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## Agricultural and Resource Economics Update

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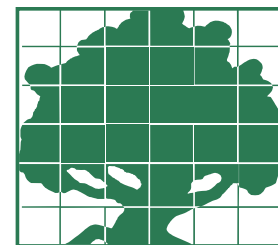
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## Does Yelp Affect Restaurant Demand?

Michael L. Anderson and Jeremy Magruder

Internet review forums increasingly supplement expert opinion and social networks in informing consumers about product quality. We estimate the effect of positive Yelp.com ratings on restaurant reservation availability and find that an extra half-star rating causes restaurants to sell out 19 percentage points (49%) more frequently, with larger impacts when alternate information is more scarce.

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by Colin A. Carter  
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Beliefs on product quality play an important role in shaping consumer demand. For many goods, consumers face *ex ante* uncertainty regarding the quality of the good and rely on imperfect signals to infer quality. Traditionally, expert opinion and social learning have helped consumers resolve these information asymmetries.

For an expert's take, consumers may consult *Consumer Reports* when buying an automobile or household appliance or they may read reviews by professional critics when selecting a movie or choosing among dining options. Alternatively, consumers may confer with peers who own the automobile or who have eaten at the restaurant. In recent years, however, online sites that cheaply aggregate consumer reviews have recently expanded and have begun supplementing both of the traditional mechanisms. But are these sites playing an important role in determining consumer demand?

Despite the theoretical potential of digital word-of-mouth to influence consumer choices, it is difficult to estimate its impact on purchasing decisions. Products that receive positive reviews are ones that appeal to consumers (i.e., they have high unobserved quality), and these products would likely experience high sales even in the absence of positive reviews. In a recent paper published in the *Economic Journal*, we leverage a feature

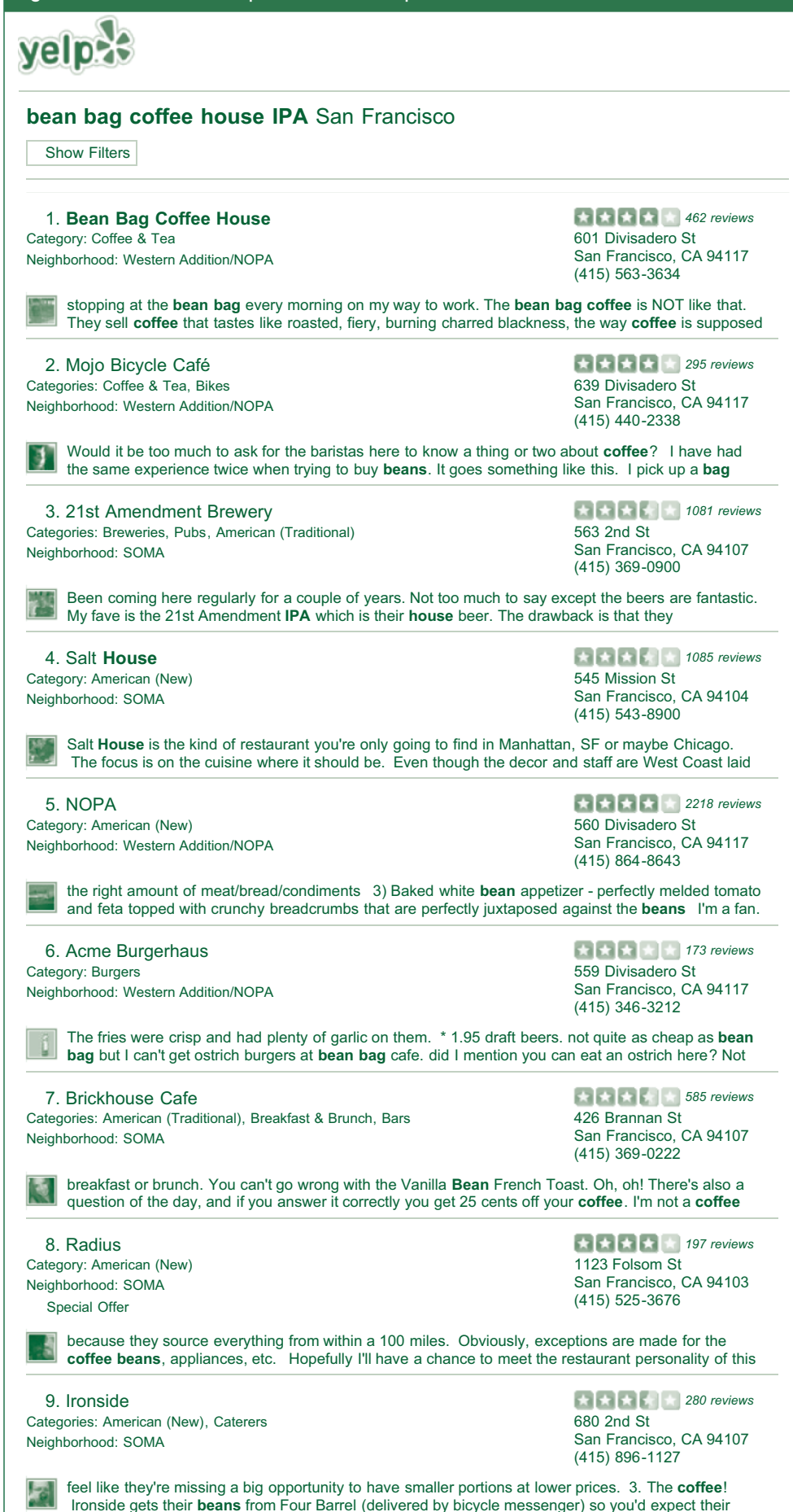
of the display system at Yelp.com—a popular site that allows users to leave reviews of local businesses—to estimate the effect of positive Yelp ratings on restaurant customer flows.

Yelp reviewers assign businesses ratings from one to five stars in whole-star increments. When a user searches Yelp.com, Yelp presents a list of businesses that meet the search criteria or fall within the category of interest. Figure 1 on the next page reproduces an excerpt from a sample search on Yelp.com. Businesses are sorted according to relevance and rating, and for each business the average rating is prominently displayed, rounded to the nearest half star. The number of stars in the average rating is easily visible, particularly because the color of the stars changes at whole star thresholds.

We downloaded the entire history of reviews from Yelp.com for each restaurant in San Francisco, CA and recorded the date of the review, the rating assigned (1–5), and the reviewer's unique user identifier. We then reconstructed the average rating and total number of reviews for each restaurant at every point in time and matched these data with reservation availability data from a large online reservation website.

As Figure 1 demonstrates, Yelp aggregates all reviews for a given business and displays the average rating prominently. However, when Yelp computes

Figure 1. Results of a Sample Search on Yelp.com



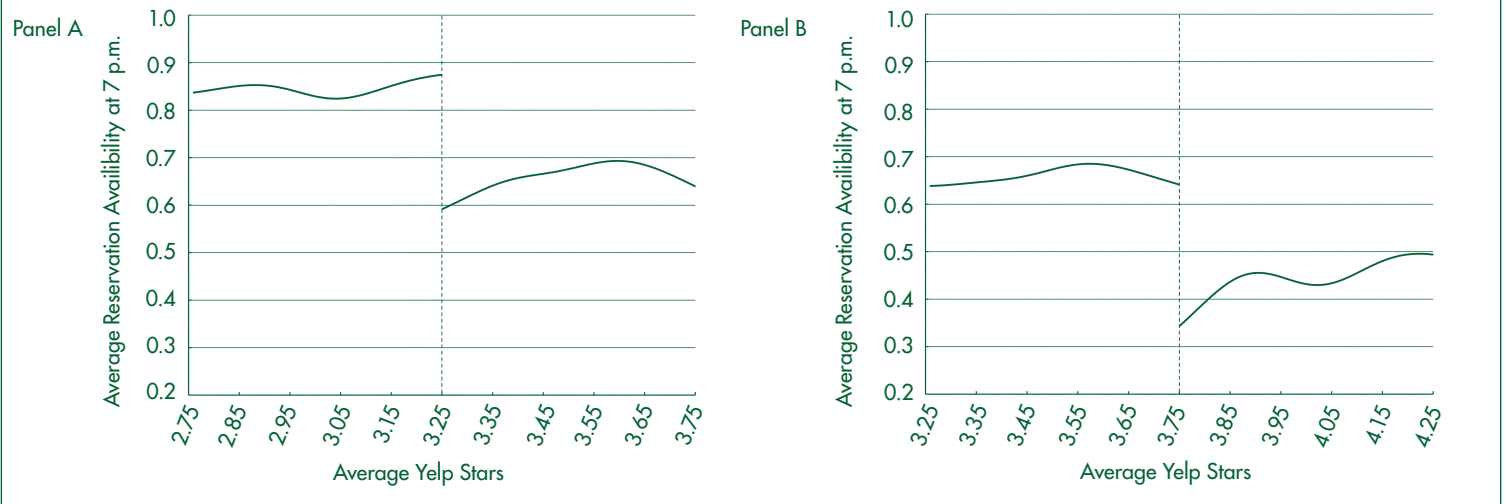
the average rating, they round off to the nearest half-star. Two restaurants that have similar average ratings can thus appear very differently on Yelp. For example, a restaurant with an average rating of 3.24 displays a 3-star average rating, while a restaurant with an average rating of 3.26 displays a 3.5-star average rating. In actuality, the true underlying quality of these two restaurants is similar on average, allowing us to identify the effect of the Yelp rating on customer demand while controlling for unobserved quality. If Yelp reviews have significant impacts on consumer demand, then we should observe a sharp increase in reservations at each major rounding threshold (e.g., 3.25 stars and 3.75 stars).

In the paper we use a technique known as regression discontinuity to estimate the effect of Yelp. Here, we present several figures that graphically summarize the results from the regression discontinuity estimator. Figure 2 plots mean 7:00 p.m. reservation availability by Yelp rating. Panel A focuses on the window where restaurants have either 3 or 3.5 stars, and Panel B focuses on the window where restaurants have either 3.5 or 4 stars. There are clear jumps in the mean availability at both the 3.5 and 4 star thresholds.

Moving from 3 to 3.5 stars—which occurs when a restaurant's rating crosses 3.25 stars—reduces the likelihood of availability from about 85% to about 60%. Moving from 3.5 to 4 stars—which occurs when a restaurant's rating crosses 3.75 stars—reduces the likelihood of availability further to below 40%.

Interestingly, for the most part, it appears that a step function is a good approximation to the overall relationship between Yelp ratings and restaurant availability. That is, restaurant availability appears to respond primarily to the displayed rating, and not the underlying average review score (which presumably measures the restaurant's true quality from the perspective of

Figures 2a and 2b. Average Reservation Availability at 7 p.m. by Restaurant Yelp Rating



consumers). Overall, we find that a half-star increase in Yelp ratings decreases reservation availability by 19 percentage points during peak dining hours.

If Yelp is providing information about new restaurants, that information should be most valuable among restaurants that are unfamiliar to patrons. We divide restaurants into familiar/unfamiliar groupings along two dimensions. First, restaurants with fewer than 500 reviews are likely to be less frequented and less well known than those with more than 500 reviews. For restaurants with fewer than 500 reviews, an extra half-star on Yelp reduces reservation availability by 20 to 30 percentage points depending on the reservation time. In contrast, for restaurants with more than 500 reviews, for whom there is likely less hidden information about quality, there is no discontinuous change at any threshold associated with additional Yelp stars.

A second test for whether the Yelp effect is due to solving information problems groups restaurants according to whether there are external sources of quality information. Here, we note that quality information is easily available for restaurants which have a Michelin star or those which appear in the *San Francisco Chronicle's* annual Top 100 Restaurants listing. In contrast, crowd-sourced information may be more

important for restaurants excluded from these prestigious rankings. We again find that an extra half-star on Yelp reduces reservation availability by 20 to 30 percentage points at all three times for restaurants without external recognition but that the Yelp ranking does not similarly advantage restaurants which have been externally accredited. These results support the hypothesis that Yelp is most valuable when there is less external information about restaurants, though other differences between the two groups of restaurants may also play some role.

The high return to positive Yelp ratings naturally creates an incentive for restaurants to manipulate their own ratings by leaving false reviews. Manipulation is feasible in this context because Yelp is crowd-sourced—any restaurateur can, in principle, leave himself a 5-star review. Furthermore, the significant increases in business at Yelp thresholds create a strong incentive for restaurants to attempt to manipulate their ratings to fall above a threshold.

Is it possible that the increases in demand that we observe in Figure 2 at Yelp rounding thresholds are the result of specific restaurants strategically manipulating their ratings so that they fall right above the rounding thresholds? If so, this would invalidate our research design, because restaurants

above the rounding threshold would not be directly comparable to restaurants below the rounding threshold.

However, if specific restaurants manipulate their reviews to fall right above the thresholds, then some of restaurants above the thresholds have “true” Yelp ratings (i.e., the ratings they would receive absent manipulation) that are lower than their observed Yelp ratings.

To generate a significant drop in reservation availability at the threshold, these restaurants must sell out virtually all the time, despite the fact that they receive low ratings from true Yelp reviewers. It seems *ex ante* surprising that a restaurant that receives poor reviews would be extremely crowded, though it is theoretically possible.

Using a short theoretical model, we show that although restaurants face incentives to manipulate Yelp ratings, it does not make sense for them to try to stay right above the Yelp rounding threshold. The intuition is simple: given that a random stream of reviews will change each restaurant’s average rating over any time period, a restaurant which is just above a threshold has a very similar likelihood of just missing that threshold after new reviews come in as a restaurant which is just below the threshold. Both restaurants therefore

face similar incentives to try and push their Yelp scores into safer territory.

We also present a variety of empirical tests that consistently show no evidence of any manipulation behavior that would cause restaurants to cluster just above the thresholds. For example, restaurants leaving fake reviews for themselves should have more 5-star reviews and fewer reviews per reviewer. We find no evidence that restaurants with these types of characteristics cluster just above the thresholds.

Two questions emerge when considering the effects of Yelp ratings on restaurant demand. First, do the effects represent the transmission of information on restaurant quality or do they represent a marketing effect generated by Yelp's ranking system? Second, what changes in customer flows and profits are consistent with the observed changes in reservation availability?

Our estimates may not represent a pure effect of information regarding restaurant quality if the order in which Yelp lists restaurants on its website (e.g., in Figure 1) is a function of a restaurant's displayed average rating rather than its true average rating. In that case, restaurants just above a Yelp threshold would be significantly more likely to be seen by consumers browsing Yelp than restaurants just below a Yelp threshold. However, we find that the order in which Yelp lists restaurants is not affected by the displayed average rating (after controlling for the restaurants' true underlying average ratings). We thus conclude that increased information about restaurant quality causes higher-rated restaurants to have lower availability, rather than any effect of increased visibility.

To gauge what changes in customer flows could be consistent with our result that an extra half-star on Yelp causes a 19 percentage point decrease in reservation availability, we performed a series of simple statistical calibrations. First, we recorded the capacity

of each restaurant in a subsample of 73 restaurants. Next, we assumed that a restaurant has no reservation availability if the number of seats reserved for a given evening reaches its capacity. Finally, we examined the average customer flows that would be consistent with reservation availability rates of 58% (the average rate above the Yelp thresholds) and 39% (the average below the Yelp thresholds) under different assumptions about the distribution of arriving customers. Our calibrations suggest that the median restaurant might experience an increase in customer flows of 6% or more if its reservation availability drops from 58% to 39%.

Modest changes in customer flows, however, can have a significant impact on profits in an industry with high fixed costs and high margins. A typical mid-to-high-end restaurant with \$20,000 per week in sales and a margin of 68% on food and beverage sales, earns approximately \$2,000 per week in pre-tax profit. In comparison, a 6% increase in customer flow translates into an additional revenue gain of \$816 per week in pre-tax profit.

Of course, the increase in profit will be lower if the restaurant is capacity-constrained or if it has to expand staffing levels to maintain service. Nevertheless, the calibrations suggest that a typical restaurant could experience substantial gains in profit when crossing a Yelp threshold.

In summary, the effects we estimate are large, and they indicate a valuable use of crowd-sourced information: because Yelp collects and aggregates the experiences of a large number of patrons, Yelp provides a convenient forum to solve asymmetric information problems about the quality of unfamiliar restaurants. Tightening the link between restaurant quality and restaurant patronage may well have positive benefits for society.

Crowd-sourced quality information may improve the average quality

of consumed meals via two mechanisms. First, it can redirect consumers to higher quality restaurants. Second, it can induce lower quality restaurants to shut down or improve their quality in response to changes in customer demand. We provide direct evidence of the first mechanism, but we cannot speak to the second mechanism. With the rapid spread of Yelp and other similar crowd-sourcing websites, this suggests that market evolution may be an important avenue of future research.

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For additional information, the authors recommend:

Anderson, M.L. and Magruder, J. 2012. "Learning from the Crowd: Regression Discontinuity Estimates of the Effects of an Online Review Database," *The Economic Journal*, 122(563): 957-989.

# Immigration Reform 2013: Implications for California Agriculture

**Philip Martin**

Congress is considering immigration reform. California farmers hope that a plan to legalize currently unauthorized workers and make it easier for them to hire guest workers in the future will be enacted. The legalization and guest worker proposals being considered should not increase farm labor costs significantly.

There were over 40 million foreign-born U.S. residents in 2011, including 11 million (or over one quarter) who were not authorized to be in the United States. The United States has been debating what to do about these unauthorized foreigners for the past decade, and in April 2013 a bipartisan group of eight senators introduced the Border Security, Economic Opportunity, and Immigration Modernization Act (S 744). The Senate Judiciary Committee in May 2013 began to mark up S 744, the most comprehensive immigration reform bill since the Immigration Reform and Control Act of 1986 (IRCA). The Senate is expected to vote on S 744 in June 2013.

S 744 has three key elements:

- More fences and agents on the Mexico-U.S. border and a requirement that all employers use the Department of Homeland Security's (DHS) E-Verify system to check the legal status of new hires, a bid to deter the entry and employment of unauthorized foreigners
- A 13-year path to U.S. citizenship for unauthorized foreigners who arrived in the United States before December 31, 2011 and remained "continuously since"

their arrival (shorter for unauthorized youth and farm workers)

- New guest worker programs for low-skilled farm and nonfarm workers and significant increases in the number of H-1B visas available to foreigners with college degrees coming to the United States to fill jobs that require such degrees.

S 744 would also change the mix of legal immigrants. Today, 70% of the immigrants who receive so-called "green cards" or immigrant visas qualify for them because family members already in the United States have sponsored their admission. S 744 would add 125,000 immigrant visas a year distributed on merit or economic grounds and eliminate some family visas, raising the economic share of immigrants. S 744 aims to be revenue-neutral, with fines and fees covering an estimated \$17 billion in additional federal spending over the bill's first decade.

## Enforcement and Legalization

S 744 authorizes up to \$6.5 billion in additional spending to "secure" the 2,000 mile Mexico-U.S. border. The border would be considered secure if 100% of the border is under surveillance and 90% of those attempting to cross illegally are apprehended in areas that have had more than 30,000 apprehensions a year. There were three such areas in 2012: Tucson, the Rio Grande Valley, and Laredo.

Currently, only employers in some states and those with federal contracts must use E-Verify, the Internet-based system that allows employers to submit data on newly hired workers to DHS to determine if they are legally authorized to work in the United States. S 744 assumes that foreigners will be discouraged from coming to the United

States if they are not certain employers will hire them, so it requires all employers to check new hires using the E-Verify system within five years.

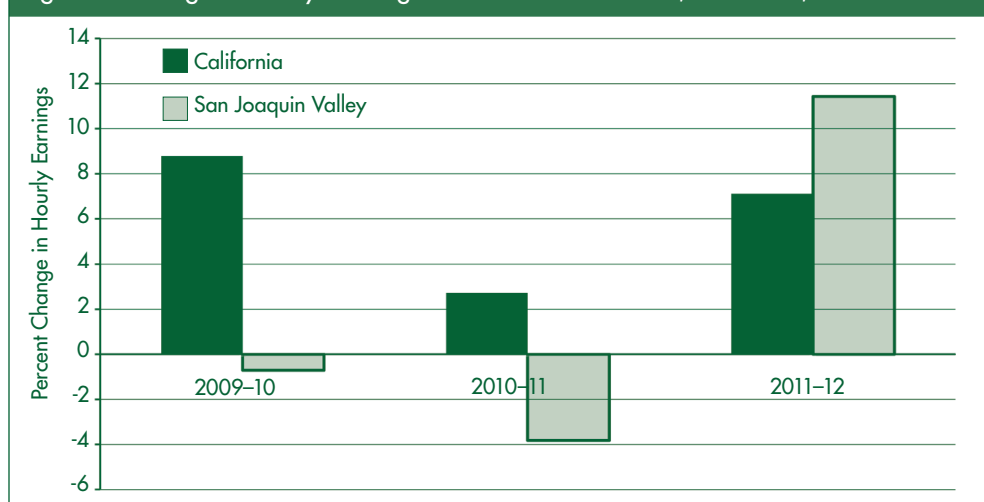
Employers with more than 5,000 employees would have to use E-Verify within two years of enactment, those with more than 500 employees within three years, and all others a year later. That is, most farm employers would have four years before they have to check the legal status of newly hired workers via the Internet. Employers would not have to check current employees.

When hired, non-U.S. citizens would have to show employers a "biometric work authorization card" or immigrant visa that includes a photo stored in the E-Verify system and can be seen over the Internet by the employer. In states that put photos on driver's licenses, new hires could present drivers' licenses for the required photo.

After DHS submits a plan to secure the Mexico-U.S. border, expected within six months of enactment, unauthorized foreigners who were in the United States before December 31, 2011 could pay \$500, any back taxes they owed, and application fees to become "registered provisional immigrants" (RPI) for six years. This RPI status could be renewed after six years for another \$500 fee. Unauthorized foreigners would have two years after S 744 is enacted to apply for RPI status.

After 10 years, if a series of enforcement indicators demonstrate that unauthorized migration is "under control" and the backlog of foreigners waiting for immigrant visas is eliminated, RPIs could apply for regular immigrant status by showing they have worked (or were enrolled in school) and lived in the United States since registering. They would have to pay another

Figure 1. Change in Hourly Earnings of Hired Farm Workers, California, 2010–2012



\$1,000 fee and pass a test of English and civics and, after three more years, these now-regular immigrants could apply for United States citizenship.

Provisional RPIs would not be eligible for most federal means-tested welfare benefits, including Food Stamps and subsidized health insurance under the Affordable Care Act. RPIs are likely to be eligible to purchase health insurance on the state exchanges that begin operation in 2014, but could not receive the federal subsidies available to those with low earnings.

There is a separate legalization program for unauthorized farm workers that provides a faster path to immigrant status. Unauthorized farm workers who did at least 100 days or 575 hours of U.S. farm work in the 24 months ending December 31, 2012 could become RPIs and receive blue or agricultural cards by paying an application fee and a \$100 fine under a program that would operate for a year after implementing regulations were issued. The spouses and children of RPI farm workers could also register and receive permission to live and work in the United States in any job (not just farm jobs).

In order to become immigrants, agricultural RPIs would have to do at least 150 days of farm work a year for three years in the eight years after enactment of S 744 or 100 days of farm work a year in five of the first

eight years after enactment. To become immigrants, agricultural RPIs would have to pay an application fee and a \$400 fine, and the family members of RPIs could apply for immigrant visas when the farm worker does.

### Guest Workers

The United States now has three major guest worker programs. The H-1B program admits about 100,000 foreigners a year with a college degree who enter the United States to fill a U.S. job that requires a college degree; about half of H-1B visa holders are employed in IT-services. The H-2A program admits an unlimited number of foreign farm workers, about 60,000 a year recently, to fill seasonal farm jobs after the U.S. Department of Labor (DOL) certifies farm employers as needing foreign workers. The H-2B program admits up to 66,000 foreign workers a year to fill seasonal nonfarm jobs.

Under S 744, more H-1B visas would be made available and there would be new guest worker programs for farm and nonfarm workers. The number of regular H-1B visas would increase from the current 65,000 a year to 110,000, and the number of visas for foreigners who have earned advanced degrees from U.S. universities would increase from 20,000 to 25,000. A High Skilled Jobs Demand Index could allow the number of

H-1B visas to rise by 10,000 a year to a maximum of 180,000, depending on employer requests for H-1B visas, and H-1B workers sponsored by their U.S. employers for immigrant visas would not be counted against the quota.

In an attempt to satisfy critics who allege that the H-1B program allows U.S. employers to replace U.S. workers with H-1B workers, all employers of H-1B workers would have to try to recruit U.S. workers for at least 30 days before hiring H-1B workers by posting job openings on a web site and certifying that they did not lay off U.S. workers to open jobs for H-1Bs. Spouses of H-1B workers could work in the United States if their country of origin provides reciprocal treatment of the spouses of U.S. workers.

Employers considered to be “H-1B dependent,” that is, having mostly H-1B employees, would have to pay higher wages and fees and could be prohibited from hiring additional foreigners with H-1B or L-1 visas. Firms with more than 30% of their U.S. workers on temporary visas would have to pay \$5,000 for each new temporary foreign worker, and those with more than 50% foreign workers would not be able to sponsor more after 2016. So-called “body shops” that bring H-1B workers into the United States and send them from one employer to another would have their access to foreign workers restricted—a blow to India-based outsourcers.

The current H-2A program that admits foreign farm workers would be replaced by new W-3 and W-4 guest worker programs a year after S 744 is enacted. USDA would develop the regulations to implement the W-3 and W-4 programs and adjust the number of farm workers admitted.

The W-3 program would be like the current H-2A program and tie a foreign farm worker to a particular U.S. farm employer and job for up to three years. However, W-3 farm workers could work for another registered U.S.

farm employer, known as a Designated Agricultural Employer (DAE), after they completed their initial contracts.

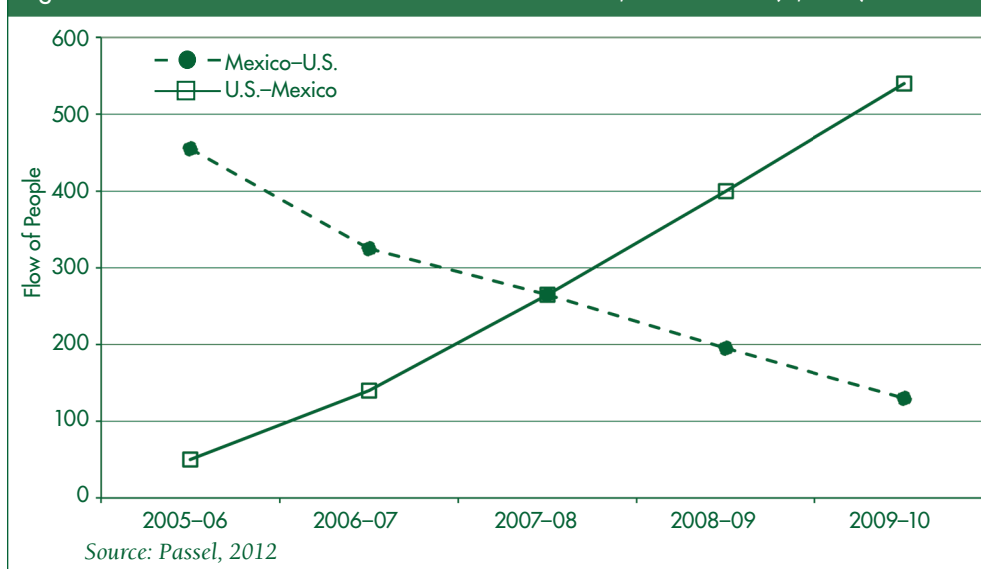
The W-4 program resembles the Replenishment Agricultural Worker program in IRCA that was never implemented. W-4 visa holders would need an initial job offer from a DAE to enter the United States, but could “float” from one DAE to another during the three years that their W-4 visas were valid. Both W-3 and W-4 visa holders could re-enter the United States for another three-year term after spending at least 90 days outside the United States.

The number of W-3 and W-4 visas would initially be capped at 112,333 a year, so that a maximum of 337,000 new guest workers could be in the United States at any one time during the three-year period that currently unauthorized farm workers who receive probationary immigrant status are required to continue doing farm work. USDA could recommend an adjustment to the number of W-2 and W-3 visas during the first five years after enactment of S 744, and adjust the number in consultation with the DOL after that.

Minimum hourly wages are established in S 744 for six farm worker occupations. Beginning in 2016, crop workers across the United States must be paid at least \$9.64 an hour, graders and sorters \$9.84, livestock and dairy workers \$11.37, and equipment operators \$11.87. The U.S. Department of Agriculture will set wages for agricultural supervisors and animal breeders. These minimum wages will be adjusted each year according to the Bureau of Labor Statistics’ Employment Cost Index by at least 1.5% and no more than 2.5%.

California farmers should benefit from a national minimum wage for guest workers that is significantly less than the average hourly earnings of California farm workers, which were \$12.56 an hour in 2012. Average hourly earnings rose sharply

Figure 2. Annual Mexico–U.S. and U.S.–Mexico Flows, 2005–2010 (1,000s)



between 2011 and 2012, and the increase was even greater in the San Joaquin Valley, which has over half of the state’s farm workers (Figure 1).

Housing emerged as a major issue. Farm employers wanted to provide housing or a housing allowance only to the W-3 workers who are tied to their farms, but S 744 requires farm employers to provide housing or a housing allowance to both W-3 and W-4 visa holders. U.S. workers employed alongside W-3 and W-4 visa holders would not have to be provided with housing or a housing allowance.

The amount of the housing allowance depends on whether the farm employer is in a metro or non-metro county. In California, W-visa workers would receive \$295 a month in metro counties and \$225 a monthly in non-metro counties in 2013, or \$1.84 an hour in metro counties for full-time workers and \$1.40 in non-metro counties. Almost all of California’s labor-intensive agriculture is in metro counties.

A new W-2 visa program would admit more low-skilled workers, with the number eventually determined by a Bureau of Immigration and Labor Market Research, located in U.S. Citizenship and Immigration Services. Its \$20 million budget raised from fees

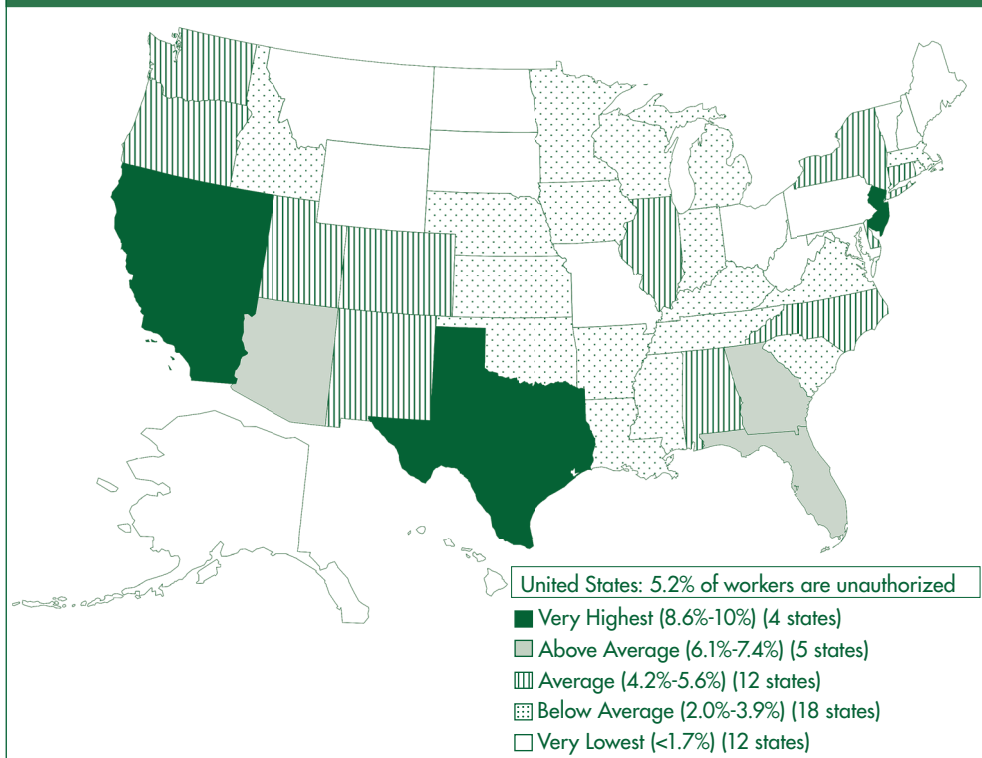
on W-2 workers and their employers. The Bureau would be charged with determining the annual change to the W-visa cap, devising methods to help employers who use guest workers to recruit U.S. workers, creating a methodology to designate “shortage occupations,” and making recommendations on employment-based visa programs.

In order to hire W-2 workers, U.S. employers in metro areas with an unemployment rate of less than 8.5% would register themselves and their jobs and request W-2 visas for specific foreigners. Foreigners’ families could also receive W-2 visas, which would be valid for three years. Up to 20,000 W-2 visas could be issued in the first year, 35,000 in the second year, 55,000 in the third year, and 75,000 in the fourth year, and the number could rise further if certain conditions are met. No more than one-third of W-2 visa holders could be employed in construction.

Where will U.S. employers get low-skilled W-visa workers? Mexico–U.S. migration has been declining, and more Mexicans returned to Mexico, often after being deported from the US, than were admitted in recent years (Figure 2). A century ago, most of the state’s farm workers were Asians. A combination of longer periods of U.S. employment and the opportunity to bring



Figure 3. Unauthorized Share of Workers 2010



family members may bring more Asians to the United States as guest workers.

### Implications for Agriculture

About three-fourths of the hired workers on U.S. crop farms were born abroad, and over half of all farm workers are not authorized to work in the United States. Although most unauthorized workers are employed in non-farm jobs, California has a higher-than-average share of unauthorized workers than most other states (Figure 3). The state's share of unauthorized farm workers is also higher than average, which explains why California farmers have been in the vanguard of those advocating for immigration reform.

If S 744 is enacted with its current agricultural provisions, there are likely to be three major changes. First, the hired farm work force is likely to become mostly legal, comprised first of currently unauthorized workers who become legal blue card holders and later legal guest workers. Second, labor costs should be stable, since average hourly earnings in California are well above the minimum wage that must

be paid to guest workers. Even if farm employers have to pay a housing allowance of up to \$2 an hour, the \$9.64 that must be paid to guest workers in 2016, plus a \$2 an hour housing allowance, is less than the average hourly earnings of crop workers in California in 2012, which were \$12.56 an hour.

Third, S 744's agricultural provisions should provide labor certainty for California farmers, and give them advantages over farmers in lower-wage areas of the United States. The capacity to hire legal guest workers for up to six years at \$9.64 an hour, with wage increases limited to 2.5% a year, should make it easier to plan investments in labor-intensive agriculture and secure financing for them. California farmers should benefit by the switch from a national minimum wage for guest workers rather than state-by-state wages. The current Adverse Effect Wage Rates (AEWRs) that must be paid to legal guest workers in 2013 range from \$9.50 an hour in some southern states to \$12 in Oregon and Washington; the California AEWR is \$10.74.

The agricultural provisions of S 744 benefit currently unauthorized farm workers at the expense of future guest workers. Currently unauthorized farm workers and their families can become legal immigrants and leave the farm work force within five years, while future guest workers will have lower wages and perhaps fewer protections than current guest workers. Farm worker advocates and farm employers negotiated the agricultural provisions of S 744, and both have said they will strongly resist efforts to change what they describe as a "delicately balanced compromise." If enacted, they should provide California agriculture with a legal work force at current costs.

#### Suggested Citation:

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# Some Impacts of Recession on California's Nursery and Floral Industry

Hoy Carman

The recession following the burst of the housing bubble in 2007 had a disproportionate impact on California's nursery and floral industry. Combined sales of nursery and floral products dropped from second to fourth among all California agricultural commodities, and from 12.2% to 7.8% of total California agricultural sales. A sharp reduction in the number of California retailers handling nursery and floral products will have long-lasting impacts on both producers and consumers.

California's nursery and floral industry will feel the effects of the "housing bubble" and the economic recession following its 2007 "burst" for many years. These effects are evident throughout the industry, ranging from the production of plants and material to structural aspects of product distribution. While there are no readily available empirical studies of the demand for nursery and floral products, it is widely accepted that housing and consumer income are important determinants of their demand.

Thus, the economic downturn beginning in 2007, characterized by increasing unemployment, reduced consumer incomes, decreasing home prices, shrinking equities and foreclosures, would be expected to adversely affect the demand for nursery products. This article uses industry data to outline industry changes and to speculate on some possible implications of these changes.

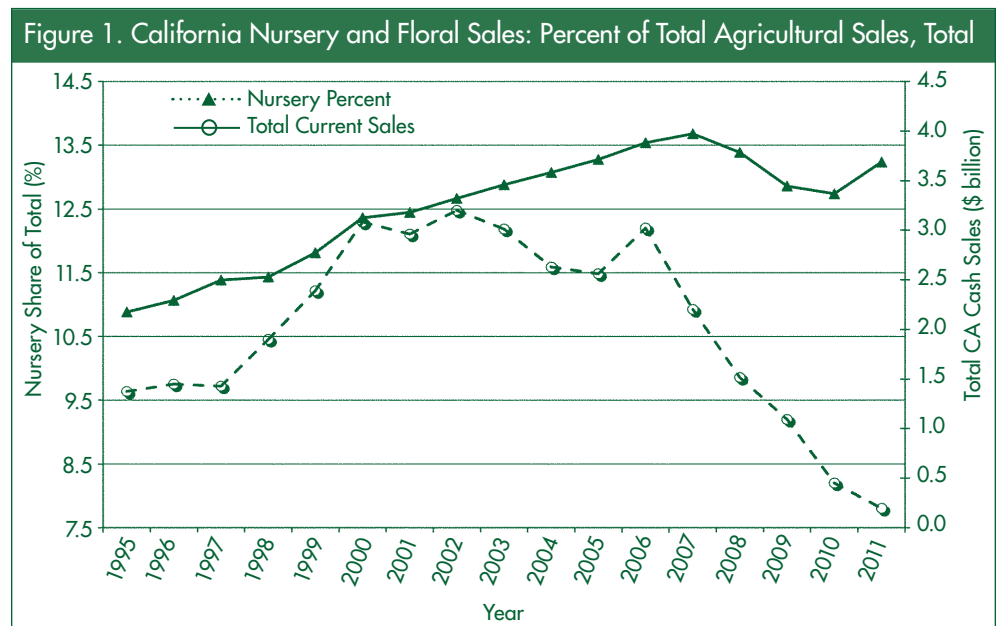
## Sales Trends

The California floral and nursery sector's ties to the real estate industry, and the unique nature of its crops, contributed to uninterrupted sales growth between 1993 and 2007. This growth continued despite the major challenges presented by shipping restrictions related to pests and diseases, increased competition from imported flowers, the impact of increased energy costs on production and transportation, limited and expensive water supplies, and less-than-ideal weather conditions. As a result of plunging house prices and recession, the combined sales of nursery and floral products dropped in 2008, 2009 and 2010 before recovering slightly in 2011.

Data from USDA's annual publication, *California Agricultural Statistics*, indicate that nursery production and sales typically ranked third among all California crops (following dairy and grapes), while floral crops usually ranked around tenth. When combined, nursery and floral production typically ranked second in value of production among all California crops.

As shown in Figure 1, total sales of California nursery and floral crops increased steadily from \$2.71 billion in 1995 to a record \$3.97 billion in 2007. Sales then decreased to about \$3.37 billion in 2010 before recovering to \$3.69 billion in 2011. Nursery and floral products' share of total California agricultural sales increased from 9.6% in 1995 to a high of 12.5% in 2002 and then, with the exception of 2006, decreased steadily to 7.8% in 2011. Combined sales of nursery and floral products dropped to fourth place among all California agricultural products in 2011, following dairy, grapes, and almonds.

Nursery and floral products' decreasing share of total California agricultural sales beginning in 2002 is due to two major factors. Most important, for most of the period from 2002 through 2007, the rate of growth for other agricultural products outpaced the growth for nursery and floral products. Then with the onset of recession, combined nursery and floral sales decreased while some other major California commodities enjoyed increasing sales.



**Table 1. Annual Taxable Sales and Number of Outlets, California Florists and Farm and Garden Stores, 2000–2011**

Year	Florists		Farm and Garden Stores	
	Number*	Sales (\$1,000)	Number*	Sales (\$1,000)
2000	5161	983,396	3601	2,060,713
2001	5338	988,022	3711	2,059,040
2002	5474	998,781	3834	2,135,472
2003	5572	1,005,452	3943	2,266,142
2004	5703	1,077,694	4061	2,386,377
2005	5708	1,133,896	4188	2,662,956
2006	5825	1,172,658	4188	2,930,230
2007	6160	1,203,148	4285	2,965,697
2008	6427	793,882	4715	2,751,233
2009	5070	461,349	5133	2,216,767
2010	4950	449,893	5427	2,269,297
2011	4798	464,761	5600	2,392,542

Source: California State Board of Equalization. Taxable Sales In California, annual reports, 2000 – 2011.

\* Number of licenses, July 1 of each year.

Annual nursery and floral product sales decreased 4.7% from 2007 to 2008, then decreased 9.0% from 2008 to 2009, and 2.2% from 2009 to 2010. Finally, combined farm level nursery and floral sales increased 9.5% from 2010 to 2011.

### Channels of Distribution

Nursery and floral products take a variety of paths in moving from the California producer to final customers, depending on the product and the nature and location of the customer. Due to the bulky nature and perishability of the products, most of the channels tend to be relatively short. For example, some producers have established retail outlets adjacent to their growing operations, especially in urban areas.

Nursery operations supplying inputs to other growers (trees, vines and other plant materials) tend to deal directly, or sometimes through a sales intermediary. Even large multiproduct retailers who deal through wholesalers and jobbers often receive shipments directly from the nursery producer.

While farm level sales of nursery and floral products decreased in both

absolute and relative terms, the most dramatic impacts of the recession and housing problems occurred at the retail level. Increasing unemployment and reduced consumer incomes combined with increased competition from alternative outlets to make retail florists an “endangered species.”

At the same time, a collapse in home building put substantial pressure on specialized farm and garden stores and retail nurseries. Data from taxable retail sales reports and the directory of firms licensed to sell nursery products help to outline the changes occurring.

**Retailers and Taxable Sales:** The California State Board of Equalization reports sales by type of retail outlet and the number of outlets. There are two retail store types for which nursery and floral products are the major products sold: florists and lawn and garden equipment and supplies stores (listed as farm and garden supplies stores through 2008). An increasing share of nursery and floral products are sold in other store types such as supermarkets, big box retailers (Home Depot, Lowe’s, K-Mart, Costco, etc.), and food and variety stores, but we

have no measure of the breakdown of sales by product line for any retailers.

Changes in store numbers and annual sales for California florists between 2000 and 2011 are dramatic (Table 1). The number of California florists increased from 5161 in 2000 to a peak of 6427 in 2008 (24.5 %), with store numbers increasing in 2008 even as sales began to plunge. Annual florists’ sales decreased over 34% from 2007 to 2008, 41.9% from 2008 to 2009, and another 2.5% from 2009 to 2010.

Total sales by California florists in 2010 were only 37.4% of their level just three years earlier in 2007. Large numbers of florists began closing in 2008, with total numbers decreasing 25.3% by 2011 (from 6,427 in 2008 to 4,798 in 2011).

Sales for California lawn and garden stores increased from just over \$2.06 billion in 2000 to a high of over \$2.96 billion in 2007 and then decreased over 25.2% the next two years before increasing 2.4% in 2010 and 5.4% in 2011 (Table 1). However, the number of lawn and garden stores increased each year from 2000 through 2011 even when total sales decreased.

Note that average per store sales peaked for both florists and lawn and garden stores in 2006 (\$201,315 and \$699,373, respectively), decreased and reached a low in 2010 (\$90,887 and \$418,149, respectively) and then recovered with increased sales per store of 6.6% for florists and 2.2% per store for lawn and garden stores.

**Firms Licensed to Sell Nursery Products:** Firms must be licensed by the California Department of Food and Agriculture to sell nursery products in California and licensed firms are listed in the annual *Directory of Nurserymen and Others Licensed to Sell Nursery Stock in California*. The firms by category were tabulated for 2003 and 2011 in a previous report and data for 2013 were tabulated for this report.

The data in Table 2 show a significant reduction in the number of retailers between 2003 and 2011 with a slight recovery in 2013. There were also less dramatic decreases in the total numbers of middlemen (wholesalers, jobbers and brokers) as well as landscapers and producers from 2011 to 2013.

## Structural Changes

Changing sales and reductions in the number of firms producing and marketing California nursery and floral products point to some rather basic structural changes with implications for both producers and consumers. First is the sharp reduction in the number of California florists and their total sales associated with the recession. The number of florists in 2011 dropped 1629 (25.3 %) from the peak of 6427 in 2008 while sales decreased \$753.26 million (62.6 %) from 2007 to 2010.

The change in farm sales of floral products was much less dramatic. California farm-level floral product sales reached a high of \$1.036 billion in 2007. Sales then dropped to \$1.015 billion in 2008 and further to \$937.0 million in 2009 before recovering to \$1.015 billion in 2010. The large decrease in sales by florists with only a small change in farm level sales is due to a significant change in retail market shares for floral products. Specifically, other outlets such as supermarkets gained market share for floral products at the expense of individual florists.

The situation for lawn and garden equipment and supplies stores is much different than florists or other retailers of nursery products. While total sales decreased after the peak occurring in 2007, the number of retail licenses continued to increase.

This is not the case for other retailers handling nursery products. As shown in Table 2, there are fewer producers (including some with direct

Year	Cut Flowers and Greens Wholesalers	Jobbers and Brokers	Landscapers	Producers <sup>1</sup>	Incidental Retailers <sup>2</sup>	Retailers <sup>3</sup>	Total
2003	853	476	454	2999	2715	3756	9821
2011	880	460	463	2959	736	2158	5848
2013	854	447	421	2833	842	2180	5834

Source: California Department of Food and Agriculture, *Directory of Nurserymen and Others Licensed to Sell Nursery Stock in California*.

<sup>1</sup> A producer is a commercial producer who grows and sells a total of \$1,000 or more of nursery stock in one year.

<sup>2</sup> An incidental retailer is an operator of a retail sales outlet for nursery stock that is handled incidental to other merchandise. Retailers such as Home Depot, Wal-Mart, Lowes and supermarkets are in this category.

<sup>3</sup> A retailer is an operator of a sales outlet that has no growing grounds except small areas devoted to the production of plants for local distribution and those producing less than \$1,000.

sales to consumers) as well as incidental and specialized nursery retailers.

The number of retailers licensed to sell nursery stock decreased from a total of 6,471 in 2003 to 3,022 in 2013, a 3,449 (53.3%) reduction in number of outlets. Given much smaller reductions in wholesale nursery sales, the surviving retailers are larger on average and probably have smaller operating margins than was typical for florists.

This very significant reduction in the number of California retailers handling nursery and floral products has implications for both producers and consumers. Some producers undoubtedly lost their major retail customers while many lost important retail outlets. The impact of the loss of outlets was not uniform but it was widespread.

This consolidation of outlets may offer some economies in distribution but the short-run impact on floral and nursery product sales will be negative. Products are not as available at the consumer level as previously, which tends to reduce consumer choice and negatively impact impulse buying.

A change from specialized to multiproduct retailers tends to reduce customer service and may reduce product assortments. And, finally, the changes noted may be

associated with more market power in the hands of surviving retailers.

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### For additional information, the author recommends:

Carman, H., and A. M. Rodriguez. 2004. *Economic Contributions of The California Nursery Industry*. Berkeley: University of California Agricultural Experiment Station, Giannini Foundation Information Series No. 04-1. <http://giannini.ucop.edu/InfoSeries/041-Nursery.pdf>.

Carman, H. 2011. *Economic Aspects of the California Nursery and Floral Industry, 2001–2009*. Berkeley: University of California Agricultural Experiment Station, Giannini Foundation Information Series No. 11-1. <http://giannini.ucop.edu/InfoSeries/111-Nursery.pdf>.



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