

State, Nation, Global: Welfare of Californian Agriculturist

Presentation contributors:

Rachael Goodhue

Richard Howitt

Larry Karp

Gordon Rausser

Brian Wright

David Zilberman

Assignment:

- Assess the welfare of California farmers in a global context
- Focus on State, National and International impacts on California agriculturalists
- Evaluate and design policies and programs that manage positive as well as negative external events
- Measure positive external effects in terms of market structure, commercial growth and profitability
- Measure negative external effects in terms of environmental constraints – pesticides, water, air quality & waste disposal
- Consider welfare implications of resource scarcity and competition for land and water

Brief History

- Land Grant University Tradition
- Berkeley Department of Agricultural Economics
- Emergence of Davis Department of Agricultural Economics
- Decline of Berkeley Department of Agricultural Economics in 1970's
- Re-emergence of Berkeley Department of Agricultural and Resource Economics
- UC Berkeley and Davis ARE departments among top three ARE departments in the world
- Integration within umbrella of GF

Distinguishing Characteristics of Agricultural Economics

- Views economics and economic analysis as part of a larger, coordinated socio-natural system
- Emphasizes integration of economic and basic science (land-grant, AES origins)
- First to apply statistical and econometric methodology to facts, experimental and non-experimental
- Focuses on the importance of time and space for understanding economic phenomena
- Identifies the flexibility or inflexibility factors of productions and economic agents
- Highlight importance of institutions

Charismatic/Watershed Events: The Last 75 years

- Great Depression
- World War II
- Interstate Competition
- Bracero Program
- Rise of the United Farm Workers
- California Water Plan and Federal Projects; Peripheral Canal and the Rise of Environmental Movement
- Establishment of the Environmental Protection Agency
- Farm Financial Crisis, Planting Flexibility and Decoupled Public Policies
- Bayh-Dole Act and the Privatization of Innovation
- Green Revolution and the Rise of Productivity in Developing Countries
- Trade Liberalization and the Globalization of Markets

1930's

Great Depression

- 1920's expansion of fruit crop acreage and decline in field crops leads to lower prices and financial difficulties for CA farms before depression
- Seven year drought, increased pumping of groundwater
- Federally financed Central Valley Project construction begins 1937
- Consequences of changing institutions
- Labor disputes
- Steinbeck's **The Grapes of Wrath**
- Countervailing power
- Marketing orders
- Cooperatives

Giannini Foundation Research Contributions during Great Depression

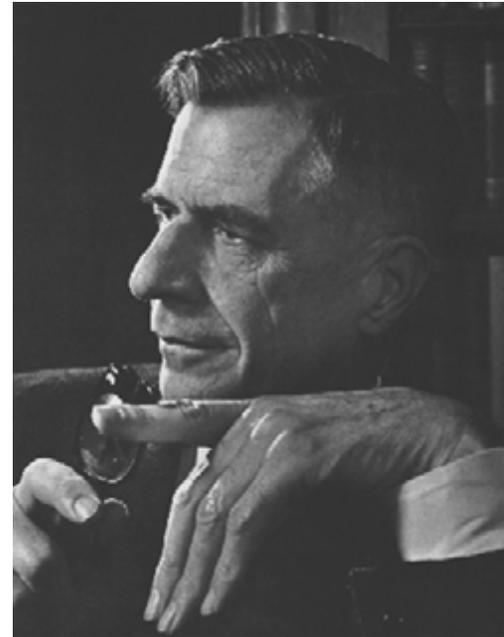
- Research leading to productivity improvements
- Studies of causes of agricultural labor unrest
- One of earliest empirical studies of agricultural labor demonstrating the importance of a supply of cheap (often immigrant) labor to the agricultural sector
- Range Committee studied ecological effect of converting brush land to pasture
- Plant breeding developed disease-resistant higher yield varieties.
- Market impacts of supply side innovations in animal breeding and agricultural engineering

World War II



1940's World War II

- Research on pricing
- Price controls
- Food shortages
- Self-sufficiency
- Quantified demand effects for California products
- 1942 Price control prospects, relevance of pre-existing interventions noted, World War I experience as guide
- Galbraith at the office of Price Administration:
 - Unprecedented, comprehensive price interventions
 - Relevance of market structure
 - Prevalence of markets with few sellers
 - Strategic insight: Decentralized Enforcement
 - Insight sourced with GF research on cooperatives and marketing orders



Galbraith

Interstate Competition

(1950's - mid-1960's)

- Time and motion studies on food processing efficiencies
- Spatial equilibrium model
- Plant location models
- Optimal assembly model
- Optimal distribution of California food products (form, time and space)
 - Unregulated
 - Regulated
- Began quantification of agricultural product demand and supply elasticities

Bracero Program

- Availability of farm agricultural labor
- World War II labor shortages led to US-Mexico agreement to allow temporary immigration of farm labor (1942-1949)
- In 1950 Mexico refused to re-authorize the act without reforms
- Braceros comprised 30% of California agricultural seasonal workers, but 80% of labor for tomato harvest in 1959
- President Johnson decided to end program in 1965
- Introduction of technological change: percentage of tomato harvest done mechanically:
1965= 25%; 1968= 95%; 1970 = 100%
- GF Research Contribution: Study of Bracero program during the 1960's in a report to Governor Pat Brown

The Rise of the United Farm Workers

- Formed in 1962, evolved from a workers' rights organization to a union, supporting a grape strike by mostly Filipino workers
- A five year boycott of table grapes led to contracts with most major growers
- Union publicly adopts Gandhi's and MLK's principles of non-violent opposition
- Use of violence and sabotage against corporate growers and small farms
- Distribution of welfare among consumers, agriculture producers and farm labor: Introduction of tomato harvester and plant breeding innovations
- A 1973 agreement between Teamsters and growers nearly destroys UF
- Migrant contribution to the agricultural sector and status of migrant agricultural workers (poverty)
- Relation between migrants and source communities
- Effect of migrant legal status on housing, wages and income transfers

19th Century

California Water Plan and Federal Projects; Peripheral Canal and the Rise of the Environmental Movement

- Water resource-demand management
- Evaluation of the consequences of reallocating water among urban, agricultural and environmental uses
- Plans for water carriers were introduced throughout the first half of the 20th century
 - Members of the GF contributed to evaluation and design of financial contracts of the state project
 - Members of the GF provided the economic rationale to conjunctive use of ground and surface water to allow overcoming droughts and instability
 - GF members introduced pricing and trading schemes that made it possible to capture more value from existing water (these studies were viewed as irrelevant at the time, but were deemed valuable later)



The California Aqueduct in the Central Valley

Kestersen, Drainage Crisis, Water Banks and CVPIA

- In 1985 it was realized that the drainage problem could not be solved by creation of a wetland
 - Access to federal water was threatened if solutions were not introduced
 - The initial proposals were capital intensive and very expensive
- GF economists proposed a management solution
 - incentives for conservation
 - changes in land use
 - local evaporation
- This research offered flexibility and the foundation for additional time to select superior solutions
- Environmental concerns pressure CVPIA to divert water from agriculture to environment
- GF research showed that the costs of diversions would be much smaller if they were combined with water trading, a key feature of the CVPIA
- GF established electronic water system, a mechanism that allows increased efficiency and water security

Establishment of the Environmental Protection Agency

- Emergence of Environmental Economics as a sub-discipline of Economics
- Development of contingent evaluation which originated by a GF Member, Wantrup
- Work on pesticide externalities, Clean Water Act, Clean Air Act
- Banning of Pesticides

The Giannini Foundation's Contributions to Environmental Economics

- Environmental preservation, uncertainty, and irreversibility
- Valuing the environment through contingent valuation: econometrics and survey design to find willingness to pay for environment applications such as Exxon Valdez, Mono Lake
- Positive Quadratic Programming: widely used tool for impact assessment of water and climate change policies
- Identification of economic growth and environmental quality

The Giannini Foundation and Pest Control

- Introduction of modern IPM and biological control
- Introduction of the modern economics of pest control (health risk and trade-offs with agricultural productivity)
- Viewing pesticides as damage control agents allows estimation of their productivity and prediction of GMO impacts
- Big green: a proposed pesticide ban in California (1991)
 - GF study showed it would negatively affect poor consumers
 - Suggested taxation or trading to reduce damages
- The Methyl bromide phase-out and ban
 - Proposed ban would be costly and counter productive
 - Allowing 25% of use would preserve 80% of benefits
- Invasive species & plant diseases may cost billions in damages
 - Medfly, pierce disease, white fly
 - Distributional effects are more significant than overall effects
 - Avoid heavy-handed strategies
 - Emphasize monitoring, prevention, rapid and precise response

1980's Farm Financial Crisis, Planting Flexibility and Decoupled Public Policies from Agricultural Production

- 1970's vs. 1980's: Asset vs. Debt-Service-Based Financing
- Evaluation of inflation, land prices, debt, exchange rate consequences
- Quantification of trade, monetary policy, exchange rates overshooting on farm financial crisis and agricultural production profitability
- Design of decouple policies and the compensation of growers for policy reform
- Planting flexibility; protection of California growers

Bayh-Dole Act and the Privatization of Innovation (1990's-2005)

- Analysis of I.P. on market structure, university technology transfer offices, establishment of I.P. pooling arrangements
- At the beginning of the genetic engineering era the Bayh-Dole Act gave universities the rights to innovation by federally financed money (1980)
- IPR coverage for new life forms, patents for plants
- WTO demanded rigorous IPR globally (TRIPS) in 1990's
- Growing private spending and stagnant public spending on agricultural research and development
- Creative designs of structured contracts between university and private companies

Giannini Foundation Research

Making Sense of the New Reality and Helping Navigate New Innovations

- Studying the industrial educational complex
- Evolution of agricultural research, redesign of extension and emerging agricultural information sector
- Identifying when the use of each type of IPR is best, i.e., patent, prize or trade-secret
- Designing mechanisms to access IPR for breeders of crops underserved by private sector
 - Specialty crops in California
 - Crops of the poor in developing countries
- Proposing IPR licensing to enhance innovation and availability of drugs for the poor
- Designing public/private research partnerships in agriculture-enhancing discovery and competitiveness

1970's-1990's

Green Revolution and the Rise of Productivity in Developing Countries

- The evaluation and assessment of income versus substitution effects on global demand for agricultural products produced in the State of California
- Retrospective influence:
 - Documentation of spillovers to US wheat and rice productivity
 - Indirect income effects on export demands for CA crops
 - Highlighted relevance to California of development economics at GF
- GF Research Continued Involvement
 - Research policy and analysis at CGIAR
 - Study of implications of IPR for further progress
 - Initiatives for sharing research resources and outputs in public/nonprofit sector

Trade Liberalization and the Globalization of Markets (1990's-2006)

- Evaluation of the GATT-Uruguay round, NAFTA, and the DohaWTO round and its implication for welfare of agriculturists in the State of California
- California is the nation's largest exporter of agricultural products
- Income growth, especially in the Pacific Rim, is driving increased demand for food and fiber
- International agreements are opening more foreign markets to California exports
- Better access of foreign products to US markets due to the fall in US import barriers
- Technical trade barriers must be based on scientific evidence
- Investments by multinational firms, joint ventures, and trade in highly processed products are changing the very meaning of international agricultural trade

Giannini Foundation Research Contributions to Trade Liberalization and Globalization of Markets

- Agricultural trade policy, particularly on imperfectly competitive markets and state traders; organization of the IATRC
- Trade policy and international trade disputes, invasive species
- Leadership of Agricultural Issues Center
- Crop-specific effects of trade agreements, wine trade and industrial organization of the wine market
- Analysis of international effects of US farm policy
- Analysis of environmental consequences of globalization

Unique Intellectual Capital of Giannini Foundation Membership UC Berkeley

- M. Anderson-- Health economics, labor economics, applied econometrics, environmental economics, public economics
- I. Adelman-- Income distribution, poverty and economic development planning, and quantitative analysis of the interactions between economic and social systems in economic development and economic history
- M. Auffhammer -- Environmental economics, large-scale modeling
- P. Berck-- Renewable resources, water economics and portfolio choice risk and futures
- A. De Janvry-- Agricultural policy and rural development in the third world, including price policy, technological change, land reform and integrated rural development projects
- A.C. Fisher-- Global environmental issues, water resource management, and valuation of environmental resources
- J. K. Gilles-- Forest fire economics and management, regional economics, fire protection planning, forestry development
- W.M. Hanemann-- Pollution, environmental policy, water resource management
- A.E. Harrison-- Economics, environmental policy, labor Management & policy
- G. Imbens-- Econometrics, quasi-experimental causal analysis
- G.G. Judge-- Econometrics, improved methods of estimation and inference spatial equilibrium modeling, the estimation of Markov chains, decision theory and efficient information processing rules
- L.S. Karp-- International trade, imperfect competition, dynamic optimization, international trade policy, and risk and uncertainty
- J.T. LaFrance-- Consumer economics and demand analysis, econometrics, agricultural policy, environmental and natural resource economics
- E. Ligon-- Developmental economics, third world economic growth
- R.B. Norgaard-- Ecological, environmental, and developmental economics; environmental epistemology
- J.M. Perloff-- Industrial organization, labor, trade, law and economics, agriculture, natural resources
- G.C. Rausser-- Public policy, environmental and natural resources economics, forecasting in food commodity systems, antitrust and organization of food systems, statistical decision theory, applied econometrics, institutional economics, political economy
- J. M. Romm-- Resource policy and economics; resource conservation and economic development; intergovernmental relations in resource management
- D. Roland-Holst-- Climate warming, general equilibrium modeling
- H.R. Rosenberg-- Farm personnel management practices and issues, particularly in relation to production technology, employment law, and labor market conditions.
- E. Sadoulet-- Economic development, agricultural policy, rural institutions, and contract theory
- L. Simon-- Game theory, collective choice, Applied Research Methods
- D.L. Sunding-- water resources, technology development and adoption, wetlands, endangered species, pesticide regulation, law and policy analysis
- S.B. Villas-Boas-- Industrial Organization with applications to agriculture and natural resources
- B.D. Wright-- Commodity market stabilization, agricultural price policy, economic development, public finance, research and development, natural resource economics and industrial organization
- A. Zellner-- Econometrics, statistics, Bayesian Decision Analysis
- D. Zilberman-- Agricultural, water and environmental policies, the economics of technological change, agricultural products, economics
- A.P. Zwane-- Trade, environment, and development, land-use change

Unique Intellectual Capital of Giannini Foundation Membership UC Davis

J.M.Alston-- International Trade, agricultural marketing, agricultural policy
S.C. Blank-- Financial management, risk, futures and options markets, management methods
S.R. Boucher --Microeconomics of agricultural development, rural credit markets, agrarian contracts, economics of information and uncertainty
L.J. (Bees) Butler- Biotechnology, dairy & poultry public policy, dairy & poultry marketing, biotechnology, public policy issues
H.F. Carman-- Agricultural marketing, managerial economics, economic aspects of taxation
C.A. Carter-- Agricultural marketing, international trade
J.A. Chalfant-- Econometrics, demand analysis, risk and uncertainty, quantitative models of the agricultural sector
R.L. Cook-- Food distribution, fruit and vegetable marketing, cooperatives
Y.H. Farzin-- Economics of environment and natural resources, developmental and international economics
R. E. Goodhue – Agricultural marketing and organization, industrial organization, contracting
R.D. Green-- Econometrics, demand analysis, advertising and promotion
S. Hardesty-- Cooperatives, marketing
A.M. Havenner-- Optimal control, econometrics, forecasting, time series analysis
R. E. Howitt-- Resource economics, quantitative methods, econometrics, operations research
L.S. (Tu) Jarvis-- Economic development, livestock economics, technology development and diffusion, agricultural trade policy
W.E. Johnston--Natural resources economics, agricultural and resource policies, commercial agriculture
D.A. Jolly-- Food safety, international agricultural development, public policy, marketing, agricultural sustainability, economics of food safety, consumption economics and public policy, international agricultural development; Director of Small Farm Program
K.M. Klonsky-- Farm business management, decision-making at the farm level; pest management, sustainable agriculture
D.M. Larson-- Natural resources, environmental economics, risk and uncertainty, applied welfare economics
P.H. Lindert-- Economic History, international economics
H. Lee-- Microeconomics
P.L. Martin--Departmental business office
A. McCalla-- Agriculture and food policy, international agricultural trade and policy; trade development and technology linkages
A.L. Olmsted-- Economic History
C.Morrison-Pau-- Productivity growth, employment and wages capacity, production structure and decision, capital investment
Q. Paris-- Microeconomics, operations research, mathematical economics, econometrics
S.D. Rozelle-- Development economics, economics of transition
R.J. Sexton-- Agricultural marketing, consumption economics, the economics of cooperatives, industrial organization
L.E. Shepard-- Public policy, consumer economics, regulation-public policy, investments-finance, antitrust-law and economic
A.D. Smith-- Econometrics, Finance
D.A. Sumner-- National and international agricultural policy, labor economics
J.E. Taylor-- Economic development, labor, applied econometrics
S. Vosti-- Tropical deforestation, economic development, poverty-environment links, population-environment links, climate-poverty links, bioeconomic models, environmental economics, biodiversity policy
J.E. Wilen-- Resource economics, environmental economics, microeconomics
J.C. William-- Commodity markets, futures markets, spatial and temporal price relations, mathematical programming

Futuristics: Expected Future Events

- Knowledge and Technology
- Competition for and the Increasing Scarcity of Natural Resources in the State of California
- Global Warming
- Bioterrorism
- Product Differentiation and Value Added Products, Domestically and Globally:
New Products, New Markets
- Opportunities for Economic and Financial Innovation

Knowledge and Technology

- Ongoing processes
 - Globalization
 - Industrialization of agriculture
 - Privatization
 - Environmentalism
 - Consumerism
- Biotechnology and information technologies are here to stay, IPR will become even more important
- California's agriculture evolving to become
 - producer of high quality differentiated products
 - seller of IPR, production, marketing skills
 - Well-integrated with California resource sector which will offer quality of life, recreation, and valued environmental services
- GF will help guide and take part in the transition

Competition for and the Increasing Scarcity of Natural Resources

Increasing Demand for Environmental Quality

- More urban, affluent population cares about environmental quality
 - Clean air
 - Open space
 - Restored habitat, including fisheries
- Demand for environmental quality places additional pressures on natural resource allocation
- Competition: more resources acquired by environmental interests

Changing Nature of Demand for Resources

- Demand is growing, but for what uses?
- Agriculture and forestry are currently the dominant users of land and water resources in the western U.S.
 - Agriculture accounts for 80-90% of all water use in most western states
- Historical response to economic growth has been to use more resources
- Increasing limits to this approach
- Result: increasing conflicts over natural resources – can these be managed so that resources do not become limits to growth? Unlikely with ill-defined property rights

Competition for and the Increasing Scarcity of Natural Resources

Water Resource Interests

- Commercial and real estate land developers
- Municipalities
- Agriculture
- Fish resources: endangered species
- Hydroelectric power
- Tribes
- Industrial process water users
- NPDES permits and municipal wastewater management systems
- Clean Water Act

California Water Shortage

- California's water system is close to "tapped out"
 - Already more than 5,000 dams in California, of which 1,400 are "large"
 - In Central Valley alone, 660 reservoirs store more than 30maf of water - roughly equal to total unimpaired flow to the Delta in an average year
 - Over half of all flows in Central Valley are already diverted (17maf)

Competition for and the Increasing Scarcity of Natural Resources

Land Resources

- Competition will intensify
- Conflicts among urban, agriculture and forestry uses
- Ecological and community preservation values
- Remediation and reuse of contaminated sites
- Financing and redevelopment of economically obsolete city cores

Air Resources

- Federal Clean Air Act and related State regulations
- Manufacturers and users of mobile air emission sources
- Tradeoffs among air quality, water quality, and energy costs
- Stationary emission sources
- Health impacts of air pollution
- New regulatory programs and land use planning
- Consumption of fossil fuels and generation of greenhouse gases

Competition for and the Increasing Scarcity of Natural Resources

Forest Resources

- Whose property rights?
- Articulation of the public interest
- Current stock of harvestable timber
- Link with water resources
- Global competition and manufacturing location

Minerals, Oil and Gas

- Restricted development
- Low-value (dolomite, gypsum, and lime) vs. high-value (precious and heavy metals)
- High increase in demand for natural gas (LNG)
- Growth in gas field and transmission systems projects
- Regulatory barriers

Fisheries

- Continued decline in natural commercial fisheries
- Endangered species constraints
- Growth in farm fisheries
- Location of seafood processing
- Increasing competition with environmental and conservation interests

Global Warming

- A GF study on the future of California, found air pollution to be major concern in the Central Valley
- Global warming will have varying impacts on regions and possibly dire geopolitical consequences
- Energy markets are tightening
- Emerging need to transition away from fossil fuel
- Bio-fuels are source of hope, but
 - must become more productive and efficient
 - require land and other resources
- New challenge for agriculture
- Design of policies and institutions future challenge to GF

Climate Change and California

- Need to reconfigure water systems
 - Invest in flood control and storage
 - Conjunctive use
 - Use the opportunity to modify rules of the game (introduce trading and incentives for conservation)
- Need mechanisms to allow flexibility and adaptation
 - Reduce restriction on land use changes
 - Provide incentives for transition in response to change
- Increase energy efficiency of California agriculture

Bioterrorism

- America's complex agrofood system potential terrorist target: across the chain
- Giannini Foundation Research:
 - Evaluation of the economic value of specific food safety measures
 - Risk assessments
 - Design of systems approaches to management of bioterrorism risks
- Giannini Foundation Contributions:
 - Identification for prioritization of food safety measure adoption, based on net benefits
 - Identification of systems of multiple control steps at different stages of production and distribution that optimally reduce bioterrorism risk

New Products, New Markets

- Fragmenting consumer markets
- New technology
 - Biotechnology
 - Information technology
- Creation of new, differentiated products to capture markets
 - Nutraceuticals
 - Metabolism-specific foodstuffs/ diets
- Giannini Foundation Research:
 - *Ex ante* assessment of consumer demand for green products
 - Identification of consumers' willingness to pay for specific characteristics, even when a product doesn't yet exist
 - Welfare effects of specific products
 - Understanding of the factors driving consumer demand for specialized products
 - Integration of approaches from the business school marketing literature with cutting-edge demand analysis
 - Contribution to interdisciplinary research in product development
 - Understanding of who benefits from specialized products
 - Methods of authenticating organic products- e.g. required spatial intervals and practices for organic crops
 - Programs for perceived food quality or safety- e.g. eggs from cage free production

Opportunities for Economic and Financial Innovation

- San Diego/Imperial Valley water transfer
- Land use and critical habitat designation
- Environmental finance
- Public/Private Partnership: Assignment of property rights and control premiums

Opportunities for Economic and Financial Innovation

- Environmental finance
- Matching of burden-sharing with direct and indirect benefits
- Payment for environmental services resulting from the demand growth for environmental quality
- Private groups acquire full or partial interest in resource preservation (conservation easements)
- Governments and nonprofits are also increasingly acquiring environmental assets:
 - CRP
 - Water Purchases
 - Trust for public lands, nature conservancy
- Willingness to pay for green products (e.g., certified timber, certified electricity, certified organic products)
- Options, futures, hedging strategies and hybrid financial instruments applied to environmental services industry (e.g., ecosystem services)

Opportunities for Economic and Financial Innovation

Implications

- Traditional business model less effective given the evolving external environment
- Institutions to manage conflict
- Search for cooperative vs. non-cooperative solutions
- Gains from trade in multilateral bargaining:
 - Exchange of public goods for zoning variances
 - Adjustment compensation for industries facing increased international competition
 - Side payments for secured permits