

Impact of Regulations on Production Costs and Competitiveness of the California Citrus Industry

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Summary

California citrus producers face increased production costs over the next few years as new labor, food safety, and environmental regulations are phased in. Cost increases associated with control of ACP and HLB are also expected if citrus growers continue to invest in coordinated control efforts. The exact amount by which costs will increase is difficult to assess because of a lack of data on the current distribution of industry wages, the degree to which food safety rules in the Food Safety Modernization Act are already being complied with, and the extent to which new sustainable groundwater rules will cause decreased citrus production. Estimates of cost increases are calculated by combining available data with reasonable assumptions. Compliance with environmental regulations not associated with groundwater sustainability is estimated to increase costs by \$17.7 million or \$67 per acre of citrus. New labor requirements will increase costs by \$112 million or \$357 per acre once they are all phased in. Control of ACP/HLB will increase costs by \$65 million or \$248 per acre if area-wide treatment controls are extended to all citrus-growing regions. Compliance training costs are estimated to total \$7.5 million or \$29 per acre. In total, future compliance with these regulations is estimated to increase costs by \$203 million or \$701 per acre. These cost increases represent about 6 percent of the total value of citrus produced in California.

Cost increases borne by California's citrus industry but not by other California crops or by other citrus-growing regions decrease the future competitiveness of California's citrus industry. Because growing citrus is more labor-intensive than some other tree crops, future labor cost increases will likely lead to some substitution away from citrus towards other crops. Costs of controlling ACP/HLB disadvantages California citrus relative to other California crops. However, they are also an investment in maintaining the competitive advantage that California has over other citrus growing regions that are infected with HLB.

Introduction

The reality of doing business in the United States and other developed countries is dealing with a large number of regulations. Compliance with labor laws, tax laws, environmental rules, business licensing requirements, insurance requirements, and safety regulations are simply a cost of doing business. When similarly situated businesses all face the same requirements within a country, then regulations do not confer a competitive disadvantage on any particular business because all face the same compliance costs. This means that compliance with Federal regulations will not help or hurt the competitiveness of any U.S. business with respect to other U.S. businesses. However, if compliance costs differ significantly across countries then U.S. businesses will either have a competitive advantage or disadvantage depending on whether U.S. compliance costs are higher or lower than a foreign competitor.

State-specific business regulations have a greater potential to impact competitiveness. States with a pro-business regulatory environment bestow a compliance cost advantage to its businesses over businesses located in states with a pro-worker or pro-environmental regulatory environment. In 2015 The Pacific Research Institute put together an index that measures small business regulatory compliance costs of all 50 states.¹ The most pro-business states are Indiana, North Dakota and Texas. At the bottom of the list is New Jersey at number 49, and California at number 50.

That the regulatory environment in California is not considered to be pro-small business will not surprise small business owners in the state. Taxes on gasoline are high. Income taxes

¹ The index can be seen at <https://www.pacificresearch.org/the-50-state-small-business-regulation-index/>

are high. Electricity costs are high in part because California taxes carbon and subsidizes renewable energy. Labor regulations are plentiful. In recent years changes in state labor laws, namely significant increases in the state minimum wage and the elimination of overtime exemptions, will significantly impact agricultural employers including citrus growers.

In a companion study I analyzed the economic impact of California's citrus industry.² I estimate that after all the effects of citrus production have spiraled through the state's economy, the total economic effect of California citrus is \$7.1 billion. The two objectives of this report are to estimate the total cost of complying with regulations that affect the citrus industry and to examine the impact of these compliance costs on the competitiveness of California citrus production relative to other California crops and relative to citrus production in other states. The important regulations I examine include recent changes to state labor laws, new food safety regulations, and regulations related to control of Asian Citrus Psyllid (ACP) and Huanglongbing (HLB). I rely on literature estimates of compliance costs regarding air quality, pesticide regulations, employee safety requirements, mandated training.

The remainder of the report is organized as follows: I begin by reviewing the previous literature on compliance costs affecting California citrus growers. I then review new California labor regulations and calculate their financial impact on California's citrus industry. ACP control costs are then examined. I then combine compliance cost estimates derived here with those from literature to obtain an aggregate estimate of compliance costs. I conclude with observations about the impact of these costs on the future competitiveness of California citrus.

² Babcock, B.A. "Economic Impact of California's Citrus Industry." School of Public Policy, US Riverside.

Previous Studies

Paggi, Noel and Yamazaki³ (2009) interviewed a panel of San Joaquin Valley orange growers to determine costs of complying with various regulations. Their study was an update of Hamilton (2006).⁴ The regulations these two studies examined were air and water quality, pesticides, worker compensation, capital investment, and compliance training. Per-acre compliance costs of the two studies were \$356 for Hamilton and \$402 for the Paggi, Noel and Yamazaki study. More than half of their estimated compliance costs are associated with air quality. Neither study looked at labor regulations other than workers compensation. A more recent study was conducted by McCullough, Hamilton, and MacEwan⁵ (2017) who interviewed 22 Central Valley farmers over the course of 15 months during 2015 and 2016. Their interview process was much more extensive than previous studies in that they spent hours working with the selected growers to obtain detailed cost of production estimates as well as compliance cost estimates. The categories were broken down into much more detailed subcategories to facilitate the interview process. Interestingly McCullough, Hamilton, and MacEwan (2017) estimate that total compliance costs for citrus were about \$100 per acre, which is far lower than previous estimates.

That estimates of per-acre compliance costs differ across studies is not surprising. It is to be expected that many compliance costs are not constant across farm size. For example,

³ Paggi, M.S.J.E. Noel, and F. Yamazaki. "Regulatory Compliance Costs and California Specialty Crop Producers Profitability" Paper presented at the Western Agricultural Economics Association Annual Meetings, 2009.

⁴ Hamilton, Lynn "Comparing California's Cost of Regulation to Other States: A Case Study Approach for Agriculture" Report prepared for California Institute for the Study of Specialty Crops, October 2006.

⁵ McCullough, M., L. Hamilton, and D. MacEwan. "The Costs of Regulation to California Farmers." Paper presented at the annual meetings of the Agricultural and Applied Economics Association Meetings, Chicago, IL 2017.

mandatory training costs that require attendance at a class will cost a 50-acre farm twice as much per acre as a 100-acre farm assuming that the attendee's opportunity cost of time is the same across the two farms. It is also likely that different growers will answer questions about compliance costs differently depending on how the questions are asked.

A major category of compliance costs that were not addressed in previous studies were costs to comply with new labor regulations regarding minimum wage, overtime, and sick leave. These new regulations will have a major impact on citrus production costs once they are all phased in. Another cost that was excluded from previous studies is the cost to control the spread of ACP and HLB. Some of these costs are mandatory while others are voluntary. Mandatory costs include the additional costs of covering shipments of citrus. Voluntary costs are insecticide sprays to control ACP. Spray costs may be voluntary but they are strongly encouraged as part of coordinated area wide ACP control efforts in Southern California. In the San Joaquin Valley, ACP spraying is generally concentrated around areas where ACP is found. If ACP becomes endemic in the San Joaquin Valley as it is in Southern California then area wide ACP control efforts will likely be started.

Labor Regulations

In recent years California's government has passed a series of labor laws that either remove farmworker exemptions from current law or that change existing law that applies to all workers. In this section I discuss these recent changes and estimate, where possible, their impact on the cost of producing and packing citrus.

SB 3 Minimum Wage Increases

On April 4, 2016 Governor Brown signed into law SB 3 which increases California's minimum wage in annual increments from \$10 per hour to \$15 per hour in 2022. The 2022 impact of the mandated increases in minimum wage on the cost of producing and packing citrus depends on what citrus industry workers would be paid in 2022 had the minimum wage law not been enacted. Martin and Costa (2017) observe that there is a distribution of wage rates paid to farmworkers with some being paid the minimum wage while others, primarily those paid piece rates, being paid higher wages, ranging from \$12 to \$14 per hour.^{6 7} The combination of Federal anti-immigration policies and a tightening labor market overall suggests that farmworker wages would be moving higher even without the mandated minimum wage increases. Thus it is not possible to precisely estimate the impact of SB 3 on the cost of producing citrus.

An alternative approach is to estimate production cost impacts under different assumptions regarding the distribution of wages paid to citrus industry workers pre-SB 3 and how much those wages would have increased without SB 3. Results are calculated for three initial distributions of wages and three different annual wage inflation rates. The three distributions are that 25%, 50%, and 75% of citrus industry wage workers were paid the pre-SB 3 minimum wage of \$10 per hour while the other 75%, 50%, and 25% of workers were paid \$13 per hour. The three non-SB 3 wage inflation rates used in the calculations are 0%, 3%, and 5% per year. A 3% inflation rate increases the \$10 wage to \$11.94 and the \$13 wage to \$15.52 in

⁶ Martin, Phil, and Daniel Costa. 2017. "Farmworker wages in California: Large gap between full-time equivalent and actual earnings." Economic Policy Institute Working Economics Blog March 21, 2017.

⁷ The 2018 minimum wage of \$11 per hour is technically applicable for employers who hire more than 25 workers. However, given competition for minimum wage workers, most employers who hire less than 25 workers will find it difficult to pay less than the wage paid by larger employers. Hence I use the greater-than-25-employee minimum wage throughout this report.

2022 whereas a 5% inflation rate increases the \$10 wage to \$13.40 and the \$13 wage to \$17.42 per hour. A common assumption across all scenarios is that 85% of the 21,866 full time equivalent jobs in the citrus industry that I estimated in my previous are wage-labor jobs. The results for three scenarios are shown in Table 1.

Table 1. Citrus Industry Production Cost Increases in 2022 from SB 3 Hikes in Minimum Wage

Percentage of citrus industry wage jobs paid at minimum wage in 2016	Wage Inflation Rate without SB 3	Annual Increase in Citrus Industry Costs (\$ million)
75%	0%	165
	3%	89
	5%	47
50%	0%	136
	3%	59
	5%	31
25%	0%	107
	3%	30
	5%	16

Source: Calculated by author.

The results show that SB 3 has a larger impact on industry costs when wage inflation is low and when the proportion of minimum wage jobs is high. With no wage inflation and 75% of wage jobs being minimum wage jobs, the impact on costs from SB 3 is \$165 million in 2022. At the lower end, with only 25% of jobs being minimum wage jobs and a robust 5% wage inflation rate, the cost impact is \$16 million.

Bill 1522 Paid Sick Leave

As of July 1, 2015, all California employers must give sick leave and allow their employees to take it. The minimum sick leave accrual rate is one hour for each 30 hours worked. Employees

are allowed to carry over at most three days of sick leave from one year to the next and employers can limit accrual to six days. This means that California's sick leave policy is really a "use it or lose it" policy. The maximum cost increase of this regulation will occur if employees had no sick leave before AB 1522 and if employees use sick leave as they acquire it. For employees that use sick leave it is as if they are getting paid for 31 hours of work when they actually work 30 hours. The additional one hour of pay is essentially a 1/30th pay increase. An upper limit on the cost of this new regulation therefore is 1/30th of the citrus industry wage bill, which I estimated to be about \$450 million. So if no citrus industry employees had sick leave before AB 1522 and all employees continuously use their accrued sick leave, then the cost of this new regulation would be \$15 million. The actual cost is likely significantly lower than \$15 million because not all workers use accumulated sick leave. For example, according to Barthold and Ford (2012), workers in the construction and hospitality industry used an average of two days of sick leave per year.⁸ Data on sick leave use by agricultural workers or packinghouse workers were not available.

AB 1513 Payment Rates for Rest and Recovery Periods

Under AB 1513 mandated rest periods (10-minute rest break for each 4 hours of work) and recovery periods must be paid at an employee's hourly wage rate for productive work time rather than minimum wage. The impact of this regulation depends on the proportion of workers who are paid more than the minimum wage and their wage rate. Because California's

⁸ Barthold, R.O, and J.L. Ford. 2012. "Paid Sick Leave: Prevalence, Provision, and Usage among Full-Time Workers in Private Industry." U.S. Bureau of Labor Statistics. Accessed on June 14, 2018 at <https://www.bls.gov/opub/mlr/cwc/paid-sick-leave-prevalence-provision-and-usage-among-full-time-workers-in-private-industry.pdf>.

minimum wage is increasing to \$15 in 2022, the cost of this regulation will decline with time because it is likely a higher proportion of citrus industry workers will be paid the minimum wage and because the gap between above-minimum wage pay and the minimum wage will shrink. No cost estimate of this regulation can be made without more data.

AB 1066 Overtime Regulation

AB 1066 phases out the current exemption from California labor law concerning rules governing payment of overtime. The situation before AB 1066 was that employers were required to pay overtime to farm labor if an employee worked more than 10 hours in a day or more than 60 hours in a week. This is in contrast to the 8-hour day/40-hour week standard governing other non-agricultural wage labor. Most states have no overtime requirement for farm labor.⁹ The current California requirement to pay overtime for agricultural labor dates from 1976 when Governor Jerry Brown began his first term in office. The AB 1066 overtime requirements phase in so that by 2022 (2025 for farms with fewer than 26 workers) growers must pay overtime if a worker works more than 8 hours in a day or more than 40 hours in a week.

There are various ways to calculate the impact of this law. Suppose, for example, that a grower has workers who normally work 6 days and 10-hour days per week. Under the existing California law, these workers do not get paid overtime. When the new law is fully phased in these workers would get paid 20 hours of overtime pay, which is 50% of their regular hourly

⁹ According to a New York Times article on August 7, 2014 titled “Long Days in the Field, Without Earning Overtime” the only states that required overtime in 2014 for farm labor were California, Colorado, Hawaii, Maine, Maryland, and Oregon.

pay. The employer's wage bill would increase by 16.67%.¹⁰ This cost increase creates an incentive for the employer to hire more workers. For example, suppose that a grower has 10 workers, each working 60 hours per week, or 600 hours of paid work per week. Assuming that additional workers are available, the employer could increase the number of workers to 15, each working 40-hour work weeks, and not pay any overtime. This response would not increase the employer's total labor costs, but it would increase management costs from the need to supervise five more workers. In addition, adding five workers to payroll systems would incur one-time costs.

The idea that reducing hours in a normal work week would cause companies to hire more workers is what led France to reduce its standard work week from 39 to 35 hours. Workers in France were allowed to work more than 35 hours but they would have to be paid overtime for the extra hours. Estevo and Sa¹¹ (2008) studied the impacts of this new law and conclude that it led to fewer hours worked by men, higher hourly wages for men, no change in hours worked by women, and no change in total employment. This evidence is consistent with French companies reducing the amount of labor they hire and paying the labor they do hire more in wages, whether in increased overtime or base wages.

Faced with higher labor costs from the new overtime rules it is likely that the first response of employers of farm labor will be to reduce the number of hours of current workers who work more than 40 hours per week. The second response will be a combination of hiring

¹⁰ One grower who was interviewed for this study has workers who normally work 10 hours Monday through Friday and 6 hours on Saturday. This grower would face a 14.3% labor cost increase from having to pay overtime if he does not change the number of workers or employment terms.

¹¹ Estevo, M. and F. Sa. 2006. Are the French Happy with the 35-Hour Workweek? IMF Working Paper No. 06/2511ZA Discussion Paper No. 2459.

additional workers while reducing the overall use of labor on the farm. The incentive to reduce overall labor requirements will be reinforced by the large increases in the minimum wages that are being phased in. Growers can reduce labor requirements by changing their farm operations: either switching to crops that require less labor or acquiring labor-saving technologies.

The ability of growers to respond to higher labor costs implies that an upper limit on the cost of the new overtime rules is 16.67% of labor costs. This 16.67% cost increase would only apply to growers who currently have workers who work 10 hours per day and 60 hours per week. The actual cost increase will be somewhat lower than 16.67% as growers reduce overall labor demand.

Accurate calculation of the aggregate impact of the new overtime regulations is not possible without data measuring the percentage of total farm labor hours that are currently paid for work that would now qualify for overtime pay. In my previous study, I estimated that the production of citrus in 2016 required 6.1 million hours of work. If all these production labor hours were logged by workers who worked 60-hour work weeks, and they will all be paid the full \$15 per hour fully-phased-in minimum wage, then adding on 20% in labor taxes results in an upper limit annual cost to growers of \$18.3 million due to increased overtime for their production labor.

Much of the labor used to harvest oranges is supplied by labor contractors who bill growers for the hours worked and the cost of managing the labor. Growers will therefore not be directly responsible for any cost increases from the new overtime rules. However, if contracted workers currently work in excess of 8 hours per day and 40 hours per week, then it is likely that the new overtime rules will increase the cost of contracted labor.

Workers Compensation

Citrus industry employers in California are required to buy workers compensation insurance for their employees. The cost of the insurance depends on the wage paid and the occupation. The pure premium rate for citrus packing workers as of July 1, 2018 is \$6.50 per \$100 worth of payroll. For citrus production workers the pure premium rate is \$7.50 per \$100.¹² Total premium will be greater than this pure premium rate because insurance companies need to cover all their overhead costs as well as generate a profit. California's premium load factor was reported to be 1.126 in 2016.¹³ If we assume that the average pure premium for citrus workers is 7%, then adding the load factor increases the premium rate to 7.9%. Multiplying this premium rate by my \$452 million total wage bill results in a \$35.7 million annual cost for workers compensation.

ACP Control Costs

In 2009 California's citrus growers decided to assess themselves an additional 8 cents per 40 pounds of citrus to cover costs of controlling ACP/HLB. The total amount collected from growers in the 2015/16 and 2016/17 marketing years was \$18.4 and \$16.7 million, all of which was used together with state and Federal support to fund ACP monitoring programs, tree removal, and ACP treatments. In addition to these fees, citrus growers also face additional expenses associated with ACP control in their own groves as well as the additional expense of

¹² Pure premium rates were obtained from the WCIRB website: <https://www.wcirb.com/content/what-wcirb>.

¹³ See page 7 of "Oregon Workers' Compensation Premium Rate Ranking" Oregon Department of Consumer and Business Services, December 2016. Accessed at <https://www.oregon.gov/DCBS/reports/Documents/general/prem-rpt/16-2083.pdf>.

complying with the regulation that fruit being transported from their fields must be covered with a tarp.

Cost of Insecticide Treatment

It is difficult to estimate the grower cost of spraying for ACP because of differences in treatment frequency and in the insecticides used. In Ventura County, which is generally infested with ACP, control efforts are designed around area-wide treatments in which all growers in a region spray during designated periods. The objective of area-wide treatments is to reduce ACP numbers by a greater proportion than if growers did not treat at all or if they treated individually. There is limited incentive for growers to try to control ACP individually because psyllids do not damage citrus directly and psyllids are mobile enough that they can move from untreated groves to treated groves. Area-wide treatments have the advantage that individual growers obtain additional benefits from the treatments of neighboring growers. In Ventura County growers coordinate treatments three times per year: twice in the fall and once in late winter before the spring flush (UCANR).

In the San Joaquin Valley, where ACP is not yet widely established, ACP treatments are focused locally around ACP finds. Growers around finds in or near commercial orchards are asked to treat two times; ideally with a pyrethroid and once with imidacloprid.

Tansey et al (2017)¹⁴ calculated insecticide treatments for control of ACP in Florida. Treatment application costs totaled \$27 per acre. Material costs for ACP-effective insecticides ranged from a low of \$5.50 per acre for Mustang (a pyrethroid) to a high of \$97 per acre for

¹⁴ Tansey, J.A., P. Vanaclocha, C. Monzo, M. Jones, and O.A. Stansley. "Costs and Benefits of insecticide and Foliar Nutrient Applications to Huanglongbing-Infected Trees." *Pest Management Science* 73(2017):904-916.

Exirel (an insecticide that attempts to conserve beneficial insects). The total cost of an ACP treatment then ranges from \$32.50 per acre to \$124 per acre. Jetter and Grafton-Cardwell (2016) report that \$630,000 was spent treating approximately 5200 acres of lemons for ACP with pyrethroids as part of an eradication effort in 2014.¹⁵ This implies treatment costs of \$121 per acre. They also report that approximately 3100 acres of lemons were treated with neonicotinoids at a cost of \$133,000 or \$43 per acre. No information was provided about the number of treatments per acre, just the total number of treated acres. Ventura County has about 23,000 acres planted to citrus. If each acre is treated three times for ACP, and the average cost of treatment is \$50, then this amounts to an annual cost of \$3.45 million.

If, as seems almost inevitable, ACP becomes generally established in all California citrus regions, then area-wide control efforts would likely be established in all regions. With 264,000 acres of citrus, area-wide control efforts would amount to \$39.5 million per year.

Cost of Covering Trucks Transporting Citrus

To reduce the spread of psyllids, citrus growers are required to tarp their fruit as it is transported from the field to the packinghouse. According to grower estimates, the cost of tarping adds a cost of \$1 per field bin. California citrus production in the 2016/17 marketing year totaled 8.77 million bins. Thus, this requirement costs growers approximately \$9 million per year.

¹⁵ Jetter, K. and E. Grafton-Cardwell. 2016. "What Did the 2011-14 Ventura County ACP Eradication Program Cost?" Citrograph 7 No 4 30-33.

Food Safety

The Food Safety Modernization Act (FSMA) was passed in 2011 and is in the process of being implemented. Requirements under the law include mandatory record keeping, management and worker training about health and hygiene for fruit handlers, and testing of water. Many of the provisions of the Act are quite similar to food safety programs under the Global Food Safety Initiative that are required by large buyers of citrus, such as Costco and Whole Foods. Examples of such programs are PrimusGFS and Global G.A.P. The approximate cost of being certified by one of these programs is around \$2,500, according to one certified grower. According to California Citrus Mutual, there are approximately 3,000 California citrus growers. If each has to pay \$2,500 to become food safety certified then that represents a one-time cost of \$7.5 million.

Growers who already are GFSI-certified face few additional requirements from FSMA. Growers who follow food safety certification programs implemented by their packinghouses also face few new regulations. For other growers the primary cost of meeting the Act's requirements are training time and higher compensation costs for work crew foremen who have added responsibilities for record keeping. The one additional requirement for already-certified growers are FSMA requirements for water testing. The initial proposals for water testing include the requirement of establishing a baseline water quality profile by taking at least 20 samples from surface water sources or four samples from groundwater over the first 2 to 4 years of the compliance period. After this initial period five samples of surface water and one sample of groundwater must be taken annually. The approximate cost of a single water test is \$30.

Sustainable Groundwater Management Act (SGMA)

By 2040 groundwater basins in California must be managed on a sustainable basis where withdrawals being limited to groundwater recharge. Much of the citrus growing area in the San Joaquin Valley overlies groundwater basins where withdrawals are much greater than recharge rates. Thus, it seems that withdrawals will need to be decreased between now and 2040 unless new recharge sources can be obtained in impacted areas.

It will not be possible to calculate the impact of SGMA until each basin's groundwater sustainability plans have been finalized. Without new surface water supplies it seems inevitable that some farmland that currently relies on groundwater will need to be fallowed to balance withdrawals with recharge rates. The only possible new surface water supplies that may be on the horizon are surplus supplies during high runoff years. This will only occur if changes in how State and Federal water projects are managed and if new water delivery infrastructure is developed.

The grower cost of land fallowed is the present value of lost profits. This cost can be approximated by the drop in land value after it has been fallowed. The current difference in land price between land with and without water multiplied by the number of acres that will need to be fallowed approximates the cost of SGMA. However, if forced to fallow land, growers will choose to fallow land planted to their least profitable crops, which may not be citrus unless HLB lowers citrus profitability.

Totaling All Compliance Costs

Calculation of the aggregate cost borne by California's citrus industry of complying with government regulations is a rather subjective endeavor because it requires specification of

what costs would be in the absence of examined regulations. For example, there is no doubt that the industry faces higher costs because California decided to increase its minimum wage from \$10 to \$15 per hour over the next few years. I calculate the cost of this decision assuming that the minimum wage would have remained at \$10 per hour per hour through 2022. But my assumption does not lead to a measure of the cost of California's minimum wage regulations because with no state minimum wage regulation, California employers would be subject to the Federal minimum wage of \$7.25 per hour. Instead, I attempt to calculate the costs of complying only with the change in California's minimum wage regulation.

For some regulations there simply is insufficient data available to calculate the costs of regulation. For example, I calculate the maximum cost of the new overtime regulation by assuming that 1) workers work 60 hour weeks and 10 hour workdays; 2) no new workers are hired; and 3) workers work the same number of hours as before and get paid 20 hours per week in overtime. But this is an unrealistic scenario because most workers do not work 60 hours per week and growers would likely try to hire additional workers and cut total labor hours in response to the regulation. Similarly I calculate the impacts of the sick leave regulation by assuming that all workers would continuously use their sick leave as they accrue it, an unrealistic assumption that maximizes the employer cost of the regulation.

In the aggregate cost calculations presented below in Table 2 I do not present such upper limits on compliance costs. Rather, to be more realistic, I reduce the upper limit costs of overtime and sick leave by 50 percent. The minimum wage cost increases assume that worker wages would have grown by 3% in the absence of minimum wage increases and that 50% of industry workers currently earn the minimum wage.

The resulting aggregate annual cost of the regulations considered in Table 2 is just under \$203 million per year. This cost represents about 6% of the \$3.389 billion in total value of California citrus. Not all of the costs included in Table 2 accrue directly to citrus growers. Some of the labor costs were calculated using estimated total industry wages. But the citrus industry is supported by citrus production so it is informative to divide total compliance cost by acreage, which results in \$701 per acre.

Table 2. 2022 Aggregate Regulatory Compliance Costs Facing California Citrus Industry

	\$ per acre of citrus production	\$ million
Environmental Compliance ^a		
Air Quality	41.97	11.08
Water Quality	9.16	2.42
Pesticides Use	15.95	4.21
Labor Requirements ^b		
Minimum Wage ^d	223.48	59.00
Overtime ^c	34.09	9.00
Sick Leave ^c	28.41	7.50
Workers Compensation	3.65	0.96
Employee Safety ^a	67.61	35.70
ACP/HLB Control ^b		
Grower Fees	64.39	17.00
Covered Trucks	34.09	9.00
State-Wide Area Control	149.62	39.50
Compliance Training ^a	28.62	7.56
Total	701.05	202.90

^aPer-acre costs from McCullough, Hamilton, and McEwan (2017)

^bCalculated by author. Costs calculated after phase-in period is completed.

^cOne-half of upper-limit costs presented in text.

^dFrom Table 1 scenario of assumed 3% wage growth with no minimum wage increase and 50% of industry workers currently paid minimum wage.

Impact on Competitiveness of California Citrus

Regulations that increase the cost of producing citrus in California have the potential of reducing the competitiveness of the California citrus industry relative to other crops that are

grown in California and relative to citrus grown in other states and in other countries. The potential loss in competitiveness will be realized for regulations that apply only to California citrus or that disproportionately impact California citrus. The largest proportion of compliance costs shown in Table 2 arise due to labor regulations. All California employers are subject to these regulations so in themselves, they do not disadvantage California citrus relative to other California crops. However, harvesting citrus is more labor intensive than harvesting crops that can be harvested using machines, such as almonds. Higher labor costs will tend to increase the relative return of machine-harvested crops in California. In addition, California citrus loses competitiveness to other citrus countries, such as lemons in Argentina and limes in Mexico, that are not subject to California labor laws.

The second largest category of costs in Table 2 are those associated with ACP/HLB control. In particular the anticipated cost of area-wide ACP management to all citrus growing regions of California will have a large impact on production costs. However, other citrus growing states and regions likely face higher costs of ACP/HLB control than does California. If California can continue to delay the arrival and spread of HLB into commercial groves through coordinated management of ACP, then this category of cost actually represents an investment that increases the competitiveness of California citrus compared to other citrus-growing regions. However, because these control costs are not borne by other California crops, they represent a loss of competitiveness relative to alternative crops that California citrus growers could grow.

The costs associated with environmental regulation in Table 2 decrease the competitiveness of California citrus relative to crops grown in other states and countries but

not relative to other crops grown in California because all growers are subject to these regulations.

Regulations for which costs cannot be estimated are not included in Table 2. The most important of these for the California citrus industry are future costs associated with potential fallowing of land due to SGMA, and possible additional costs of complying with FSMA. The additional costs from FSMA compliance include possible higher costs of compensating labor foremen for additional oversight responsibilities and the cost of testing water supplies.