project is to use the machinery repair and remaining value equations in the literature to determine the marginal cost of using machines. Such costs are very relevant in the partial budgeting situations that frequently arise. The current literature contains frequent reference to average costs, but the marginal cost is often inaccurately assumed to be equal to the current repair cost per unit of use (without considering future repairs, remaining value, and trading time).
JOSEPH BALAGTAS

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**Economics of GM-free Labels**

Monsanto’s recombinant bovine somatotropin (rbST) technology is one of the so-called first generation genetically modified technologies, a genetically engineered hormone that increases milk production when administered to dairy cows. The FDA has approved rbST for use in the United States, but consumer advocates and some dairy farmers and processors have argued that potential animal and human health risks associated with rbST warrant caution, and that consumers have a right to know if they are consuming milk from cows treated with rbST. Indeed, dairy demand studies have found that some consumers are willing to pay for non-rbST milk. However, milk from cows treated with rbST is indistinguishable from non-rbST milk; that is, non-rbST is a credence attribute. Thus, absent some mechanism to overcome the information asymmetry, the market would supply less non-rbST product than is socially optimal.

The signaling mechanism in use in the U.S. is voluntary labeling; dairy processors may use labels that indicate that a product was produced from milk from cows that were not treated with rbST. Voluntary labeling has been shown conceptually to lead to increased provision of credence attributes, increase choice for consumers, and increase consumer welfare. However, in the case of U.S. dairy markets, non-rbST labels appear to have had the opposite effect on consumer choice. In recent years, major milk processors including Dean Foods, Wal-Mart, Costco, Kroger, and Starbucks have begun to sell only non-rbST dairy products, requiring that the cooperatives and dairy farmers that supply milk to their plants not use rbST. Thus, contrary to the predictions of the extant literature, voluntary labeling of non-rbST has not expanded consumer (and producer) choice, and has made at least some consumers (those indifferent to the rbST technology) worse off.

The purpose of this research is to explain the unexpected effects of voluntary non-rbST labels, and to evaluate the consequences for consumers and dairy farmers. This project will incorporate microeconomic theory as well as empirical methods in order to evaluate the effect on provision of rbST and non-rbST products under voluntary labeling, and the implications for consumer and producer welfare. More generally, this research explores the economics of food labels and supply and demand for food attributes.

**Fruit & Vegetable Planting Restrictions**

Current U.S. farm programs make payments to farmers based in part on historical base acres planted in particular program crops, including corn, soybeans, cotton, etc.
Eligibility for payments requires that farmers not plant horticultural crops on such base acres. The fruit and vegetable planting restriction on base acres potentially influences planting decisions, and thus has been challenged successfully in the WTO for trade distortions. However, the extent to which the planting restrictions influence planting decisions remains to be debated, and is ultimately an empirical question. Similarly, the extent to which planting restrictions are trade-distorting is also an empirical question that has yet to be settled. This research involves econometrics and partial equilibrium simulations to model and measure the economic effects of the F&V planting restrictions in U.S. policy.
A self-control problem occurs when present behavior does not accord with a rationally chosen desired future outcome. In economics this has been variously modeled as “hyperbolic discounting" and as a principal agent problem. These models explain why consumers often make commitments in the present to certain forms of future behavior. Voluntary restriction on future choice serves as a mechanism to impose self control before the fact by increasing the time between decision and consumption. Examples abound in personal finance. For example, buying a home is often cited as a method of forced savings.

Self control problems are especially relevant to food consumption. In the obesity debate, one economic study attributes much importance to the role of innovation in reducing the time for food preparation and thus the delay before consumption. “People with self-control problems respond more to the ready availability of food than people without such problems.” One such innovation is the vast growth in the restaurant sector and the availability of a large variety of highly palatable, reasonably-priced offerings. In the case of home consumption there is a significant delay between choosing foods in the supermarket and final consumption of the meal. A shopper may be able to resist fattening foods simply because consumption will occur in the future. Refusing to purchase these items imposes a restriction on future behavior. “Dieters try not to keep cheesecake in the refrigerator." This mechanism is not available when dining out: the delay between decision and consumption is nearly eliminated, and giving in to temptation is likely for someone with self-control problems.

This project will investigate the importance of self-control by mining several large USDA data sets. In particular, data on individual food intakes will be used to measure and compare behavior in restaurants and when dining at home, and to relate differences to variables related to self control, especially weight status (BMI). A second possibility is to use commercial household “homescan” panel data purchased by USDA to examine home food consumption. For example, if diminishing time between food purchase and consumption is causing consumers to choose tasty, calorie-laden foods, frequent shoppers would be expected to buy more such items than “major trip” shoppers.
**Industrialization and Vertical Coordination in the Agricultural Sector**

Significant changes are occurring in the agricultural sector — changes often described as the industrialization of agriculture. One of these changes is increased use of alliances, contracts and negotiated coordination between the various stages of the food chain. As quality and other product attributes become more important and valuable to consumers, and technology for producing and measuring these attributes develops, the benefits of negotiated coordination are likely to increase. The objective of this project would be to evaluate the efficiency gains, transactions costs, and quality impacts of changing technology to measure quality and other product attributes, and changes in market coordination systems in the markets for nutritional and industrial products in the agricultural sector. Results will be useful in anticipating both structural changes in the sector and strategies that agribusiness companies may adopt to increase efficiency and market share. (in collaboration with Allan Gray)

**Strategic Risk Assessment and Management for Agribusiness Firms**

The accelerating speed of change in the food and agribusiness industries is resulting in more risk and uncertainty – the future is becoming much less predictable. Not only is the future more uncertain, the drivers of that uncertainty are also changing – strategic risk which generally has a low probability of occurrence, but large consequences, is becoming an increasingly important component of the decision environment. Managing these risks requires not only new assessment tools such as scorecarding and mapping, but also more systematic decision frameworks that can be best structured as decision trees. And managing time to redefine a strategic choice in an uncertain environment into a growth, divest, exit, pause or follow-on option that truncates the loss exposure and allows capture of the profit potential transforms strategy under uncertainty from a defensive posture of minimizing losses and protecting positions to an offensive posture of creating and capturing value. This work would expand the risk assessment tools and techniques typically used in agricultural economics to include strategic risks, options analysis and scorecarding and mapping and the application of these tools and concepts to the development of strategy for agribusiness firms. (in collaboration with Allan Gray.)
# JOHN M. CONNOR

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## Cartel Efficiency

The Lerner Index of market power is imbedded in nearly all oligopoly models; it is deduced as the first-order condition from a wide range of models for profit maximization for both individual firms exercising market power and groups of leading firms exercising coordinated effects (i.e., tacit or overt collusion). In empirical studies, the price effects of cartels are typically measured using the Lerner Index or its one-to-one correlate the overcharge.

Maybe the Lerner Index is not the best measure of cartel pricing effectiveness. From the Cartel Overcharges sample, one can find a significant sample of studies that calculated both the Lerner Index and the monopoly price (e.g., Roeller and Frode 2006). That ratio I call cartel pricing efficiency.

The objective of this project is to explain why it varies using variables that capture market and internal structures of cartels. For example, one might hypothesize that cartel efficiency is negatively related to the number of firms in the cartel and the share of the market not controlled by the cartel (the fringe). Another interesting hypothesis (never tested before) is that satisficing conduct is a better predictor of the Lerner Index or of cartel efficiency; in particular, it may be the case that cartels aim at a target price effect that provides some simple multiple of historical industry rates of return. Satisficing behavior may be preferred to maximizing behavior as a way to recruit risk-averse cartel members while at the same time reducing the probability of detection by antitrust authorities.
Is there a Threshold Degree of Concentration for Cartel Formation?

Some authors/models (e.g., Selten) predict formation when the number of cartelists (with minimum degree of supply control?) falls below 5 or 6. Philips and Ferris say it is HHI=1667. Dick has different, more complex HHI hypothesis. Using either PFO or PIC data, we can test the relative predictive power of the hypotheses.

The Severity of Corporate Cartel Sanctions I

For the US, EU and Canada, examine the determinants of the variation in the fine/sales ratios using whole cartels as units of observations; for the US, also look at the settlements/sales ratios. See Giradin and Harvey (2005) as a model that will be easy to surpass. Are the ratios rising over time, and do changes in policies (e.g., leniency awareness) or political regimes (Presidential in the US, Commissioners in the EU) have explanatory power? Are fines higher in the EU if preceded by a US finding of guilt? Do joint raids have an effect? Do settlements rise if timed after a criminal conviction? Do they vary by court Circuit or District? What explains the larger number of firms convicted in settlements compared to criminal? [Repeat for sanction/damages ratios?]

The Severity of Corporate Cartel Sanctions II

Use company-level ratios as observations. Repeat analysis above, but ask some new questions. Does the nationality of the defendant systematically affect harshness? By how much has the application of cooperation discounts to the convicted cartelists adversely affected deterrence? Can we quantify the deterrence trade-off between the granting of full amnesty (100% fine discounts and in the US a reduction from the treble to single civil damages) and the additional discoveries of otherwise clandestine cartels?

Trade Associations and Cartel Duration

Trade associations are frequently linked to cartel formation and stability. Collect data on the role of international trade associations in cartels, especially EC-sponsored task forces, and link to PIC data. Some are fined or mentioned explicitly in EC decisions. The DOJ rarely does so; why not? Does the assistance or mere existence of an association extend cartel duration? Is the effect exogenous, or does it interact with market concentration or cartel supply control?

Cartels and Controlled Market Experiments

Starting with Marco Haan’s (2005) survey of laboratory experiments that involve collusion with full communication, derive parameters of factors that facilitate cartel formation or that have significant positive effects on the equilibrium market price. Compare the predictive value of these parameters with observed cartels in the PIC data set. Compare result to SSE Working Paper No. 698 by Maria Bigoni et al. (May 2008).
Drivers of Indian Farmland Values

Research has shown that farmland values are influenced by both agricultural earnings and nonagricultural factors. One possible project in this area would be to identify those factors that are important in determining the value of Indiana farmland and in forecasting their future value.

An important source of income to an investor in farmland is the rent received from a tenant. Over time, the most common type of lease used for farmland rental has shifted from a crop-share lease to a fixed cash rent lease. With the upward spike in commodity prices, there is increased interest in using a flexible cash lease or other type of lease that adjust automatically to such unexpected surprises. This project would explore various types of lease arrangements and determine how the terms of a flexible lease may shift the risks and rewards for the tenant and landlord.

Economics of Cropping Systems

The technologies associated with the cropping systems used in the Midwest continue to evolve. Questions have arisen regarding the appropriate application rate for nitrogen fertilizer on corn. The use of corn grain and plant cellulose for ethanol production has raised questions about the appropriate crop mix. The development of controlled drainage and underground irrigation systems has raised questions about the profitability of such systems. This project could explore one or more of these issues associated with cropping systems.
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**Resource Policy, Conservation Issues, Energy and Biofuel Issues for Agriculture**

The areas of interest here include water quality issues related to agricultural production affecting such things as the dead zone in the Gulf of Mexico. Also included here are water issues stemming from biofuel production coupled with land use issues stemming from increased crop and biofuel feedstock production. There may also be an opportunity to work on economic issues related to reactive nitrogen pollution and trade-offs in nitrogen use. There is no firm funding at the moment.

**Energy, Renewables, New Technology and Energy Policy**

There may be limited funding to work on projects dealing with a range of energy related subjects. Much of the work will be related to renewables and assessment of new technology. Conservation and energy policy issues will also be involved. Such work would likely be done jointly with other faculty in the Department and faculty in other Departments. There is no firm funding at the moment.

**CLIMATE – Economic Impacts and Cost of Mitigation and Adaption**

There are sporadic opportunities through the Purdue Climate Change Research Center and its members for economic impact work on climate change. These are multi-disciplinary and can cover a wide range of climate related topics.
Data availability at relatively low levels of spatial aggregation has contributed to the use of spatial econometric techniques in the study of economic growth. Although the utilization of such techniques is proliferating, their application has been rather mechanical and explicit links to theory are oftentimes not very well developed. This project focuses on analyzing regional economic growth data (for US counties, with a special emphasis on the Mid West and the state of Indiana) in comparison to NUTS 2 regions in Europe. The theoretical emphasis includes developing a link to the New Economic Geography literature, where a strong emphasis has been put on the relevance of agglomeration economies. In addition, the development of a link between the literature on economic growth and income (in)equality, for which specific spatial econometric techniques are available, will be pivotal. A potential extension of the project could focus on the development and use of appropriate econometric techniques to analyze space-time data.

Meta-Analysis in Economics: Does Publication Bias Distort our View of the World?

Meta-analysis centers on the use of statistical tools to analyze and summarize an existing body of empirical literature. The technique was originally developed in the context of experimental sciences, but its use in economics is quite extensive nowadays and includes publications in high quality journals. The merits of meta-analysis in the economics profession are, however, not necessarily undisputed and two issues are rather prominent in the assessment of the pay-off of meta-analysis. One issue focuses on the assessment of the validity of the technique in a non-experimental (or quasi-experimental) setting, which is relevant for large parts of the economics literature. The other concerns the potentially distorting role of publication bias, which has been raised some ten years ago by Card and Krueger discussing the impact of minimum wages. The main purpose of this project is to assess the potentially distorting role of publication bias in meta-analysis in economics. Specific objectives of the project include: a) a theoretical and conceptual analysis of selective sampling and publication bias, b) a review of basic statistical indicators that have been used to test for publication bias, c) the development of a statistical test in a meta-regression framework, and d) the determination of the impact of publication bias in a prominent empirical literature.
Spatial spillover effects are at the core of many areas of applied economic research. For instance, in trade theory, economic growth, location theory (including Foreign Direct Investment), rural-urban linkages, etc. In environmental economics spatial spillovers are relevant as well, but their impact has not been very thoroughly investigated. Exceptions include work on the environmental Kuznets curve, the valuation of air quality, and hedonic pricing models. This project focuses on modeling spatial spillovers in environmental economic models. The project centers in particular on determining the impact of spatial spillovers in complying with environmental regulation (e.g., set maximum values for air pollution). Spatial spillovers are likely to be relevant both with respect to economic development of an area as well as with respect to air pollution, making a systems approach desirable. Concurrently, several problems related to the spatial sampling design of air quality data need to be tackled, for instance, because it is not uncommon that air quality monitors are located in relatively polluted areas only.
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**Time Series Testing of Market Power**

First order conditions for profit maximization suggest that input prices and the value of marginal product should be cointegrated regardless of the degree of competition. However, the first order conditions for oligopolistic firms lead to very different hypotheses about the value of the cointegrating vector versus those of the perfectly competitive firm. While the methods for testing these hypotheses have been worked out, they are tedious to apply and the connection between market power and the cointegrating vector has not been previously addressed in the literature on market power. Furthermore, the traditional structural models used for testing market power suffer from multicollinearity and specification bias, and data driven time series specifications can alleviate these problems to some degree.

**Monte Carlo Valuation of Investment Options**

Recent developments by Brody and Glasserman using monte carlo methods to value options and derivatives make it easier to estimate option values where the stochastic process does not necessarily follow Brownian Motion. Closed form solutions do exist for other classes of stochastic process, but these processes are restrictive. This research would focus on using time series methods to estimate discrete approximations to the stochastic processes of interest and use Brody and Glasserman’s monte carlo approach to value important agricultural investment or policy options such as farmer investment in cooperative processing.
JOAN FULTON

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**Economic Implications for Producer Investments in Value-Added Business**

This research addresses one of the critical issues the industrialization of agriculture poses for producers. Part of the industrialization process involved forming more tightly aligned supply chains that extend from the producer through the first handler to the processor or potentially the retailer. Examples of these organizations include New Generation Cooperatives, limited liability companies, as well as joint ventures and strategic alliances. The purpose of this research is to identify the returns and risks for producers who take the initiative in the formation of food supply chains through investment in value-added first handling, processing or other downstream activities. Key success factors associated with value-added businesses will be identified as part of this research. The results will be useful for producers as they consider significant capital investment in value-added processing.

**Structural Change in Cooperatives and Agribusiness: Joint Ventures, Strategic Alliances and Mergers**

The structure of all sectors of agribusiness is currently undergoing rapid change, including increased consolidation due to mergers, acquisitions, joint ventures and strategic alliances. This research will explore the structural changes in agribusiness, related to mergers, acquisitions, joint ventures, and strategic alliances, and identify the driving forces behind the reorganizations as well as the factors that contribute to the success of the new structures. The objectives of the research are to (1) analyze theoretically and develop a model of the structural change that is currently occurring in cooperative and investor oriented agribusinesses with particular emphasis on mergers, acquisitions, joint ventures and strategic alliances, (2) continue with the database development of the mergers, acquisitions, joint ventures, and strategic alliances that have occurred in the United States among cooperative and investor oriented agribusinesses at the regional and national level during the 1990s. In addition to listing the partners involved in the restructuring the database will contain the driving forces behind the reorganization as well as the factors that contributed to the success and/or failure of the reorganization. (3) perform empirical analysis of the data, draw conclusions and identify implications for agribusiness decision makers and policy makers.
Word of Mouth Marketing

In the changing, industrialized agriculture agribusiness firms are looking for new and innovative marketing approaches in order to remain competitive. One method of marketing that has not been the subject of a lot of research is word of mouth marketing. This research will examine how agricultural producers respond to different types of word of mouth marketing. Producers who have been part of a structured program (often a facilitated teleconference) will be interviewed to determine how effective the marketing program was. Demographic factors, associated with the participants, as well as characteristics of the program that have the greatest influence on success will be identified. The results of this research will be useful to agribusiness firms as they adapt their marketing programs to meet the changing economic conditions.
Industrialization and Vertical Coordination in the Agricultural Sector

Significant changes are occurring in the agricultural sector — changes often described as the industrialization of agriculture. One of these changes is increased use of alliances, contracts and negotiated coordination between the various stages of the food chain. As quality and other product attributes become more important and valuable to consumers, and technology for producing and measuring these attributes develops, the benefits of negotiated coordination are likely to increase. The objective of this project would be to evaluate the efficiency gains, transactions costs, and quality impacts of changing technology to measure quality and other product attributes, and changes in market coordination systems in the markets for nutritional and industrial products in the agricultural sector. Results will be useful in anticipating both structural changes in the sector and strategies that agribusiness companies may adopt to increase efficiency and market share. (in collaboration with Mike Boehlje)

Understanding Large Commercial Producer Buying Behaviors and Attitudes

Every 5 years the Center for Food and Agricultural Business conducts a survey of large commercial producers regarding the input purchase behaviors and attitudes. The new survey will be conducted in January of 2008 with new data available by April of 2008. This dataset can be used to explore a number of issues associated with large commercial producer buying preferences. In the past research has been conducted on producer brand loyalty, segmentation of producers according to preferences for various attributes of the marketing bundle, and producer preferences for distribution channel linkages. Many other questions related to producer buying behavior remain and the dataset provides a rich source to explore these questions.
While attention has recently shifted to the potential impacts of climate change on the poor, almost no attention has been paid to the likely poverty impacts of proposed programs aimed at climate mitigation. The hypothesis underpinning this research project is that, in many regions of the world, the poverty consequences of policies to mitigate climate change could dominate the poverty impacts of the climate change itself.

Forestry and agriculture account for roughly one-third of global greenhouse gas emissions (IPCC 2007) thus offering tremendous potential to contribute to climate change mitigation programs. Furthermore, at high carbon prices (e.g., $100 per ton CO$_2$ equivalent), the combined mitigation potential of agriculture and forestry is greater than that of any other individual sectors in the economy (World Development Report 2010, 25). Indeed, Golub et al. (2009) estimate that, in the context of a globally efficient carbon policy, implemented over the next two decades, these sectors could account for as much global abatement as would be attained from reduced fossil fuel consumption, based on a global carbon tax of $28 per ton CO$_2$ equivalent.

Much of this low cost abatement is due to avoided deforestation in the tropics. This has focused considerable international attention on programs for Reducing Emissions from Deforestation and Degradation (REDD). Indeed, a handful of wealthy nations committed a $3.5 billion down payment for REDD -- with much more to follow -- at the recent climate summit in Copenhagen. As it happens, much deforestation occurs in areas with relatively high poverty rates – namely at the agricultural frontier in developing countries. This opens the possibility of significant interactions between climate change mitigation efforts and poverty.

There are two channels through which mitigation policies can affect poverty. The first of these is through payments for environmental services. When the poor are involved in efforts to sequester carbon, the payments to these households may directly serve to alleviate poverty. In addition to these direct impacts from payments for environmental services, mitigation policies can have indirect poverty impacts through commodity and factor markets (in much the same way as the climate change impacts discussed above). This potential for indirect effects is illustrated by the contribution of biofuels programs – motivated themselves in part by greenhouse gas (GHG) mitigation objectives – to the recent run-up of world food prices. The poverty impacts of higher commodity prices induced by mitigation efforts are unclear since higher prices may hurt low income consumers, even as they have the potential to benefit rural agricultural households where many of the world’s poor reside.

The recent push for biofuels has, to date, been heavily concentrated in the US and
the EU, which has limited the global price impacts. However, a major, global initiative to reduce GHG emissions from agriculture and forestry – with much of the spending in the tropics – could have even more significant commodity price impacts in agriculture. The reason is that most of the abatement strategies serve to increase the global demand for land. Carbon forest sequestration is most obvious in this regard, but policies to reduce nitrogen fertilizer applications (an important source of nitrous oxide emissions), sequester agricultural soil carbon, and reduce methane emissions from paddy rice production and/or livestock all have the potential to require more land for a given amount of agricultural output. This in turn can have important impacts on commodity prices. For example, Golub et al. (2009) estimate that a global agricultural carbon tax/forest sequestration subsidy of $28 per ton CO₂ equivalent could boost world average prices by 31% for rice, 28% for ruminants and 11-13% for other crops. In the context of the proposed US climate change legislation (the so-called Waxman-Markey bill), McCarl estimates that mitigation efforts could result in the diversion of nearly 50 million acres from cropland to forest cover in the US, causing corn prices to be twice as high as they would otherwise be in 2050 (McCarl 2009).

The broad objective of this proposal is to estimate the impact of alternative mitigation strategies on poverty in a cross-section of developing countries. The work will unify two strands of literature – all utilizing modified versions of the GTAP model of global trade and resource use. Firstly the work of Golub et al (2009), as extended in the context of a series of projects with the UN-FAO, provides a starting point for the assessment of mitigation policies on global commodity and factor prices. A second strand of work is that by Hertel et al (2009) which develops a poverty module for assessing the impacts of trade reforms on commodity prices and factor returns and thereby on poverty. The third strand of work is that by Hertel, Burke and Lobell (forthcoming) which utilizes a poverty-augmented GTAP model to assess the poverty impacts of projected climate change in the year 2030. By combining these three lines of work, this project will test the hypothesis posed in the first paragraph above, namely that the near term poverty impacts of climate mitigation policy dominate the poverty impacts of climate change.

**Economic Impacts of Extreme Climate Events**

Agriculture as well as other land and water-intensive sectors will be challenged by climate change, including the likelihood of increased frequency and intensity of extreme events. Such events exert critical controls on human and natural systems (e.g., Easterling et al., 2000: Parry et al., 2007). Changes in extreme climate regimes could thereby have dramatic sociological, economic and ecological consequences, particularly through changes in the hydrologic cycle.

In this project, we will combine a new land/water/energy modeling framework with high resolution, regional climate modeling (Fig. 1), and show how future Integrated Assessment Models (IAMs) can be modified...
to better address key emerging challenges in integrated assessment. The proposal will address climate change impacts, particularly focusing on extreme wet, dry and hot events, including their potentially adverse effects on economic activity at regional, national and global scales. Various types of adaptation will also be considered, including investments in irrigation and flood prevention.

Many climate models predict an increase in the frequency and intensity of rainfall over many parts of the world (IPCC, 2007). The framework we will be developing can be utilized for evaluating the impact of drought on food production. Cai (2005) uses IMPACT-WATER to examine the impact of historical climate realizations on future water requirements in 7 of the world’s major river basins. He finds that economic growth and the associated decline in irrigation water supply will result in more frequent occurrences of food shortage due to droughts. In addition, he concludes that adaptation, through changing cropping patterns, investments in irrigation efficiency, as well as improvements in water saving and recycling in the non-farm sectors are all important components of any effort to mitigate the most severe effects of drought. We will extend this work, linking it to future projections of the incidence and severity of droughts under future climate scenarios. The accuracy of these predictions will be improved by utilizing high resolution climate model outputs of precipitation and other climate variables on a 6 hour time scale which will be fed into the Global Hydrologic Model (GHM) maintained at the Ven Te Chow Hydro systems Laboratory, UIUC (Batra, et al., 2009). This model predicts surface discharge and groundwater recharge rates which then feed into WSM to determine water availability for agriculture and other sectors, respectively, within the economic modeling framework. By introducing climate shocks which span multiple river basins, as well as continents, we can assess the role of interregional as well as international trade as vehicles for climate change adaptation (Randhir and Hertel, 2000).
**Impact of Cowpea Storage Technologies in West and Central Africa**

Purdue and its partners in Africa are engaged in a ten country effort to disseminate the use of non-chemical cowpea storage technologies in West and Central Africa (http://news.uns.purdue.edu/x/2007a/070606FultonGates.html). Cowpeas (*vigna unguiculata*) are known as “blackeye peas” to most Americans. They are particularly susceptible to insect damage in storage. Insecticides can be used to control the storage insects, but in Africa the insecticides are often unavailable locally, too expensive for farmers, or if available and affordable frequently misused by illiterate growers. Every year the media in Nigeria reports illnesses and deaths linked to misuse of storage insecticides on cowpeas. Purdue faculty and researchers in Cameroon and Senegal have developed low cost and effective non-chemical alternatives to storage insecticides. (http://www.entm.purdue.edu/entomology/research/cowpea/Extension%20bulletins/english.htm).

The objective of this research would be to measure the change in adoption of cowpea storage methods linked to the extension effort and factors that make the extension effort more (or less) effective. This research involves surveys to in several West and Central Africa countries, plus analysis using economic surplus methods and logistic regression. The surveys will focus on cowpea storage practices, economics of cowpea storage and how storage practices are influenced by extension communication.

**Biotechnology and the Economics of the Seed Sector in West Africa**

In West Africa the formal seed sector is not well developed. Most of the public sector seed system built in the 1970s and 1980s has collapsed. Only a few countries have for-profit seed companies (e.g. Ghana, Nigeria) and those companies are struggling. The main off-farm source of seed is from non-governmental organizations (NGOs), but they are not perceived as the long term solution. Seed sector underdevelopment has always constrained the dissemination of improved varieties in the region, but it becomes particularly important when genetically modified (GM) seeds are considered. With biotechnology seed companies typically acquire the additional responsibility of implementing biosafety and resistance management (e.g. refuges, rotations) plans.

A key hypothesis is that in West Africa the seed sector has not developed because improved varieties were not sufficiently better than traditional varieties to justify the transactions cost involved in seed marketing. Bt cowpea varieties may change that  

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<td>PhD</td>
<td>Biotechnology and the Economics of the Seed Sector in West Africa</td>
<td>NGICA &amp;/or AATF</td>
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situation with 200% to 300% yield increases over traditional no-insecticide production. The first step in this research would be focus groups and key informant interviews with seed sector participants throughout West Africa. Case studies would be done of both functioning and failed seed businesses. Simulation may help us understand how introduction of Bt cowpea may affect the seed sector. This work would be done as part of the Network for Genetic Improvement of Cowpea in Africa (NGICA) plan to create Bt cowpea.
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<td>MS</td>
<td>Intergenerational Transfer of Small and Medium Sized Farms and Rural Businesses</td>
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**Entrepreneurship/ Small Business Development**

Topics of interest in this area are family business management practices, self-employed women, minority business ownership and management practices. Another area of interest is the comparison of small farm businesses to non-farm family businesses. This is a collaborative study with multi-state partners in Consumer and Family Science.

**Small Business Demise and Recovery after a Natural Disaster**

The process of business recovery from disaster has yet to be studied comprehensively. Understanding this process is important not only to characterize and reduce attrition post-disaster but also to determine whether private and government disaster relief policy, business owner practices and family and community factors are leading to recovery. Research to date has narrowly focused on business characteristics and not on the interactions and interdependencies among businesses, the business owner’s family, and the community. A systems theory approach advocates considering simultaneous stressors on the business, family, and community to understand what leads to business demise or recovery.

**Intergenerational Transfer of Small and Medium Sized Farms and Rural Businesses**

The transition of the business from one generation to another is an aspect of long-term sustainability that is often overlooked in research and educational programming. This study will identify the plans and processes that have been used by farm and non-farm rural family businesses for successfully making the management transition and for transferring business resources to a new generation, and thereby provide valuable information to help improve the long-term sustainability of small and medium-sized family farm businesses. This work will examine not only the family and the business but also the interactions that simultaneously influence the success of rural family farm and non-farm rural family businesses in Indiana, Illinois, Michigan, and Ohio, where success may be a qualitative measure of perceived achievement of family and business goals such as intergenerational transfer and/or a quantitative measure of business profit and household income.
# NICOLE J. OLYNK

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<td>MS/PhD</td>
<td>Impacts of Changing Animal Welfare Practices for US Livestock Producers (currently dairy focused)</td>
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<td>MS</td>
<td>Business Management for Animal Shelters: Financial and Strategic Management (Consumer Preference Assessments Regarding Human-animal Bonds)</td>
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<td>Economics of Alternative Livestock Production Practices</td>
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<tr>
<td>MS/PhD</td>
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**Current planned work:**

**Changing Consumer Demand and Preferences for Credence Attributes of Livestock Production Practices (currently dairy focused)**

Consumers are increasingly sensitive to processes and procedures employed in animal agriculture. Prior to changing processes on farms, economic impacts for both producers and consumers must be assessed. Currently, a team of investigators (Nicole J. Olynk, Michael D. Boehlje, Timothy G. Baker, Philip L. Paarlberg, Michael M. Schutz, and Donald C. Lay) is involved in a Mission Oriented Grant, entitled “Animal welfare/Behavior Regulations: Alternatives and Consequences of Policy Options”. Tentative plans for continued work include an assessment of consumer preferences for dairy cattle welfare attributes.
(currently dairy focused)

As consumer demand requires changes in agricultural production practices, producers are faced with decisions regarding the adoption (or disadoption) of production practices on their farms. Producers can potentially face changes in the production practices available for their use through both market and regulatory mechanisms. As agricultural producers consider changes in the production processes used, economic impacts of such changes on both the producers themselves, as well as eventual impacts on consumers overall, must be assessed in order to provide insight into potential impacts on production and markets in the future.

Business Management for Animal Shelters: Financial and Strategic Management  
(Consumer preference assessments regarding human-animal bonds)

This economics-based component of the existing project, Purdue Maddie's® Shelter Medicine Program, ongoing at Purdue University School of Veterinary Medicine (SVM) enables further development of knowledge on shelter management. A component of this project is to conduct a nation-wide survey to determine key factors affecting potential shelter customer decisions. Data regarding preferences for shelter services, characteristics of shelters which are preferred, and consumer attitudes towards companion animal versus other animal bonds will be assessed.

Economics of Alternative Livestock Production Practices

Consumers are incorporating information (and/or their perceptions) regarding animal welfare, impacts on the environment, and social responsibility, into their food purchasing decisions. The line between food safety, animal welfare, and environmental impacts is often blurred; it is difficult to distinguish the motivation for purchasing decisions into only one of these categories. Regardless of the motivation behind these decisions by consumers, producers are facing tough decisions regarding adoption of alternative production practices to meet consumers’ demands for certain product attributes (i.e., pasture-based livestock rearing systems, alternative ration formulations, disadoption of previously widely accepted technologies). Assessments regarding costs and benefits of adopting various livestock production processes are needed.

Future planned work (Jan 2012), pending funding:

Producer Willingness to Change and Consumer Preferences for Climate Change Mitigation and Adaptation Strategies  
(swine and poultry producers in the Midwest Region)

Producer and consumer surveys will be administered to gather stakeholder input and assess capacity for greenhouse gas emission mitigation. The percent of producers which are likely adopters of given mitigation or adaptation strategies, estimated through modeling using survey data, will be used to assess the potential regional impact of a given mitigation strategy. A national survey of consumers, including a choice experiment, will
be administered to identify consumer values and preferences surrounding alternative climate change response strategies by poultry and swine producers.

**Producer Willingness to Adopt Climate Change Mitigation and Adaptation Strategies (swine producers in Midwest Region; willingness-to-adopt by-product feeding/biofilter usage)**

Integrating the performance of various mitigation strategies, assessment of costs of various mitigation strategies (including indirect costs incurred on-farm due to employment of these practices), and analyses regarding producers’ willingness to adopt mitigating practices allows a more complete analysis of potential impacts of swine production systems on greenhouse gas emissions. A mail-based producer survey, with a choice experiment, will be administered to swine producers in order to determine their willingness to adopt the mitigation and adaptation practices explored in this analysis. Prior to conducting this survey, producer focus groups will be held to pilot test and refine the survey instrument and choice experiments.
PHILIP L. PAARLBERG

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<td>Plant Disease Surveillance Prioritization</td>
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**Consumer Price Expectations during Livestock Disease Outbreaks**

Traditional modeling of consumer demand specifies demand as a function of current prices and income which means single price elasticities capture consumer response to price changes during a livestock disease outbreak. Observed behavior suggests that consumers react differently to situations where price changes are perceived as temporary deviations versus situations where price changes are viewed as structural. This project is intended to support U.S. livestock disease surveillance efforts by re-specifying consumer demands for livestock products and crop products to incorporate long-run price expectations.

**Plant Disease Surveillance Prioritization**

Traditional methods of prioritizing plant disease surveillance efforts rely on crop production value. Crops with the highest production value receive the bulk of surveillance efforts regardless of the disease risk and likely spread. This research prioritizes surveillance efforts by combining disease risk, disease spread, and economic criteria. It develops a series of commodity models that can be shocked with demand and supply impacts from plant disease outbreaks to determine comprehensive measures of economic consequences. Supply shocks are based on disease spread. Using probabilities determined from risk assessment, expected welfare measures can be calculated and compared for alternative surveillance options.
GEORGE F. PATRICK

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<td>Risk Management Strategies for Farmers</td>
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“Dismounting the Tiger”
Tax-Saving Strategies for Retiring Farmers

Many farmers defer substantial amounts of income by delaying sales of raised grain and prepaying input costs. At retirement, these farmers face very significant income and self-employment taxes. Sales of raised crops are subject to both self-employment tax and income tax, and can make a significant portion of Social Security benefits subject to income taxes. Sales of depreciated assets, like machinery and equipment, are generally taxed as ordinary income. This research project will explore alternative ways of disposing of farm assets and analyze the tax consequences. Increasing after-tax values for farmers will be emphasized.

Risk Management Strategies for Farmers

Agricultural producers face many sources of variability which can affect the cash flow, net returns, and economic progress of the farm firm. The risks which producers face and the risk management responses available to producers have been significantly affected by the 2008 Farm Bill. The Average Crop Revenue Election (ACRE) program appears to significantly affect risk management strategies and impact direct payments, marketing loans and loan deficiency payments. Less than fully equity in the farm business creates financial risk which may compound the effects of the business risks which all farmers face. Farmers typically combine production, marketing, and financial responses to risk and practice risk balancing. Past research has often failed to consider the sequential nature of the decision-making and knowledge which becomes available during the production process. For example, grain storage investments are often analyzed assuming storage will be used each year without considering the effect of alternative market situations. This project will analyze the interactive effects of various risk responses in a whole farm situation. Emphasis will be given to the short and long run consequences of alternative risk management strategies on representative farm firms.
Development of a Tool for Evaluating Electric Energy Policy for Indiana

Energy has emerged as one of the grand challenges facing mankind. In the coming years it is clear that the State Utility Forecasting Group housed at Purdue will need to have the capacity to evaluate alternative energy policies in a rapid and flexible manner. To that end, we are interested in developing a version of the MARKAL model for the state of Indiana. This model is designed for long range planning of energy systems with explicit incorporation of emissions abatement technologies. The model is optimization-based and identifies least-cost responses to a variety of policies including regulations, taxes, subsidies and emissions restrictions.

Evaluation of the Impact of Wind Generation Capacity on the Reliability of Indiana’s Electricity System

Traditionally in the electricity business we think of generation capacity as something we can dispatch – that is, we can choose to operate that capacity at any time we find it economically advantageous. Demand on the other hand is less manageable – it fluctuates based on electricity consumers’ needs which can and do change at any time without notice. Thus, there is a real-time balancing act that ensures that sufficient operating capacity is available to serve the fluctuating load (demand). Intermittent technologies like wind power generation (and photovoltaic solar power generation) are more like demand in the sense that they cannot be dispatched at will – that is, if the wind is not blowing, we are not generating wind powered electricity no matter how much we need it.

The reliability of the electricity generation system is measured in terms of a probability. It is the probability that sufficient capacity will be available to serve demand. As discussed above, demand is a random variable. Because of the possibility of generation failure (a forced outage) for one or more of the generators in the system, available capacity
is also a random variable. Traditional approaches to evaluating the reliability of the generating system are based on simulation methods that estimate the probability that available capacity will exceed demand, and a probability the corresponds to a failure no more frequently than one day in ten years is considered to have adequate reliability. A key feature that simplifies the probability calculation is the stochastic independence of the forced outage of a generating unit with demand. With an intermittent generating resource like wind, this independence property is violated.

The goal of this project will be to develop an approach to evaluating the impact of a growing wind capacity in the generation portfolio on the reliability of the electricity generation system. The resulting method will be applied to the Indiana generating system and be used to evaluate reliability under different levels of penetration of wind power technology.

**Managing Intermittency of Renewable Generation**

The intermittent and uncertain nature of wind has led many to completely discount it as primarily an energy only resource. While it is true that the available capacity during periods of peak electricity demand is low (wind speeds are often low during the hottest periods), it is not likely to be zero. Furthermore, preliminary analysis by SUFG has indicated that the higher outputs during other periods could have an impact on the type of generation (baseload vs. intermediate vs. peaking) that is needed going forward. The goal is to determine the impact of intermittent generating resources on the need for other generation assets. This is an important issue as the amount of intermittent resources is rapidly growing in Indiana.

**Analysis of Biomass for Electricity Generation**

Biomass has a role to play if we are to make serious reductions in greenhouse gas emissions while maintaining a supply of energy adequate to support economic activity. The goal of this project will be to take a fresh look at the economics, engineering and environmental efficiency of either firing or co-firing electricity generation with woody biomass. This would build upon recent work that used a life-cycle analysis where the biomass was harvested for electricity generation. The analysis we have in mind would make use of wood waste products from other industries.
### GERALD SHIVELY

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<tr>
<td>PhD</td>
<td>Dynamic Time Series Models of Agricultural Price Formation</td>
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**Agricultural Intensification and Deforestation in the Philippines**

I have an ongoing research project focusing on the impacts of agricultural development near the forest margin in a remote part of Palawan, in the Philippines. I am using panel data to study the ways in which technological advances in agriculture (in this case irrigation development) have had spillover environmental effects.

**Estimating Dynamic Time Series Models of Agricultural Price Formation**

I have an ongoing interest in time series econometric work focusing on dynamic models of agricultural price formation and market integration, including models with spatial characteristics, structural breaks, and changes in regime. I have very interesting sets of data from Ghana and the Philippines that are ideal for graduate students interested in advanced time series econometric work. The data are available for term paper and thesis writers.
## WALLACE E. TYNER

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### Economic Analysis of Renewable Energy Policy Issues

The United States and other countries have embarked on massive programs to stimulate increases in renewable energy production. There are many policy approaches that can be used to stimulate added production. The impacts of these policy alternatives can differ significantly in terms of reduction of risk for the private sector, cost to the government, and environmental and climate change impacts. The purpose of this research is to conduct economic analysis of a wide range of policy alternatives in these three dimensions.

### Comparison of Biofuels with Other Energy Pathways

Biomass can be converted to biofuels or converted to electricity. The economic and life-cycle impacts of these renewable energy pathways differ from wind, photovoltaics, and conventional fossil energy pathways. At least a couple of research projects are envisioned that would evaluate biofuels pathways in comparison with other energy futures. At least one of these projects likely will also evaluate water impacts of cellulosic biofuels.

### Systems Analysis for Renewable Energy Development

Our renewable energy future likely will include a mixture of feedstocks including cellulosic materials. We do not have a good understanding of the economics of production, processing, or distributing these fuels. This project, which could involve two or more students, will involve building process models for bio-chemical and thermo-chemical conversion of cellulosic materials and estimating the impacts of various policy alternatives on the development of those sectors. It may also entail developing regional supply curves for these fuels. The analysis will be complete life-cycle including greenhouse gas emissions and environmental impacts. Some of the research also will entail using GTAP to estimate global land use impacts of cellulosic biofuels.
**Agro-Industrial Policy, Technology, and Environment**

The effects of climate change on world agricultural productivity as well as the indirect land use changes induced by energy policies are important loci of current applied economic work. The main concern in these works is how the global agricultural sector can adjust to cope with ever-increasing demands for food and biofuels while minimizing adverse environmental impacts. Agriculture is an inherently spatial process; thus, understanding production adjustments to changing supply and demand conditions requires knowledge of how much land is available, where that land is located, how productive such land is, and how feasible is to access unused lands.

These aspects of land use have been an intense area of research in CGE models. Although econometric work informing global land use modeling is presently at an early stage, the release of gridded global data on agricultural production have facilitated the global study of issues such as shifting production patterns and yield gaps. These data have also been instrumental in constructing harvested-area weighted average measures of temperatures employed in cross country assessments of climate change impacts.

The proposed research has two objectives. Firstly, we aim to extend the existing econometric literature to tackle the issues of global land supply and productivity of unmanaged lands. (To ground the paper in a topic of current relevance I propose to work around the recent econometric literature on the effects climate change on agricultural productivity.) A second contribution is to improve the current state-of-the-art in CGE modeling of global land use. In particular, by combining land accessibility and biophysical features with access costs, we aim to improve current practice in modeling land supply and the productivity of marginal lands.
# H. HOLLY WANG

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**Chinese Food Demand and Food Safety**

China is the most populous country in the world with a fast growing economy. Its food consumption and demand are an important issue internationally, especially for the US, the large agricultural exporting country. Chinese consumers’ preference on food, especially related to food safety issues can be evaluated by surveys, simulated experiments, and real experiments. New tools are constantly being developed in evaluating consumers’ preference. There will be plenty of opportunities to collaborate with scholars in China through field work, international conferences and paper coauthoring.

**Risk Analysis for Agricultural Market and Insurance**

Commodity futures market, crop insurance and US government agricultural programs have provided risk management benefits to crop growers. New policies have been developed from time to time, and their risk management effectiveness and income transferring effects are needed to be evaluated for farmers growing different crops. The impact of these programs may also in the crop choice decisions that interact with energy, environment and natural resources.
STEVEN WU

Degree Level | Research Topic | Funding
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Ph.D. | Agricultural Market Structure and Robust Contract Design | Pending

Ph.D. | Experimental Economics and Applications to Agricultural Problems. | Yes, for carrying out experiments only

Agricultural Market Structure and Robust Contract Design

This project will use cutting edge methods from contract theory and algorithmic game theory to design and test robust contractual trading mechanisms (rules) that promote efficiency while imposing constraints on rent-seeking (where the party with market power seeks to use contracts to extract profits from weaker parties). An obvious application is in agricultural contracting markets where there is a perceived imbalance of market power between integrators and growers/smallholders. Recent research has shown that market concentration in contractually based industries does not necessarily decrease efficiency although it can lead to contracts that facilitate rent-seeking which can create perverse distributional outcomes. In the absence of efficiency losses, standard economic theory would treat rent-seeking as a distributional issue. However, in practice, rent-seeking can create political pressure to regulate which can indirectly reduce the competitiveness of U.S. agriculture. In development contexts, the introduction of new value added processing industries may provide new market outlets for farmers or small holders. However, these new opportunities might not improve farmer or smallholder welfare if rent-seeking occurs. Our goal of creating contractual and bargaining mechanisms that are robust to rent-seeking can provide model private strategies that can be used to preempt pressures to regulate and improve the welfare of the weaker party. Even in cases where regulation is unavoidable, our goal is to create efficient rent-seeking proof mechanisms that can provide benchmarks by which new regulatory proposals or contractual boiler plates can be measured.

Experimental Economics and Applications to Agricultural Problems

Ph.D. students who are interested in experimental economics are encouraged to present ideas or jointly develop ideas with professor Wu to conduct economic experiments. Funding will be available for experiments that have potential to lead to joint publications. Professor Wu is flexible with regard to subject matter and is open to questions related to agriculture, development, energy, mechanism design, agribusiness, and/or contract theory/organization design. The primary criteria is that the idea is interesting and important, addresses an agricultural economics related issue, and potentially leads to publications and at least one dissertation essay.