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# ECONOMICS AND AGRICULTURAL SUPPLY IN CALIFORNIA: THE ACTIVITIES AND ROLE OF THE GIANNINI FOUNDATION

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Seventy-five years is a long time—at least long enough for one to hope to see some return on an investment. Over a seventy-five-year period, the Giannini Foundation of Agricultural Economics has helped support the research of almost 3,000 economist-years.<sup>1</sup> Over that period, members of the Foundation have produced more than 10,000 pieces of research that have ranged from policy briefs, budget bulletins, and Extension speaking notes to academic journal articles and books. They have also supervised almost 800 Ph.D. dissertations completed by students of agricultural and resource economics at Berkeley and Davis.

Early documents of the Foundation indicate support for very broad mandates concerning economic consequences of agricultural production (including “overproduction”), acquiring supply and demand information useful in advising California farmers, and all economic questions affecting farmers and their families. Twenty years after the Foundation’s initiation, Robert Sproul (1951) summarized his understanding of the purposes of the Foundation as “to study and make better known the economic facts and conditions upon which the continued solvency and prosperity of California’s agricultural industry must, of necessity, rest.” Here there is an almost explicit assumption that economic well-being of agriculture is paramount. Such an assumption is consistent with the language and tone of the original Foundation documents, which clearly indicate that the Foundation was to support research on the economics of agriculture to the benefit of farmers in California. However, given this objective, it is also clear that the founders accepted a broad and inclusive vision of the economic research that could serve agriculture in the state.

This brief paper explores the evolution of research by members of the Giannini Foundation in the context of the evolution of California agriculture. It would be easy to simply document that research as it has been well recognized within academic circles with numerous awards and other such indicators of quality. Members have been national research leaders and served with distinction in government and other professional pursuits outside of their roles as academic researchers and Cooperative Extension specialists. This success is not cataloged here. Instead, the paper attempts to give a flavor of the research efforts and their relationship to agriculture in the state. The goal is to document the connection between supported research and contributions and the primary stated objectives of the Foundation.



This paper first outlines very briefly the evolution of production agriculture in California from about 1930 to the present. This section relies on data from USDA and uses the Giannini Foundation report by Johnston and McCalla (2004) to document the shifts in commodities and issues that have been important over the decades. Next comes documentation of publications by Foundation members and a discussion of the relationship between agricultural trends and research trends. This section also provides data on doctoral dissertations, which are an important part of the research supported by the Foundation. The paper then describes some of the commodity situation and outlook publications that were an important contribution of the Foundation in its formative years but have since become less prominent. It then discusses in somewhat more detail a few representative publications that highlight the topics and approaches in agricultural supply economics over the first half of the life of the Foundation. The paper concludes with reflections on the overall contribution of the Giannini Foundation to the success of California and world agriculture.

### SEVENTY-FIVE YEARS OF CALIFORNIA AGRICULTURE AND ECONOMIC RESEARCH

The Giannini Foundation began in 1928 as California agriculture was continuing its long-term shift from field crops toward more intensive crops such as vegetables, tree and vine fruit, and other horticultural commodities. This trend has continued to the present. The number of irrigated acres had already grown substantially—to about 4.75 million acres in 1929—with irrigated crops replacing dry land wheat on the floor of the Central Valley (Table 1). Grazing was important in the state, as it remains today, but the focus of grazing in California shifted from sheep to cattle (Johnston and McCalla 2004; Benedict 1946). From 1929 to 1949, the number of farms in California remained stable but the number of acres of land, harvested crop land, and irrigated crop land all rose (Table 1). Harvested crops and irrigated fields have remained minority uses of land in the state’s farms, meaning that grazing has continued to be the primary agricultural use.

YEAR	NUMBER OF FARMS IN 1,000S	LAND IN FARMS IN ACRES	CROP LAND HARVESTED IN 1,000 ACRES	IRRIGATED LAND IN ACRES
1929	136	30,443	6,549	4,747
1939	133	30,524	6,534	5,070
1949	137	36,313	7,957	6,599
1959	99	36,888	8,022	7,396
1969	78	35,328	7,649	7,240
1978	73	32,727	8,804	8,505
1987	83	30,598	7,676	7,596
1997	74	27,699	8,543	8,713
2002	80	27,589	8,466	8,709
2007	81	25,365	7,633	8,016

Source: Olmstead and Rhode, chapter 1 in Siebert, *California Agriculture: Dimensions and Issues* (2004); 2007 Census of Agriculture.



Table 2 shows that oranges were the top commodity in the state in 1930 and 1940 and the importance of the orange industry is reflected in the research conducted by Foundation members in those early years. Table 2 shows that dairy products were second in terms of cash receipts in 1930. As the population in urban centers increased, dairy farming that focused on supplying the milk market grew as well. (More recently, the California dairy industry has become a major producer of processed dairy products for national and international markets.) The movement of agriculture north, away from urbanizing Southern California, appears in the shift in commodity mix over the years (Table 3).

As documented in the next section, California’s agricultural commodity mix has been important in determining research topics for Foundation members. The geographic shift in agriculture is also reflected in changes in patterns of Foundation research, which focused more on Southern California fruit issues in the early years. Representative contributions include those by Erdman and Fuhriman (1929), Wellman (1932), and Shear and Pearce (1934).

Tables 2 and 4 indicate the relative rise of cattle and calves as a commodity in California and the relative decline of oranges in the first half of the period. In 1950, field crop production peaked at 20% of California’s agricultural cash receipts and then began a gradual decline (Table 4). Figure 1 shows the growth and subsequent decline of grain crops and especially of cotton. Between the 1950s and the mid-1980s, grains and cotton returned as important commodities. Figure 2 documents how grapes have replaced oranges as the most important tree and vine crop. More recently, notice that almonds have risen rapidly (as have tree nuts as a group).

	RANKING			
	1930	1940	1950	2007
Oranges	1	1	6	29
Dairy Products	2	2	3	1
Poultry and Eggs	3	3	4	9
Cattle and Calves	4	4	1	7
Grapes	5	5	5	3

Source: U.S. Department of Agriculture, National Agricultural Statistics Service.

COUNTY	1930	1940	1950	2007
Los Angeles	1	1	6	23
Tulare	2	2	3	1
Fresno	3	3	1	2
San Bernardino	4	8	18	19
Imperial	5	12	5	15
Orange	6	11	10	37
San Joaquin	7	4	4	5

Source: Censuses of Agriculture (1930, 1940, 1950, 2002, and 2007); Johnston and McCalla (2004).

### GIANNINI PUBLICATIONS FROM 1929 TO 1999

Next, consider the mix of topics chosen for research by Foundation members. Figure 3 classifies more than 9,000 publications by Giannini Foundation members into nine areas according to classifications established by the Foundation’s librarians. This classification scheme has changed over time, requiring the collapsing of some categories that were used occasionally in various years into the nine referenced here. Studies on “cooperatives and futures markets” were assigned to Marketing and Trade and studies

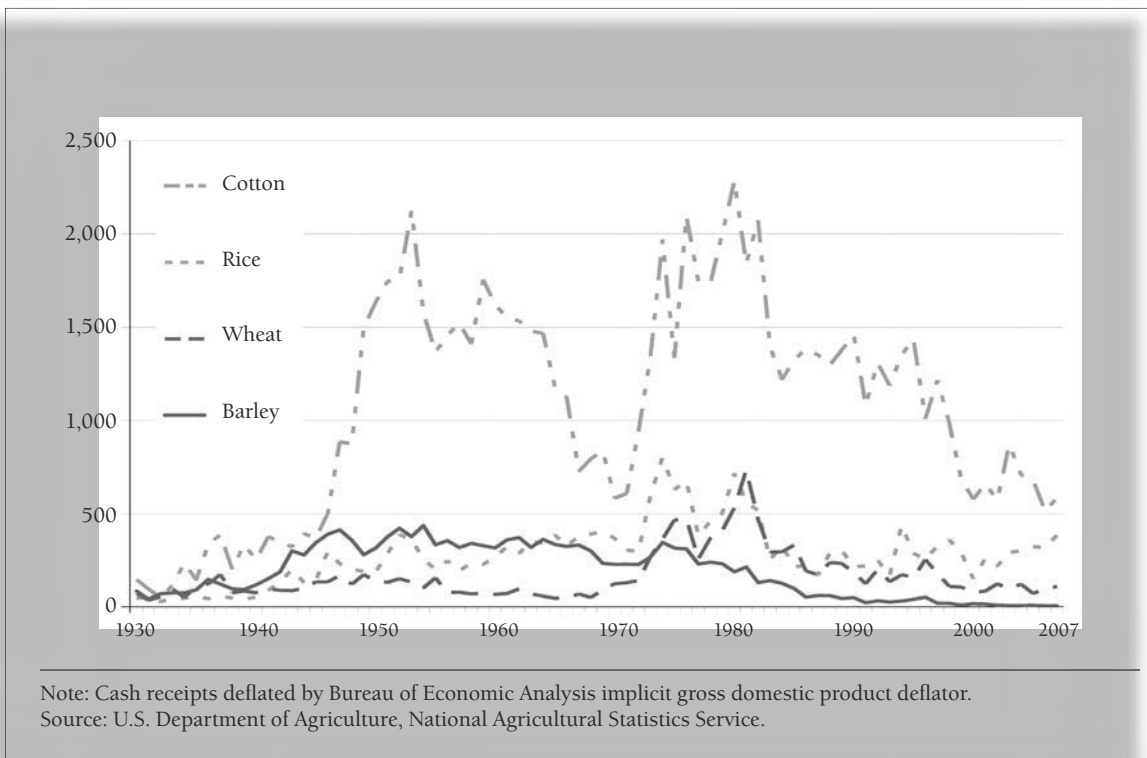


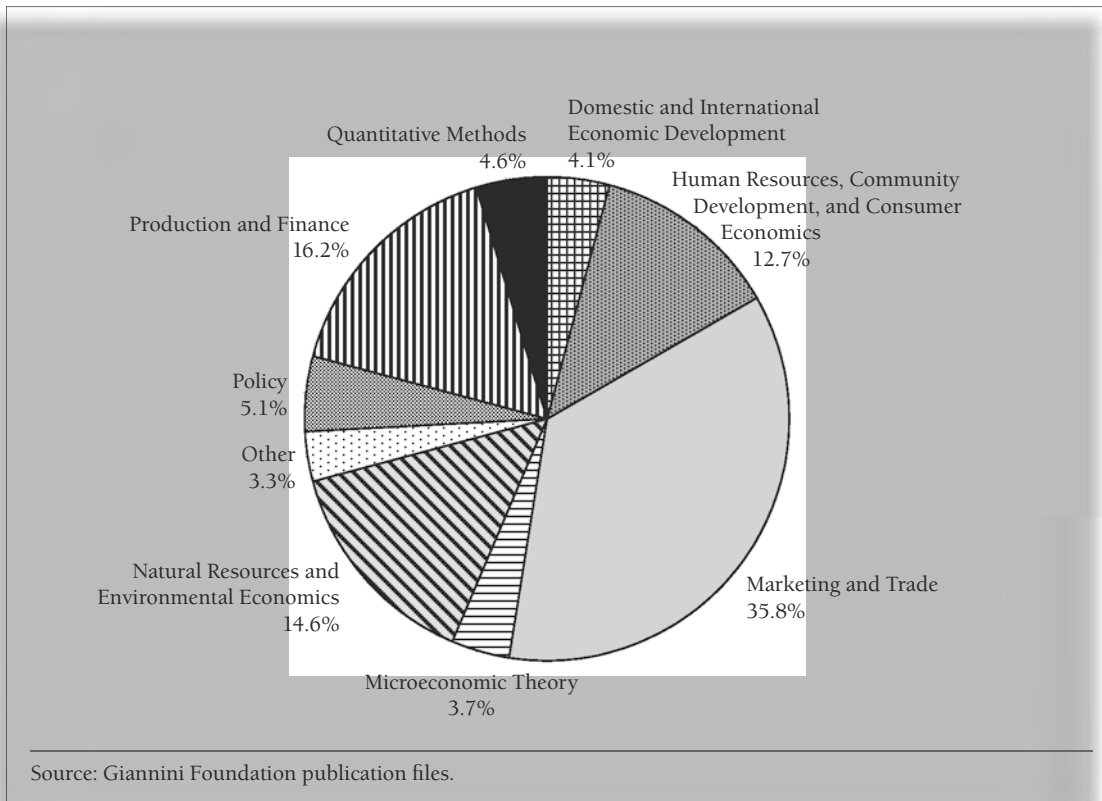
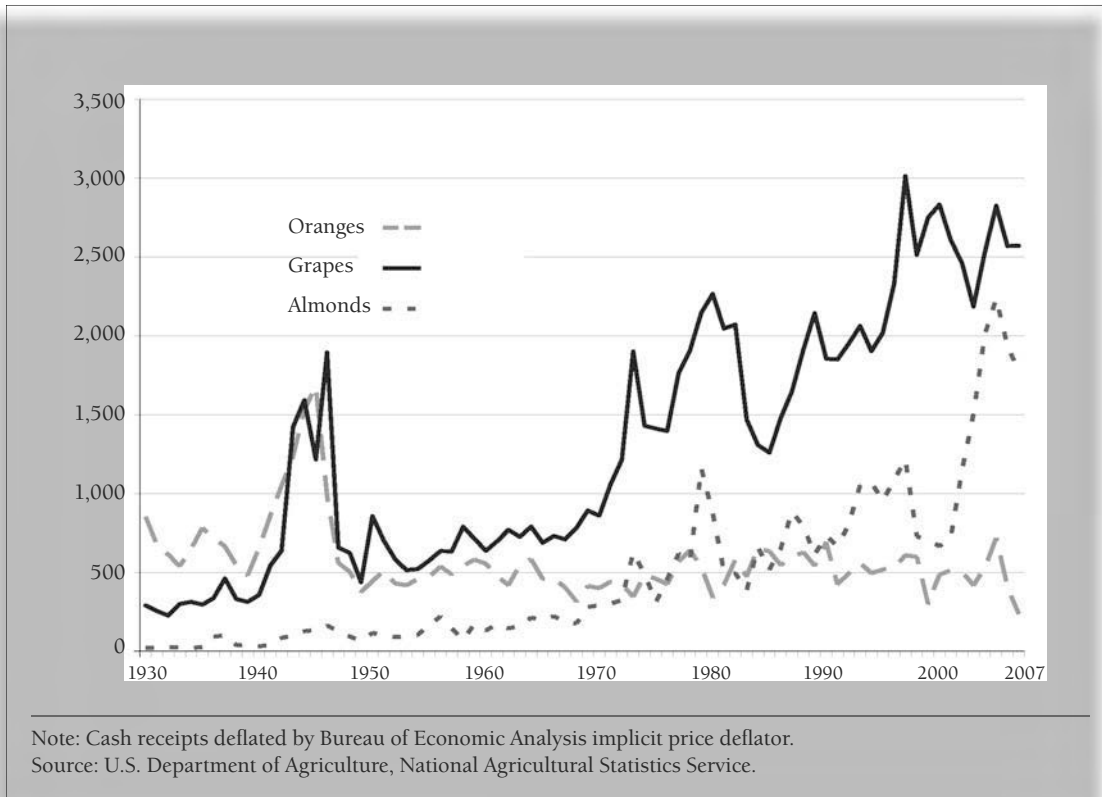
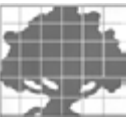
on “situation and outlook” and “farm management” (listed in early years) were assigned to Production and Finance. Naturally, there is room for error in making these assignments, but this scheme seemed to best capture the general thrust of the research trends.

Figure 3 indicates that Marketing and Trade, comprising almost 36% of Foundation research publications, was by far the leading category of research between 1929 and 1999. Three categories each accounted for about 13–16% of the publications: Production and Finance, Natural Resources and Environmental Economics, and Human Resources, Community Development, and Consumer Economics.

	1930	1950	1970	1990	2000	2007
Cattle and Calves	8	14	19	9	5	5
Poultry and Other	13	12	9	6	4	4
Dairy	13	11	12	13	15	20
Vegetables	17	16	18	20	26	22
Fruits and Nuts	36	21	20	27	28	29
Greenhouse and Nursery	2	2	5	10	12	11
Field Crops	9	20	13	12	6	6

Source: U.S. Department of Agriculture, National Agricultural Statistics Service.



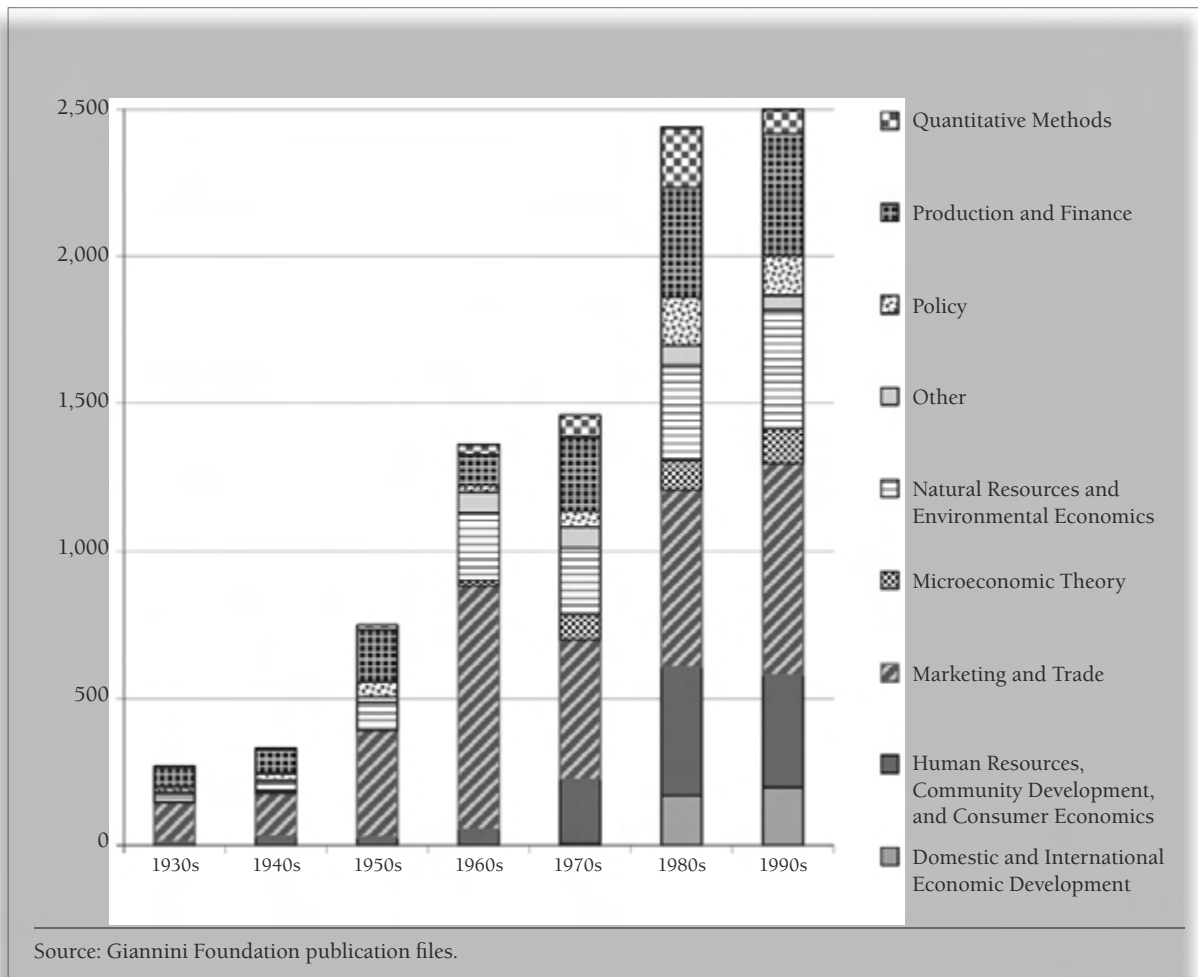




Of course these categorizations can be problematic when trying to isolate research that is focused on California's commodity agriculture. A study on management of hired farm labor, for example, could be focused mainly on production agriculture but be listed under Human Resources. Similarly, research on demand for the state's farm products could have been assigned to Consumer Economics.

Figure 4 dramatically demonstrates the rapid growth of the rate of publication over time by category. Giannini Foundation members published about 250 studies in the 1930s and about ten times that number in the 1990s. Big jumps occurred from the 1950s to the 1960s and from the 1970s to the 1980s and 1990s. Some of the increase is attributable to a rising number of researchers and students but the rate of publication per member also grew. It is instructive to note that the size of the staff increased during the first six decades and then began falling significantly from the 1980s to the 1990s (Giannini Foundation *Annals* 2006).

Figure 5 presents a stacked bar chart by decade for shares of publications among the categories. Through the 1950s, Marketing and Trade accounted for nearly one-half of the publications and Production and Finance accounted for almost one-quarter. In the 1960s, Marketing and Trade jumped to 60% of the total and Production and Finance fell to less than 10%. Natural Resources and Environmental Economics grew to about 17% of all publications during the 1960s. The three decades since 1970 have mirrored the full period—about 15% fell into Production and Finance, 25–30% into Marketing and Trade, and about 15% into Natural



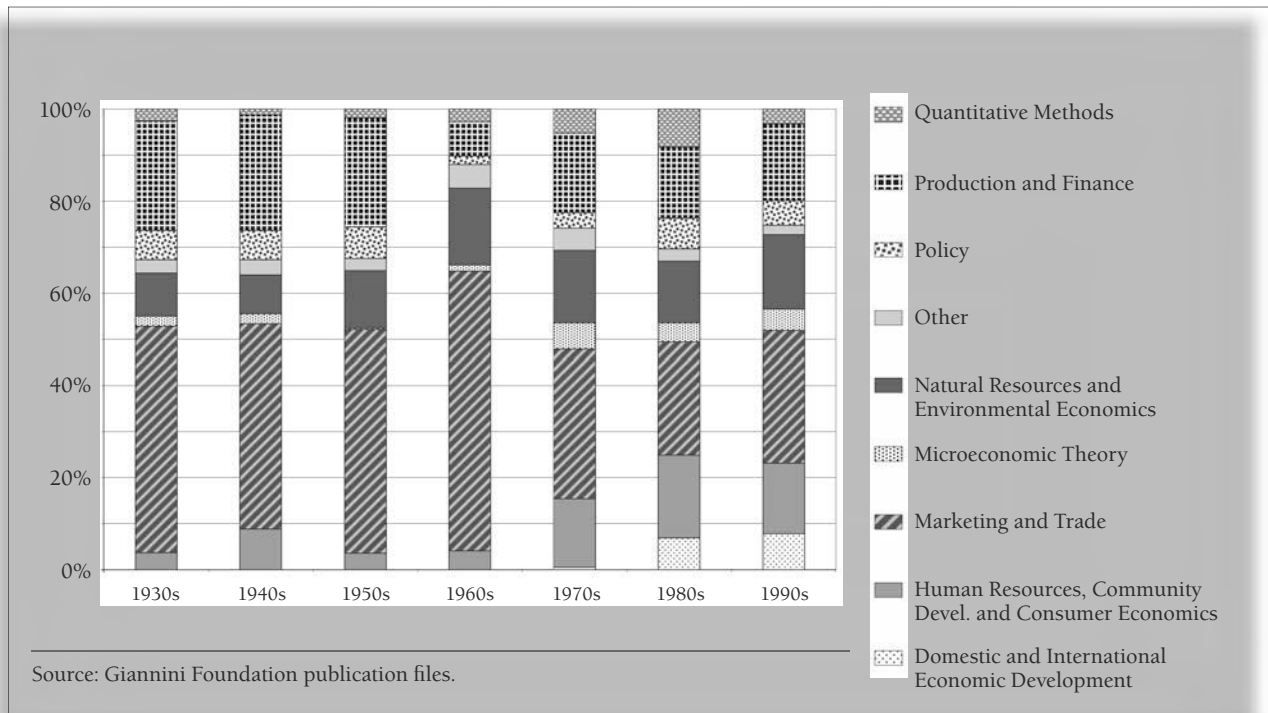


Resources and Environmental Economics. Since the number of publications per member has been so much greater in recent years, the period between 1970 and 1999 dominates the seven-decade totals.

International Economic Development was not listed prior to the late 1970s. In the past two decades, then, Economic Development has accounted for about 8% of all publications (Figure 5). Quantitative Methods and Economic Theory have been fixtures in members' research throughout the Foundation's seventy-five-year history. In the 1990s, these categories accounted for about 8% of total publications, down slightly from the 1970s but up from the less than 5% of publications in the early decades.

The Great Depression of the 1930s dominated California agriculture during the early years of the Foundation's existence so it likewise permeated the members' research efforts. How farmers coped with low prices and price fluctuations were early themes. Beginning with the New Deal, considerable Foundation research related to government subsidy and marketing policies. In the early days, Benedict, Tinley, and Tolley were leading figures. For a magisterial treatment with complete citations, see Benedict (1953). Throughout the 1930s, the Foundation supported research that provided a background for understanding government policies and occasionally made a direct evaluation of the consequences of newly established government programs. Because most of California agriculture was devoted to commodities that were less directly affected by the big commodity subsidies, much of the policy-relevant work was devoted to marketing questions in support of analysis of marketing orders for the state's commodities. Nonetheless, the share of work that was labeled as policy was only about 7% at the time and that share has remained at less than 10% since (Figure 5).

An important output of the Giannini Foundation has been support for dissertations supervised by members. These dissertations are classified into ones that deal directly with California agriculture and ones that do not using the entire set of dissertations that were completed between 1917 and 2005.





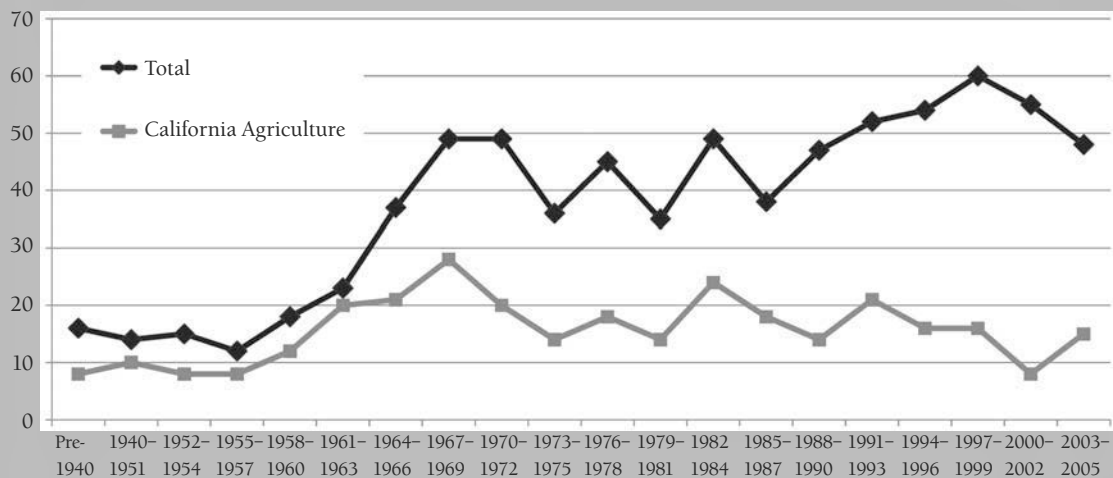


The dissertations were sorted into topics based on their titles. Inclusion of a dissertation as closely relating to California agriculture required an evident link between the dissertation’s title and an issue of specific importance to the state’s agricultural industry.

Obviously, using only titles has limitations—a dissertation may have a strong connection to agriculture but may fail to make that link evident in the title. One might, for example, develop a methodology that is then applied to an issue of interest to agriculture in the state but the application was not considered important enough to include in the title. In that sense, then, the author and the dissertation committee were relied upon to signal, through the title, whether the application was significant or simply incidental to the main thrust of the work.

In addition, in the broadest sense, almost all of the dissertations are somewhat relevant—a tool from mathematical economics may later be applied to the state’s agricultural economics. Furthermore, one may plausibly argue that any specific application in environmental economics or economics of less developed countries has a link back to California agriculture.

But using such broad indicators would render the classification meaningless so the approach here was not so catholic. Dissertations most clearly dealing with California agriculture were easy cases. A dissertation with a title that mentioned a specific crop produced in California and that was not applied solely to a developing country was included. Also included were dissertations dealing with trade or governmental policies in other countries with which the United States trades. Dissertation titles specifying governmental policies in the United States and titles dealing with inputs into California agricultural production—labor, land, water, genetic resources, pest management, technological advances, research and development, and conservation, for example—were included. Finally, all dissertations dealing with consumer demand for agricultural products were included.<sup>2</sup>



Source: Giannini Foundation dissertation files.

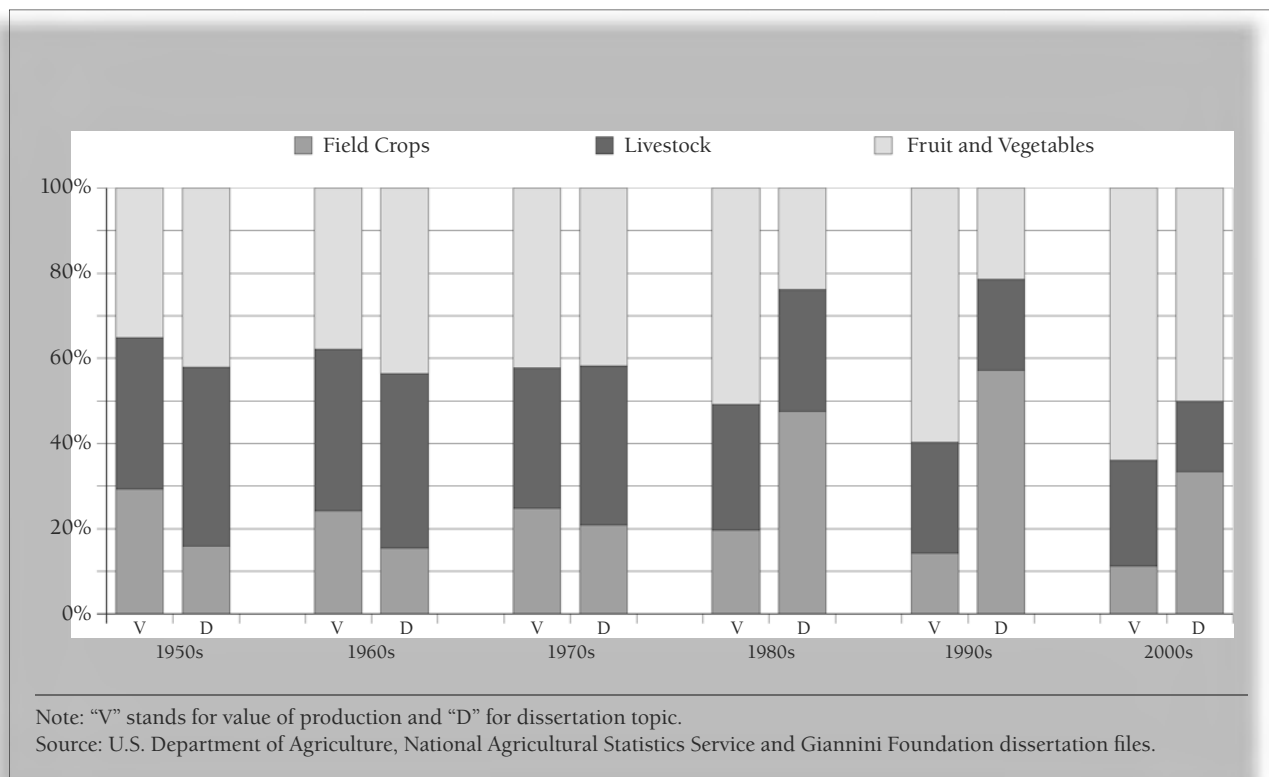


Figure 6 divides the dissertations into three-year periods and shows that the number of dissertations supervised grew rapidly—from about ten per three-year period in the early 1950s to almost fifty in the late 1960s. Numbers then stabilized at around forty through 1987 before rising to sixty a decade later. The number of dissertations directly related to California agriculture rose to about twenty per three-year period in the 1950s and remained at that level or slightly less before declining gradually in the 1990s. The share of dissertations focusing on topics directly connected to California agriculture declined for most of the 1990s, with some rebound in the last few years.

Figure 7 shows the relationship between the distribution of commodities listed in dissertation titles and the distribution of value of agricultural production by commodity group. Overall, the mix of commodities among the dissertations mapped closely the gross value of California agricultural production, at least until the most recent three decades. In the 1980s and 1990s, there was a larger share of dissertations on field crops and a smaller share on tree crops and vegetables than would be warranted by the shares these crops held in production value. One can speculate that interest in trade issues and the national and global importance of grains may have influenced these choices, or perhaps the influx of Canadian and Australian appointments is a simpler explanation.<sup>3</sup>

EXAMPLES OF GIANNINI FOUNDATION RESEARCH ON AGRICULTURAL SUPPLY AND RELATED TOPICS

To understand the history of the Foundation in the early years, let us review a few of the important or prominent papers that relate directly to California agricultural supply in the early 1930s. Given that others will deal with trade, resources, and marketing, this paper focuses on the supply side. This section discusses research contributions and the following section deals with





situation and outlook reports. The Foundation also contributed outreach publications and statistical compilations. Finally, no attempt has been made to select the most important or path-breaking research. Rather, this section discusses a few representative studies that are likely to be interesting now because of the topic, the authors, or the context. Most of the example publications were published in the *Journal of Farm Economics* (now the *American Journal of Agricultural Economics*), the premier academic journal in the field, although many were also published in preliminary or extended form in Giannini Foundation publications.

Before reviewing these representative studies from the first three decades of the life of the Foundation, we should note that an important tradition of Foundation members has been to periodically review and reconsider issues and research topics. This is not an official Giannini policy but has been the consequence of researchers pursuing their own agendas. A representative example is the series of research papers on joint production of pollination services and honey. Unlike those among the economics profession who wrote on “externalities” involved in bee economics without knowing anything about the industry, Giannini economists focused directly on the commercial bee industry, its economic contributions, and markets for the two main products—honey and pollination services. Research started with two papers by Voorhies, Todd, and Galbraith (1933a, 1933b). After several additional studies in the early years, pollination research continued with J.W. Siebert (1978, 1980), Olmstead and Wooten (1987), and Willett and French (1991) and is being revisited currently at both Berkeley and Davis.

Having mentioned the farm economics work of Kenneth Galbraith and his coauthors, note the contribution to production economics by Peterson and Galbraith (1932). In the *Journal of Farm Economics* they wrote on the concept of marginal land in agricultural supply. Peterson was a newly appointed assistant professor trained by John D. Black at Harvard and Galbraith was a graduate student and part-time lecturer at UC Davis who was soon to join the Harvard faculty under Black’s leadership. The authors began with references to Marshall’s *Principles of Economics* (1890, 1920) and his treatment of marginal economics. As might be expected for the period, they developed this marginal argument with no use of formal mathematics. They noted that the rent is zero on marginal land and, therefore, a small decline in yield or output price would cause the land to drop out of production. The reasoning was developed using examples that included land on the western slope of the Sierra Nevada range. They reasoned that, as one moves east from the Central Valley floor, elevation, slope, terrain, climate, and soil quality all change gradually. And at some point we find land that is just on the margin of cultivation. The authors generally spoke of marginal land as being of relatively low quality. There was little appreciation of nonfarm opportunity cost. There also was no appreciation, even in the 1930s, that in California one margin of cultivation was the urban edge where the high value of the land for other uses meant that the relative returns to farming on that land might be zero or negative, even for crop land deemed to be of high quality by most physical measures. That is, much of the analysis emphasized the physical nature of land rather than its economic characteristics. It is also true that, despite specific examples from California, the purpose of the paper was to clarify concepts and theory, not to apply those concepts to specific agricultural issues.



Siegfried von Ciriacy-Wantrup, writing in 1941, attempted to clarify the still vexing topic of joint production and joint costs. Some inputs are used in more than one output in a multiproduct firm and allocation of costs across outputs is troublesome and to some degree arbitrary. Ciriacy-Wantrup listed three classes of joint costs: jointness in process, jointness in time, and jointness in risk. (Chester McCorkle (1955) stressed the importance of these ideas in applying linear programming to farm management but this paper leaves to specialists to define just what these mean and how they apply in linear programming.) Ciriacy-Wantrup noted the importance of fixed assets in the context of joint costs in agriculture and discussed how choice of farm size and diversification related closely to notions of joint costs. The following year, Ciriacy-Wantrup (1942) applied the concept of joint costs to the issue of private incentives for conservation and moved a step closer to the field of resource economics with which his reputation is now much more associated.

Gordon King (1956) provided insightful discussion of Nerlove's 1956 meeting paper, "Estimates of Elasticity of Supply of Selected Agricultural Commodities." Of course, Nerlove's research launched a revolution in agricultural supply econometrics and King recognized its importance. King emphasized his agreement with Nerlove's focus: "The paper presented by Marc Nerlove emphasizes the need for reconsideration of results obtained from statistical estimates of supply response from time series data. He has made a substantial contribution in the formulation and application of price expectations models to the estimation of supply . . . His position is that many statistical estimates of supply response have been too low . . . because of incorrect formulation of the price factor to which farmers react" (King 1956, p. 509).

King then broadens the Nerlove agenda and states:

I fully agree . . . as to the importance of the role of expectations of future prices in farmers' supply response; not only the price of that single commodity, but the prices of alternative outputs, the factor costs of the alternative enterprises, and the alternative employment possibilities of the factors, including the operator himself. In brief, the comprehensive supply response study requires knowledge of the production functions underlying various enterprises, factor and product prices, and the conditions and rapidity with which farmers will react to seemingly more profitable production, as well as the ever present problem of technological change. (King 1956, p. 509)

Indeed the agenda set forth by King remains challenging and perhaps his recognition of these challenges explains his shift toward research on commodity demand when he joined UC Davis soon after publishing these remarks.

King also recognized many approaches to supply analysis in addition to time series econometrics. He explained that "this problem of trying to predict probable supply response has been tackled by various methods, such as budget analysis of modal-type farms, linear programming, and analyses of farm records, as well as by the analysis of time series data" (King 1956, pp. 509–510).

Also, in 1956, Giannini Foundation economists tackled econometric estimation of supply in a study by Yair Mundlak and Chester McCorkle (1956) on the supply of spring potatoes in California. They used econometric analysis rather than programming or other "normative" approaches because, as they stated, linear programming



“would tell the researcher what should be done for individual firm profit maximization, not what is done” (Mundlak and McCorkle 1956, p. 554). They noted that a combination of normative methods, estimation with survey data, and time-series analysis might be the best way to answer supply-response questions. They did not mention panel data or cross-section time series data, which would figure prominently in Mundlak’s work after he left California.

Mundlak and McCorkle did not focus on price expectations. They assumed that lagged price was a sufficient proxy for expected price and further assumed that this expected price was exogenous. They also did not attempt to deal with all of the subtle issues raised by King. They did place spring potato supply in a multicrop context along with alfalfa and cotton, which were the relevant alternative crops in the southern San Joaquin Valley, the region to which their analysis applied. They noted that spring potato acreage was determined by expected relative profitability with respect to alternatives and by total cultivated area in the region. Their estimated own-supply elasticity was approximately 2.4, large relative to the standard error. They also found that “the signs of the coefficients suggest a competing relationship between cotton and potatoes, and complementarity between alfalfa and potatoes” (Mundlak and McCorkle 1956, p. 562). The alfalfa estimate, in particular, was robust to alternative specifications and highly significant. Mundlak and McCorkle further commented on the positive relationship between the price of alfalfa and potato acreage but did not explain it with either farm management or agronomic evidence.

In the later 1950s, activity analysis—linear programming, input-output analysis, and related tools—figured prominently in the academic work on agricultural supply. McCorkle, Boles, and Faris were early adopters of activity analysis among Giannini Foundation economists. They used linear programming models for a variety of applications and described activity analysis’ applicability more broadly. McCorkle ended his 1955 methodological survey on the use of linear programming in farm management with the following prediction: “As wider use is made of linear programming in the analysis of farm management problems, more problems of sufficient complexity to preclude the simple computational procedures will become common. Further introductions of electronic computing equipment will offer additional opportunities to attack such problems. It is necessary, therefore, that a broader understanding be had of how these problems are adapted for different types of computing equipment” (McCorkle 1955, p. 1235).

In the late 1950s, Harold Carter and Gerald Dean joined the group of those regularly publishing their applications of programming methods and econometrics, among other tools, to commodity supply and farm management issues. This pattern of research has continued to the present day with contributions to both conceptual issues and practical questions of local importance.

To conclude this brief review of Giannini Foundation research on agricultural supply and related questions, let us consider a fundamental long-run issue facing agricultural supply. Although mainly known for work on marketing and economic organization, R.G. Bressler devoted his 1958 American Farm Economics Association presidential address to “The Impact of Science on Agriculture.” He noted the rapid productivity growth in agriculture and focused on research and development as a



production activity and capital investment. (He observed in passing that only 4% of federal funding for agricultural research was devoted to social sciences.) Bressler did not provide estimates of rates of return to research nor of productivity growth or measures of the linkage from research and development to productivity growth. (Nor did he cite the work of Griliches or Schultz, with whom we now associate early work on the economics of agricultural research and development.) He did, however, consider investments in productivity-enhancing research in the context of the agricultural “surpluses” with which government programs had been dealing throughout the 1950s. Bressler argued that curtailment of agricultural research and development should not be the policy instrument chosen even if government-set supply controls were applied. He provided a number of compelling reasons for the position, mainly concerning the uncertainty and long time horizon associated with research impacts on productivity, and few economists would disagree with his conclusions.

#### GIANNINI FOUNDATION STUDIES ON COMMODITY SITUATION AND OUTLOOK, FARM PRODUCTION, AND FARM MANAGEMENT

An early feature of Giannini Foundation work was preparing situation and outlook reports and sometimes simply publishing economic data series for California farm commodities. Most of the first two dozen papers and reports of the Foundation dealt with commodity situations and outlooks. In Foundation paper 12, which was subsequently published in the *Journal of Farm Economics*, H.R. Tolley (1930) outlined the role of local versus national outlook research. He began: “The purpose of outlook reports, national, state or local, any of us would say, is to make available to farmers information which they can use as a guide in planning their production and marketing programs.” He went on to consider the information demands: “What information do farmers in a particular area or locality need in order to do their planning most intelligently? The answer that most of us economists would give at first thought is: Information that will make it possible to form an intelligent judgment as to prices that may be expected at marketing time for the commodities to be produced” (Tolley 1930, p. 588).

Tolley went on to distinguish between outlook work of national relevance, which would naturally be done at the federal level, and local outlook work that would naturally be done at the state or regional level. He also considered the use of outlook reports in farm management and budgets. He noted that there is sufficient information to prepare budgets in agriculture and stated that “recently the manager of a farming corporation in California producing something like a million dollars worth of commodities annually, mostly fruits and vegetables, told me he has been making an annual budget each year since 1922, and that with the exception of 1929, when a severe freeze curtailed his production very seriously, the estimates of income made at the beginning of the year have been within 5% of the actual income” (Tolley 1930, p. 594). This is a remarkable claim and few California growers of fruits and vegetables would make such a statement today.

The tradition of regular, systematic, and routine reporting on local situations and local outlooks for the hundreds of California commodities faded gradually.<sup>4</sup> In the United States, such outlook studies are now mainly the province of USDA for products of national importance and private industry analysts for other products and



specific locales. A partial exception is the baseline studies of the Food and Agricultural Policy Research Institute (FAPRI), which is based at Iowa State University and the University of Missouri. FAPRI provides ten-year projections that assume constant policies and are used mostly for simulations of the impact of alternative policy measures. In part because hay, fruit, vegetable, and tree nut crops are not subject to large national subsidy programs, neither USDA nor FAPRI provides much routine outlook analysis for these crops. Rather than preparing outlook studies, Giannini Foundation economists shifted relatively soon to periodic, intensive studies of issues facing California commodity industries. These periodic studies, including some that estimate supply and demand functions and consider policy options or the impacts of trade, have required some description of the market situation and outlook as background but outlook is not the main purpose.

Preparation of reports on commodity costs of production continued for about twenty years and, after a hiatus, has been reinvigorated in the past thirty years, although it is now considered more of an outreach activity than a research activity. These studies, now available on the UC Davis Department of Agricultural and Resource Economics website, are based on historical experience and do not use forecasts of input or output prices. Thus, they must be supplemented by farmers' own estimates to be helpful as decision aids. Nonetheless, the studies are probably among the Foundation's most used outputs in terms of commercial agriculture in California.

Farm management is another area of early effort that gradually received substantially less emphasis over the years. L.W. Fluharty was a regular contributor of early papers on "Enterprise Efficiency Studies on California Farms" and related topics. R.L. Adams, who was trained as an engineer, wrote often in the 1930s and 1940s on management of large farms, farm machinery issues, and general topics in farm management and organization. Size economies and issues in large-scale versus family farms were regular themes that have been recurring issues for the Foundation ever since. Farm land tenancy and farm credit issues were closely aligned to farm management, as were studies on land and water, especially in those early years before resource issues were considered a part of environmental and resource economics.

## CONCLUSIONS

This paper has compiled and categorized Giannini Foundation publications and dissertations and reviewed some important research related to agricultural supply from the first half of the history of the Foundation. This analysis indicates patterns and trends and documents insightful path-breaking research contributions by the Foundation. However, it does not review all 10,000 member publications nor determine which publications are the most important. It would surely be educational to skim through a few hundred candidates and select the top dozen that made the most remarkable contributions. The real fun would be finding and learning from the hidden gems that did not win awards or receive many academic citations but that nonetheless reward closer study. While a few interesting Foundation research contributions have been discussed, there are several hundred more that are probably just as interesting. The strategy here for finding gems was to devote attention to the 1930s



through the 1950s and leave aside the recent work with which many economists are already much more familiar.

This paper also did not discuss in detail the major agricultural supply issues or problems that have faced California agriculture over the past seventy-five years. A few major trends are listed—growth in the importance of irrigation, the shift in production from Southern California to the San Joaquin Valley, the growth and then decline in cotton and grain acres, the reversal of fortune between the grape and orange industries, and the growth in importance of tree nuts. But the key economic problems that drove those trends and how farmers have coped with other challenges to production agriculture in California are not outlined. Giannini Foundation research topics have reflected these important supply issues but it is too much to claim that Foundation research has provided solutions.

It was beyond the scope of this paper to analyze how California agriculture has been affected by the research on agricultural production and supply conducted by members of the Giannini Foundation. The fundamental question is whether the research in this topic area has had an impact. And without a response to this preliminary question, it is not possible to investigate the payoff or rate of return to the Foundation investment. For many years, economists have attempted to measure rates of return to investment and there is a large industry associated with calculating rates of return to research. Giannini Foundation colleagues are experts in that field and I urge them to conduct the research on research that is called for. This paper can simply conclude with a citation to George Stigler's (1976) delightful paper, "Do Economists Matter?" Stigler answers his question affirmatively and even quantitatively (with reference to a calculation attributed to Coase). I have spent many years avoiding disagreement with Professor Stigler or Professor Coase and will not start now.

## NOTES

1. The Giannini Foundation provided partial support for the research effort of University of California agricultural and resource economists. A greater share of the total budget came from state and federal funds. The calculation was simply to sum the number of Giannini-Foundation-affiliated faculty members each year for the seventy-five-year period. This does not count graduate students or research associates.
2. To make the criteria more clear, let us consider a few recent examples of dissertations that were or were not included in the list of those dealing with California agriculture. Included is John Crespi's dissertation, "Generic Commodity Promotion and Product Differentiation" (2000). There is no mention of California or a specific commodity in the title but the topic is clearly of importance to agriculture in California. Included is Sadi Grimm's dissertation, "Estimation of Water and Nitrogen Crop Response Functions: A Factor Nonsubstitution Model Approach" (1986). Again, there was no specific mention of an application to California and perhaps the dissertation was purely methodological but the issue is of clear relevance. Patricia Boyland's dissertation, "Effects of Tractorization in Rice Culture in the Philippines" (1989), was not included because the application is specific to economic development and any connection with the economics of California agriculture seemed tangential. Similarly, Yurie Tanimichi's dissertation, "Essays on the Economic Analysis of Transboundary Air Pollution" (2002), was not included. Here there is no indication of any application to California agriculture and the application seemed more likely to air pollution in general. Amos Golan's dissertation, "A Discrete-Stochastic Model of Economic Production and a Model of Production Fluctuations—Theory and Empirical Evidence" (1988), seemed to be more methodological than oriented to an application to





California agriculture. Had efforts been expanded to reading abstracts, these excluded dissertations might have been found to have closer connections to California agriculture than is evident from the titles.

3. Figure 7 includes data from 1950 forward because there were only six dissertations prior to 1950 that had an identifiable commodity focus. Of those six, one dealt with dairy, one with tomatoes, and the others with tree crops, including oranges, plums, almonds, and peaches. Several of the other dissertations dealt with fruit and tree nut or horticultural crop issues without specifying a commodity in the title. And one dissertation that was not commodity-specific, Varden Fuller's famous 1939 dissertation on hired farm labor, was clearly devoted to California agriculture.
4. By "routine" I do not mean easy. Indeed, one reason that such work is not popular among researchers is because it is so difficult and, unlike other research we undertake, it is often soon evident when our forecasts prove inaccurate.

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