# Economic Costs and Benefits of Proposed Bureau of Cannabis Control Regulations for the Implementation of the Medicinal and Adult Use Cannabis Regulation and Safety Act (MAUCRSA)

***Standardized Regulatory Impact Analysis***

Prepared for the California Bureau of Cannabis Control

by the University of California Agricultural Issues Center

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# Economic Costs and Benefits of Proposed Bureau of Cannabis Control Regulations for the Implementation of the Medicinal and Adult Use Cannabis Regulation and Safety Act (MAUCRSA)

## *Standardized Regulatory Impact Analysis (SRIA)*

The Bureau of Cannabis Control ("Bureau"), formerly named the Bureau of Marijuana Control, Bureau of Medical Cannabis Regulation, and Bureau of Medical Marijuana Regulation, will be proposing final regulations to implement the Medicinal and Adult Use Cannabis Regulation and Safety Act (MAUCRSA), which combines and amends the statutes previously propagated in the Medical Cannabis Regulation and Safety Act of 2015 (MCRSA) and Adult Use of Marijuana Act of 2016 (AUMA). MAUCSRA re-establishes the Bureau as the state's licensing and enforcement authority for the distribution, transportation, testing, and dispensing of cannabis in California, including those activities conducted by operations licensed as microbusinesses.

This Standardized Regulatory Impact Analysis is submitted for the purpose of evaluating the benefits and costs of the regulations proposed by the Bureau, many of which went into effect in preliminary form as emergency regulations on December 7, 2017. The University of California Agricultural Issues Center (AIC) assessed the costs and benefits of the Bureau's proposed regulations and two alternative sets of regulations.

On some issues, MAUCRSA provided detailed regulatory specifications that the proposed regulations implement precisely. On other issues, MAUCRSA provided broader guidance about the regulations. This SRIA considers the full package of proposed regulations, including those that implement precise statutory requirements. AIC gathered detailed cost, price, quantity, and other information to assess the impact of the proposed regulations on the industry and on the state. The results of this analysis are presented in this SRIA with background information and details provided in the Appendix.

AIC's analysis of the cannabis industry in California was conducted on both the medicinal and adult-use cannabis segments in the state, both of which have been taxed and regulated according to the statutory requirements of MAUCRSA and the regulations proposed by the Bureau. In this document, we use the term "adult use" to refer to non-medicinal cannabis sales, and we use the term "illegal" to refer both (1) to the segment of current and future cannabis sales in California that are unlawful under the MAUCRSA or current California criminal code, and (2) to the segment of past cannabis sales that were previously unlawful under whatever statutes were in force at the time of such sales, including AUMA, MCRSA, and earlier versions of California criminal code.

After outlining statutory authority, this SRIA summarizes the scope of analysis and outlines AIC's approach to the calculations of economic impacts. A key feature of the approach is defining a baseline against which to measure the economic impacts of the proposed regulations. These direct economic impacts are characterized in terms of effects on prices, quantities, revenues and taxes.

After measuring economic effects of the proposed regulations on the California cannabis industry, AIC used a standard economy-wide model (IMPLAN) to project ripple effects on the California economy more broadly. The SRIA outlines findings in terms of employment, impacts on businesses, potential influence on broad indicators of benefits and costs, and government revenues.

Finally, in addition to the benefits, costs and related impacts of the proposed regulations, AIC evaluated the benefits and costs of two alternatives: an alternative to represent a lower-cost package of regulations and an alternative to represent a higher-security package of regulations.

## 1. Statutory authority

The set of statutes collectively known as the Medical Cannabis Regulation and Safety Act (MCRSA), which became effective in 2015, established the Bureau within the California Department of Consumer Affairs and assigned to the Bureau the responsibility of creating and administering a licensing and enforcement structure for the distribution, transportation, testing, and retail sale of medicinal cannabis in California.

The set of statutes collectively known as the Control, Tax and Regulate Adult Use of Marijuana Act (AUMA), which became effective after the passage of Proposition 64 in the California general election of November 2016, legalized the sale and regulation of adult use cannabis to adults 21 and over in California, and established a system for regulating and taxing the adult-use cannabis segment. On June 27, 2017, California Senate Bill 94 (SB 94) amended, reconciled, and consolidated MCRSA and AUMA into a single act: the Medicinal and Adult Use Cannabis Regulation and Safety Act (MAUCRSA).

Under Government Code section 11346.3, a California state agency proposing a "major regulation," which Government Code section 11342.548 defines as "any proposed adoption, amendment, or repeal of a regulation subject to review by the Office of Administrative Law . . . that will have an economic impact on California business enterprises and individuals in an amount exceeding fifty million dollars ($50,000,000), as estimated by the agency," is required to prepare a Standardized Regulatory Impact Analysis (SRIA) to be submitted to the state Department of Finance for review and comment before the regulations are noticed to the public.

The first requirement of a SRIA is that it must verify that the regulation under review meets the definition of "major regulation" under Government Code § 11342.548. The regulations adopted by the Department of Finance further define the threshold as $50 million in either costs or benefits occurring within one year of full implementation of the proposed regulations.

AIC calculations showed that these proposed regulations met the definition of "major regulation," as explained in Section 7 below. In our approach to this and other determinations to be made in the SRIA, AIC relied on guidance from the 2015 joint report from the Office of Administrative Law and Department of Finance, which clarifies the interpretation of Government Code section 11346.3 with respect to SRIA content, purpose, and the "major regulation" determination.[1]

## 2. Nature and scope of regulatory impacts considered

The economic calculations and simulations reported below proceeded in three steps. First, we empirically assessed the 2017 situation for cannabis in California as it stood near the end of 2017.

Second, we projected the impacts on the medicinal and illegal cannabis market segments of the launch of adult-use sale and taxation of all legal cannabis. This step establishes a relevant base for the regulatory analysis. It provides the baseline against which the proposed regulations may be measured. We call it the "Taxation Baseline." Evaluating this baseline before evaluating the impact of regulations allows analysts to consider each of these two sets of effects independently.

The third step, and central focus of the SRIA, is to calculate and simulate the impact of the proposed Bureau regulations on the medicinal and adult-use cannabis segments separately from the effects of taxation. We called this final market scenario "Proposed Regulations." Under MAUCRSA, a cannabis business may apply for a single microbusiness license that allows the business to operate under a single license in multiple segments: cultivation, level 1 manufacturing, distribution, and retail. If a microbusiness has both medicinal and adult use

[1] November 1, 2015, report by the Directors of the Office of Administrative Law and Department of Finance to the Chair of the Senate Committee on Governmental Organization and the Chair of the Assembly Committee on Government al Organization, SB 617 and Finance Regulations appended.

cannabis, then two microbusiness licenses would be needed. Operations using a microbusiness license are allowed cultivation in an area of less than 10,000 square feet and may only conduct level 1 manufacturing, which refers to making cannabis products using nonvolatile solvents, or no solvents. The microbusiness must conduct three of the four potential activities and all activities must be on the same premises. Note there are no size restrictions on distribution or retailing in the microbusiness license provisions.

The Bureau has responsibility to issue licenses to cannabis microbusinesses. However, the cultivation and manufacturing activities of microbusinesses must meet the same provisions in the associated regulations covering other license types (as issued by other agencies) for those activities. The state and local cultivation and manufacturing taxes and regulatory costs have already been included in the economic analyses of cultivation and manufacturing done for the SRIA of the California Department of Food and Agriculture or the California Department of Public Health, along with their analyses of cultivation or manufacturing activities under other licenses.

The distribution and retail activities of microbusiness license holders are analyzed in this SRIA. To avoid double counting, we do not include impacts of the cultivation regulations or the manufacturing regulations that cover microbusinesses. That is, this SRIA treats the cultivation and manufacturing conducted under microbusiness licenses in the same way that it treats those activities when conducted under other license types.

The license type for event organizers does not allow those organizers to act as distributors or retailers. Any cannabis sold at event requires a license for that activity, either a retail or microbusiness license. We include the quantities, revenues, and impacts of regulations related to cannabis sold at events in our analysis of the distribution and retail activities.

## 3. Approach to economic modeling

Measuring the economic impact of a regulation is contingent on estimating relevant baseline market prices, quantities, revenues, taxes, and related aggregates that would occur in the absence of the regulation. The creation of such a baseline is often not as simple as assuming current conditions continue to apply in the absence of the regulations, even when data about market conditions are readily available.

The economic data and modeling underlying this SRIA are unusually complex for two reasons: (1) the unavailability of much relevant government or other public data and unavailability of much relevant banking, accounting, or other private data; and (2) the necessity of developing a counter-factual projected baseline that enabled the analysis to estimate the separate effects of taxation and adult-use legalization from the impacts of the proposed regulations.

First, there are no official government data sources on output, prices, jobs, or other economic aggregates for the industry to which the proposed regulations on medicinal cannabis apply, and official tax collections reflect a minority of operating businesses. Because much of the industry to which the proposed regulations apply has long been prohibited by Federal law, normal industry data have not been reported in standard authoritative Federal sources.

Moreover, businesses have not reported their financial results in standard ways. In many cases, businesses have been operating with cash, outside of the normal banking system, in a quasi-legal, quasi-regulated manner. Furthermore, the closely related adult-use segment has been illegal even under state law. Finally, illegal prices and quantities are even more difficult to estimate, with a high degree of price dispersion, uncertainty, and rapidly changing market conditions.

The lack of reliable authoritative public or private data required AIC to develop estimates of data that would have been readily available for most other industries. For instance, we collected price

data from about 2,500 medicinal cannabis retailers in California. Estimates of economic aggregates and relationships provided below are approximations based on the best available information as of December 2017.

Second, as noted in Section 2, MAUCRSA legalizes, regulates, and imposes taxes on both legal medicinal and legal adult-use cannabis. The joint launch of these two regulatory systems, which took place with licenses beginning to be effective January 1, 2018, created legal sales in two cannabis segments: medicinal cannabis and adult-use cannabis. When fully in place, such a dual-segment system will enable many buyers who had previously been buying in the medicinal segment to shift purchases to the adult-use segment. However, there is a financial benefit for some buyers in the medicinal segment for whom tax savings more than offsets the annual cost of obtaining a medicinal recommendation from a physician and a county-issued medicinal identification card. Cannabis buyers will realize financial savings from remaining in the medicinal segment if they purchase sufficient quantities of cannabis annually such that their savings of approximately 8% in avoiding the sales and use tax exceeds their approximately $100-per-year cost of obtaining a medicinal recommendation and ID card. There are also a handful of legal advantages to the medicinal system, which are discussed in Section 5.

In addition to Bureau regulations, many regulations related to the cultivation of cannabis, taxation of cannabis leaving the cultivation site, and regulation of the manufacturing of cannabis products commenced at the same time. The impact of these regulations also must be considered separately from the Bureau regulations that are the focus of this SRIA.

In order to isolate the impact of the proposed regulations from the impact of taxation and the legalization of adult-use sale in the relevant economic situation and context, AIC modeled and simulated the implications and effects of a hypothetical scenario in an adult-use cannabis retail market exists side-by-side with the legal medicinal cannabis segment. In this scenario, both adult-use and medicinal are taxed, including local and state taxes, but neither is regulated. We call this the “Taxation Baseline.”

These effects created the baseline against which we simulated the impacts of regulations. We then analyzed the impacts of the proposed regulations on the medicinal and adult-use cannabis segments in the context of the (hypothetical) cannabis industry with the baseline of taxation and legalized adult-use sale in place.

Let us illustrate the magnitude of the issue more concretely and foreshadow the estimates presented below. Based on our best assessment, in 2017 the California medicinal cannabis segment without adult-use sales was on pace for aggregate pre-tax revenue of about $2.5 billion. Without yet considering the implications of the proposed regulations, but taking into account the legalization of the cultivation and sale of adult-use cannabis; state regulations implemented for cultivation and manufacturing; local regulations implemented for all segments of the cannabis industry; and the taxation of all legal cannabis, our economic calculations suggest that revenue in the medicinal cannabis segment will decline, while the new adult-use segment will grow to be slightly larger than the medicinal segment in before-tax retail spending. Thus, the proposed Bureau regulations are likely to apply to an overall legal cannabis segment with retail revenue without counting state excise and sales taxes of about $5 billion.

Projecting the effects of taxes or regulations on a market requires the specification of supply and demand response parameters. These are often expressed as elasticities—a percentage change in quantity with respect to a percentage change in price or other causal factor. In this case, key estimates and assumptions include how responsive demand for cannabis overall is to prices and how responsive demand for cannabis in each segment is to relative prices in those segments. Simulation also requires evidence and assumptions about shifts in demand affecting each segment. On the supply side, we used assumptions about how responsive supply in each segment was to relative prices across segments. Evidence and assumptions about shifts in costs were required as well.

In summary, in order to isolate the impact of the proposed regulations, our procedure was to incorporate the changes to the marketplace step by step. First, based on conditions for the 2017 cannabis market, we simulated the economic effects of legal adult-use sale, taxation and

regulations by all government entities, both state and local, other than the Bureau. Next, we incorporated the impact of the proposed Bureau regulations into the model and solved for economic aggregates. Finally, we assessed the impact of the proposed regulations by comparing the Taxation Baseline with a scenario that adds the effects of Bureau regulations on top of that baseline.

In constructing separate estimates for the medicinal and adult-use segments, we evaluated the differences between the local and state regulations, including sales tax differences, differences in possession limits, and other axes of variation in legal allowances and criminal penalties. The principal differences are articulated in Section 5.

Our estimates in this SRIA use the tools of "equilibrium displacement," which compares hypothetical equilibrium situations that incorporate the supply and demand shifts caused by state and local regulations, taxes, tourism, and other supply and demand effects we expect to occur. This method of comparing equilibrium situations that are different because of imposition of policies and regulations is a standard economic approach to modeling and is often the most straightforward approach when considering alternatives that have not yet occurred. Of course, all methods of economic modeling have their advantages and drawbacks.

One of the drawbacks of equilibrium displacement modeling is that it compares two static equilibria and does not develop quantitative estimates for the adjustment paths of prices, quantities and other aggregates that evolve over time. The equilibrium approach does allow detailed estimates for a period applicable after initial market flux has settled out of the system and generates concrete estimates that meet the statutory requirements for a SRIA and are compatible with the IMPLAN model for presenting broad economic impacts and ripple effects.

The mandate of a SRIA is to estimate the economic impact in the 12 months after the regulations go into effect. The equilibrium estimates developed and reported in this SRIA assume that the regulatory changes are internalized into prices and consumer and producer behavior.

The projected impacts presented in this SRIA are applicable to a one-year period after the regulations are fully implemented and markets have adjusted to those regulations. We do not specify a particular set of dates to which this analysis applies, because the time period until full implementation and adjustment is still uncertain. It is possible that the California cannabis market will display the volatility and disarray common in immature markets in the midst of structural change for several months, or even years, after regulations are implemented but are still short of full implementation. All of our estimates should be interpreted with this in mind.

## 4. Overview of data collection and initial market conditions

In constructing initial estimates of prices and quantities in the California cannabis market that applied in 2017, AIC drew upon a variety of sources, including our own AIC retail cannabis price survey, which was conducted by AIC researchers in October 2016 through November 2017 (details and results are in Appendix Chapter 4); third-party longitudinal retail and wholesale price surveys (Appendix Chapters 3 and 5); an AIC meta-analysis of published scientific journal articles, white papers, and government reports; and confidential AIC interviews with market experts and industry participants (Appendix Chapters 3 and 5). The appendix includes a complete list of references to documents cited and reviewed.

AIC started from estimates of the revenue of California medicinal cannabis retailers in 2017. There are no official or widely accepted industry estimates of the size of the pre-legalization-and-regulation (medicinal) cannabis industry in either revenue or quantity terms. AIC estimated that in 2017 there was about $2.5 billion of total annual sales revenue (not including sales taxes) being collected in the medicinal cannabis segment.

We developed that $2.5 billion revenue estimate as follows: The California Department of Tax and Fee Administration (CDTFA, formerly known as the Board of Equalization) has estimated sales tax revenue from medicinal cannabis retailers was approximately $60 million in 2015. No

full year data were available for 2016. The statewide average tax rate is about 8.3% and that the rate of tax compliance was estimated at about one third.

Using an effective tax rate of about 3% (0.083 times 0.33), $60 million in sales tax receipts implies industry revenue of about $2.1 billion. This estimate is within the range of other published estimates. For more detail, see discussion and tables in Appendix Chapter 5. We estimate quantity to be growing at a 10% annual rate between 2016 and 2017.

Using data from the AIC survey of retail prices and other sources, we estimated the November 2017 market price of retail medicinal cannabis in California to be about $3,600 per flower-equivalent pound. By flower-equivalent pound, we simply mean a unit of cannabis sold at retail that is equivalent to one pound of dried flowers for retail sales.

More specifically, the data from the AIC survey (Appendix Chapter 4) provide information on a variety of prices in November 2017 from a large sample of more than 2600 cannabis retailers from every part of California. AIC collected data on prices of two package sizes for dried flowers and on prices of non-flower products. Unfortunately, no data on quantities transacted were available. AIC therefore used auxiliary information from interviews with industry participants and industry publications to develop weighted averages of product prices. AIC focused on the cannabis dried flower prices to create a flower-equivalent average price.

With the price of $3,600 per pound, the estimated California 2017 retail sales revenue of about $2.5 billion implied an annual retail quantity of flower-equivalent units of approximately 700,000 pounds of medicinal cannabis sales, before adult use cannabis was available from legal retail markets.

AIC estimated that in 2017, about 25% of total cannabis by volume (i.e. flower-equivalent pounds) that was sold in California was sold in the legal medicinal segment, and the remaining 75% was sold in the illegal segment. This estimate is based on the literature reviewed in Appendix Chapter 5 and interviews with industry participants. We estimate that in 2017,

aggregate annual sales in the illegal segment, where price was lower, were $5.0 billion, and total cannabis retail sales in California were about $7.5 billion.

## 5. Baseline market conditions with adult-use sale, taxation and non-Bureau regulations

For about two decades, the only cannabis legally available for sale in California has been medicinal cannabis, which, according to the Brown Guidelines, can be sold only to California state residents over the age of 18 with doctors' recommendations and for the use of those between ages 12 and 18 with parental guidance.

A doctor's recommendation has been relatively easy to acquire; for example, receiving a recommendation did not require an in-person medical examination and could be accomplished with a short visit to one of many websites. Under the requirements of MAUCRSA, an in-person examination is required, but it is hard to estimate how much effect this will have on the cost of obtaining a medicinal recommendation and the number of permit holders.

Consumers over the age of 21 in the medicinal cannabis segment can readily shift to the adult-use segment, which would not require the added step of obtaining a doctor's recommendation. On the other hand, sales and use taxes in the adult-use segment that are exempted for medicinal cannabis may offset this savings for those who purchase substantial quantities in a year. Whether consumers end up in the medicinal or adult-use segments of the legal market depends in part on how much the price differential between legal and illegal cannabis grows due to taxes. With taxation, more consumers who would otherwise have entered or remained in one of the legal segments may now shift to the illegal segment.

In Washington State, the quantity purchased in the medicinal segment fell by one-third in the first year after the legal adult-use cannabis system took effect, and by more subsequently. Colorado, which has had a legal medicinal cannabis industry since 2001 and began taxing and regulating adult-use cannabis in 2015, is a more apt comparison. But there are many important

differences between the Colorado and California taxes, regulations, and other market characteristics. See Appendix Chapter 10 for details and references to comparative literature.

As mentioned above, there are several reasons that a significant quantity of cannabis may remain in the medicinal segment. Remaining buyers in the medicinal segment may include:

- Buyers who wish to possess more than one ounce of dried flower (medicinal consumers can possess up to eight ounces)
- Buyers who want to buy edibles more potent than those allowed for adult-use purchase under the regulations
- Buyers who wish to possess open containers or opened and resealed containers of cannabis in the passenger area of a vehicle (adult-use cannabis must have its original seal and can only be transported in the trunk of a vehicle)
- Buyers who are between 18 and 20 years of age
- Buyers for whom a medicinal retail establishment is more convenient
- Buyers for whom a medicinal recommendation is important to their personal acceptance of cannabis use (say, for personal values, family relationships, or job rules)

Some buyers may find the legislated sales-tax exemption to be cost effective (saving consumers an average of 8.3% per transaction); however, eligibility requires obtaining a state-authorized county identification card, which we estimate costs about $50 per year plus the time investment required to obtain the card.[2] On the other hand, some consumers may be dissuaded from obtaining the card because they do not want to register their name with the government as a cannabis user.

Although the state-authorized county identification card is not necessary for medicinal cannabis buyers to enter a medicinal cannabis retail location or purchase medicinal cannabis, the language of MAUCRSA implies that the state-authorized county identification card will be necessary to receive the sales and use tax exemption.

[2] https://www.boe.ca.gov/pdf/l481.pdf

Current state records indicate that relatively few medicinal cannabis buyers (less than 7,000 annually for the past few years) have obtained a state-authorized identification card.[3] The AIC analysis suggested that eligible buyers that wish to buy in the legal segments and who spend less than about $1,500 per year on cannabis, about four ounces, could realize cost savings by switching from the medicinal segment to the adult-use segment. Aside from the legal advantages mentioned above, we identified no economic reasons that would restrain most low-volume buyers from switching.

There are also no apparent supply-chain advantages for the medicinal cannabis segment that might translate to lower consumer prices for medicinal cannabis relative to adult-use cannabis. Cultivators and distributors are permitted under MAUCRSA to produce both medicinal and adult-use cannabis in the same production facilities, so switching will also be fluid from a production and distribution standpoint. Advertising, vertical integration, and other restrictions are also imposed equally on the medicinal and adult-use segments.

AIC analysis indicated that the opening of the market for adult-use cannabis and associated taxation will cause demand and supply in the existing cannabis market to change in several important ways that are relevant to the impact of cannabis regulations. First we specify three demand-side effects, and then we explain supply-side effects, the biggest of which is the combined effects of state and local taxation.

### 5.1 Demand-side effects resulting from adult-use legalization, taxation, and non-Bureau regulations

Demand effect (A): Some current demand in the legal medicinal cannabis segment may shift to the newly legal adult-use segment due to the lower annual transaction costs. Adult-use cannabis purchase does not require an annual doctor's recommendation, which is costly for

[3] https://www.cdph.ca.gov/programs/MMP/Documents/MMPCounty%20Card%20Count%2012-16.pdf

buyers of medicinal cannabis. Costs are likely to be $50 or more per year plus the cost of time and inconvenience. An in-person doctor's visit is now required by MAUCRSA. This demand effect is described in more depth in Appendix Chapters 5 and 7.

Demand effect (B): We project that with a legal adult-use segment available, demand currently in the illegal adult-use segment will move to the legal adult-use segment to avoid the inconvenience, stigma, and legal risks of buying from an unlicensed seller with whom there is no legal recourse. The adult-use segment gains most of this formerly illegal quantity, and the medicinal segment gains as well. Part of the demand shift is in response to tracking and security advantages of legal cannabis as opposed to illegal cannabis.

Adult-use and medicinal cannabis each also lose in quantity demanded from what would otherwise occur because of higher prices due to taxation and non-Bureau regulatory costs. In our models, the demand effect B is also represented as a reduction of demand within the current illegal segment offset in total cannabis purchase by an increase in the newly-legal adult-use segment by the roughly the same magnitude. This demand effect is described in more depth in Appendix Chapters 5 and 7.

Demand effect (C): The third demand-side effect attributable to taxation, non-Bureau regulation and adult-use legalization is a growth in the aggregate consumer demand for legal cannabis among consumers who were not previously in the California cannabis market at all. AIC modeled this as an increase in the demand for legal adult-use cannabis of about 5% of total cannabis sold in the period before the Taxation Baseline.

We expect this demand increase for two reasons. The first is new demand created by the opening of the cannabis market to consumers in the state who have had interest in the product but have avoided it until now. Some of these potential consumers did not want to get a medicinal cannabis recommendation when they felt they had no medical condition that warranted use. Moreover, potential consumers may have avoided the illegal market because of inconvenience, legal risk, or unwillingness to participate in illegal drug activity because of moral

concerns or social stigma. Finally, an increase in publicity and advertising may attract purchasers who had not previously entered the market.

The second component of the outward demand shift resulting from adult-use legalization is new demand created by the opening of the cannabis market to California's out-of-state leisure and business visitors. There are more than 260 million visits to California from residents of other places per year. These visitors spend more than $122 billion in California.[4] A significant portion of this spending is on leisure goods and services. For instance, tourists have been estimated to spend $7.2 billion per year on wine in California.[5]

Demand for new forms of leisure spending by tourists and other visitors to California is potentially large. Given that adult-use cannabis remains illegal in most other states, California's legalized adult-use industry may attract some new visitors whose primary reason for visiting the state is cannabis tourism, as has been observed in Colorado. This effect is discussed in the context of tourism survey data from Colorado in Appendix Chapter 10 and included in the model in Appendix Chapter 7.

Some researchers have reported a dramatic impact of cannabis tourism in Colorado—a state that, like California, already has a booming tourist industry—while others have reported only modest gains. One source of uncertainty with respect to tourist demand lies in the known negative self-reporting bias in cannabis consumption surveys, a bias that may be stronger amongst tourists who have little incentive to admit to using drugs that are illegal in their home states.

Self-reported use rates, which are cited in many studies and which we draw on to project market size and compare California data with that in other states are associated with uncertainties beyond predicting tourist demand. Self-reported use rates have been known to jump dramatically when states legalize adult-use cannabis (29% in Colorado, for instance), and it is not known to

[4] http://industry.visitcalifornia.com/Find-Research/California-Statistics-Trends/

[5] Estimates of California wine tourism at http://www.discovercaliforniawines.com/media-trade/statistics/.

what extent this effect can be attributed to actual increased use rather than a diminished negative self-reporting bias as cannabis becomes less of a taboo in the state.

### 5.2 Supply-side effects of adult-use sale and taxation

5.2.1 Adult-use sale. As cannabis is moved more into the mainstream of the economy through legalization of adult-use cannabis, suppliers have better access to capital, technology and management. With legalization of the sale of adult-use cannabis in 2018, legal sellers have a lower chance of loss from forfeiture and lower probabilities of criminal prosecution. Recent data have shown that the cannabis industry has unusually high costs compared to production and marketing of other agricultural products, and that many of these costs, including risk premiums, can be attributed to the illegality of adult-use cannabis sales prior to November 2016. This is reflected in the large differences (large compared with non-cannabis industry norms) that AIC and other industry observers have documented between costs per unit reported by businesses and receipts per unit at each stage in production, processing, distribution, and retailing of both medicinal and illegal cannabis.

In recent years, especially after the passage of AUMA in 2016, lower operating costs and lower risk premiums are being observed as new capital comes into the marketplace. At the same time, as long as the uncertainties of Federal law remain in place, businesses in the cannabis industry will continue to face unique challenges even when cannabis is taxed and regulated on a state level. For instance, it does not appear that businesses will have access to the normal banking system even after taxation and regulation. New challenges also face the industry as it prepares for the greater levels of inspection and oversight mandated by MAUCRSA. We therefore assume a 10% reduction in the business costs of selling both adult-use and medicinal cannabis in the Taxation Baseline.

Basic operating costs and the cost of labor in cannabis businesses will likely fall as the cannabis industry becomes more mainstream, attracts investment from legal sources, attracts better management, and improves practices throughout the supply chain. These lower direct costs are

more than offset by higher regulatory costs and taxes. Such regulatory costs and taxes are implemented by the state for cultivators and manufacturers and local regulations and taxes are applied throughout the supply chain. More information on these impacts is found in Appendix Chapters 3, 5, 6, and 7.

5.2.2 Taxation. The new system of taxes on cannabis is likely to have substantial impact on quantities sold in the legal segments. The Taxation Baseline assumes full compliance with state and local taxes and regulations. The state excise tax of 15% is based on an estimate of retail revenue that is collected at the distributor level. Cannabis is also subject to California's usual sales and use tax of 7.25% plus local jurisdiction taxes that average about one percent. (As noted above, sales to certain buyers in the medicinal segment are exempt from the sales and use tax.) The sales and use tax is expected to be fully enforced on the legal cannabis market, which has not occurred in the past.

In constructing the Taxation Baseline, we incorporate our estimate of local cannabis retail taxes (see Section 5.2.3) as well as the state and local cultivation taxes and regulatory costs imposed on cultivators and manufacturers. These include the regulations and licensing fees for cultivation proposed by the CalCannabis division of the California Department of Food & Agriculture (CDFA) as well as local cultivation taxes and fees (see section 5.2.4), and the regulations and licensing fees for manufacturing by the California Department of Public Health (CDPH) as well as local manufacturing taxes and fees (see Section 5.2.5).

5.2.3 Local cannabis retail taxes. The landscape of local taxation continues to change rapidly. Hundreds of municipal and county meetings were held throughout 2017 to determine the structure and details of legal cannabis tax and regulation policies. Such decisions are still under consideration in many places. Local policies have sometimes been changed, repealed, or reversed. AIC obtained data from CannaRegs, a leading provider of legal information and analysis for the cannabis industry, from which we constructed a snapshot of the local tax situation as of June 2017, including sales and use taxes and local cannabis taxes.

In order to estimate local taxes, we began with California's 7.25% state sales and use tax and add a weighted average of local sales and use tax rates around California. The local weighted average sales and use tax at the cash register is 1.05%, extrapolating from a population-weighted stratified random sample of jurisdictions across the state covering areas including 50% of the state's population. We therefore use a total weighted average sales and use tax across all 540 jurisdictions at 8.3% (7.25 plus 1.05). Per MAUCRSA, this tax is assessed on the adult-use segment, but only partially on the medicinal segment.

In order to estimate state-wide average local cannabis-specific retail tax rates, we assessed 50 adult-use retail cannabis tax rates and 51 medicinal retail cannabis tax rates from throughout California. We found a local cannabis-specific retail tax (added on top of state and local sales and use taxes, state excise taxes, etc.) averaging 9.55% for medicinal cannabis (51 observations) and 10.13% for adult-use cannabis (50 observations). (Similar data found for cultivation the medians were $25 per square foot for cultivation and 10% for local cannabis taxes on both medicinal and adult use.)

Most jurisdictions that have determined local cannabis retail taxes have set the same tax rate on medicinal and adult-use cannabis. A minority of jurisdictions have set lower rates for or exempted medicinal cannabis from local taxation, resulting in a slightly lower state-wide average for medicinal cannabis taxes of 7.8% compared to 8.2% for adult-use cannabis.

We assumed full compliance after taxation and adult-use legalization.

5.2.4 Costs of cultivation taxes and regulations. To estimate cultivation taxes and regulatory costs, we rely on the estimates of ERA Economics, which prepared the SRIA for CDFA. This includes $148 per pound (in dried flower equivalent) in state cultivation taxes; local taxes and fees of $108 to $219, depending on grow type (for a weighted average estimate of $128); and other regulatory costs of $41 to $91 per pound, depending on grow type (with a weighted average across the types of $50, recognizing the importance of greenhouse and indoor cannabis in the legal and regulated cannabis market). These costs include state license fees, track and trace, labor,

pesticide, labeling, and other compliance. AIC estimated the total cost of these state regulations plus state and local taxes and fees of $326 per pound, included in the Taxation Baseline. For details on these calculations, see Appendix Section 5.2.4.

5.2.5 Costs of manufacturing taxes and regulations. For manufacturing regulatory costs and local taxes, we rely on the estimates of the Humboldt State University team that prepared the SRIA for CDPH. We estimated the total cost per pound of $95 per pound, including local taxes, state and local license fees, labeling requirements, track and trace, and other costs. For details, see Appendix Section 5.2.5.

The total of cultivation and manufacturing taxes and regulations is thus ($326 + $95) = $421.

The changes in demand, costs, and taxes resulting in the "Taxation Baseline", based on our simulation of the California cannabis market, can be summarized as follows. Once these market changes are incorporated, before regulations are applied, the legal adult-use segment will have about 26% of total quantity (about 711,000 pounds with a full tax-inclusive price of $4,698 per pound), the medicinal segment will have about 21% of the total quantity (about 594,000 pounds with a price of $4,439 per pound), and the unregulated illegal segment will have about 53% of the overall quantity (about 1,473,000 pounds with a price of $2,636 per pound). The total quantity is about 2.78 million pounds (all measured in dried-flower equivalent). These calculations are detailed in Appendix Chapter 8, Tables 8.1a–8.3e.

Our regulatory impact analysis evaluated the impact of Bureau regulations relative to this hypothetical Taxation Baseline.

## 6. Overall market impact of the proposed regulations

AIC created the Taxation Baseline as described in order to identify and isolate the expected economic effects of the proposed cannabis regulations. Our simulations control for legal sales in the adult-use segment, taxation and non-Bureau regulations in order to isolate the economic impact of the Bureau's proposed regulations from the impact of the other recent changes to the California cannabis marketplace.

### 6.1 Drivers of economic impacts of proposed regulations

The economic effects of the proposed Bureau regulations on market prices and quantities derive from four sources. Two sources are on the cost and supply side: (1a) the direct costs imposed on the industry by the regulations compared with the Taxation Baseline, and (1b) reductions in retailer costs as regulations create a more transparent and reliable business environment. Two sources are on the demand side: (2a) less access to the legal cannabis segments because of restricted hours of operation of retails stores and delivery services, and (2b) an increase in consumer willingness to pay for the tested and regulated product compared with the situation without regulations but with taxation and adult-use sale.

First, the Bureau regulations impose direct costs on the cannabis industry. Details about components of the industry costs of complying with the proposed regulations are described below in Section 12. In that section, compliance costs of the proposed regulations are compared with compliance costs of two alternatives: an alternative package of lower-cost options and an alternative of higher-security and higher-cost options. The costs of compliance, and the data and calculations underlying them, are discussed in more detail in Appendix Chapter 6.

Overall, we found that the proposed regulations (compared to no regulations) add approximately $408 per pound of marketable dried-flower equivalent in direct operating costs. Most of the addition to costs, about $257 per pound, is due to the added costs of cannabis

testing. In addition to regulations that have direct quantifiable costs, we model impacts of proposed regulations, which are based directly on the MAUCRSA.

The adult-use and medicinal regulations and costs are similar, and restrictions limiting vertical integration (i.e. participating in several stages from cultivation through retailing) are relatively minor for both medicinal and adult-use segments. In simulation models, AIC specified that the direct cost increase for both the adult-use and medicinal segments caused by the proposed regulations was approximately 11% of the initial value of $3,600 per flower-equivalent pound. This was calculated as $408/$3,600.

Regulations that require detailed track-and-trace systems, security cameras, recordkeeping, and similar measures have a side effect of causing the distribution and retail services to move more thoroughly into mainstream business channels. These regulations thus help make the business more attractive to mainstream sources of labor, management, and capital. While it is hard to quantify the associated cost reductions, to recognize these impacts, we attribute a 2% reduction in operating costs to the overall regulatory environment. This partly offsets the direct cost increases caused by the regulations themselves.

Proposed Bureau regulation details are in Section 12 where they are compared to alternatives. The four main categories are (a) Bureau license fees which are estimated to cost $44 per pound; (b) added distribution regulation costs, especially child-resistant packaging, which are estimated to cost $48 per pound; (c) regulations on retail delivery, which are expected to cost $10 per pound; and (d) and retail compliance, including waste storage and disposal, video surveillance archive, and other MAUCRSA-mandated regulations, which are estimated to cost $49 per pound. The total of these four categories is $151 per pound.

The second broad set of economic effects of the proposed Bureau regulations is on the demand side. Restrictions on the operating hours of retail establishments and delivery services require that these businesses only operated between 6am and 10pm. Prior to this restriction, many medicinal cannabis retailers operated much later in the evening or even 24 hours per day,

depending on their own business decisions and local restrictions. AIC research suggested that as of December 2017, there were more than 100 retailers in the state open 24 hours per day.

In December 2017, AIC surveyed 82 cannabis retailers from both northern and southern California by telephone and found that 63% we open after 10pm and 26% were open after midnight. Based on this survey we expect that a 10pm closing hour would reduce business hours by 13%, but we have no strong evidence of the share of daily quantities purchased during those hours.

Consumer responses to restricted hours are complex and fall into broad categories:

(1) Some demand would shift to earlier hours. We would expect buyers who purchase large package sizes for their monthly use, for example, would continue to buy from their preferred source and shift to earlier in the day.
(2) Other buyers that had less flexibility over time would not purchase cannabis at all, and shift their demand to some other product (say alcohol) that is available during the late evening hours when legal cannabis is unavailable.
(3) Some demand would shift to the unlicensed or illegal cannabis segment, which is not limited by hours of operation.

It is hard to gauge the relative importance of these responses. In our simulations we assume that demand is reduced, for both segments of legal cannabis, by 2% and demand for illegal cannabis is increased by 1.5% due to the hours restrictions. This assumption implies that much of the quantity purchased during the hours where legal operation is no longer available shifts to available hours and remains in the legal segment. One reason for that response is that buyers with flexibility across segments and with easy access to the illegal segment are likely to have already chosen this lower priced option. Furthermore, as with other products, a high proportion of cannabis quantities are likely to be purchased by consumers who buy their weekly or monthly supply in large purchases to take advantage of volume discounts and this behavior indicates a degree of advanced planning. This is an additional source of uncertainty in our projections.

The largest demand impact is that increase in consumer willingness to pay for legal cannabis that has more security, traceability, labeling information, and intensive product testing. In the AIC simulation, the increase in willingness to pay modeled as equivalent to an increase of 7% in willingness to pay compared with the situation without regulation but with taxation and adult-use legalization. This impact is converted to an equivalent shift in the quantity demanded at a given price using the own price elasticity of demand.

Most of the demand shift towards regulated and tested cannabis is from the illegal cannabis segment, so that segment experiences a reduction in willingness to pay by 6%. Some of the demand shift may also be from new entrants to the cannabis market who value a safe, secure and tested product. We discuss increased willingness to pay for government regulations on product traceability, testing and labeling with reference to some of the relevant literature in Appendix Chapters 5, 6, 7, and 8.

Margins of potential error include projections of prices and quantities and similar aggregates. The number of companies in each part of the industry and their distributions by size or location are especially uncertain. This is not only because of the lack of reliable data on the industry and the lack of direct comparability between California and other legal cannabis states, but also because of the unpredictable path of regulation, adoption, compliance, and common practices. All the effects will be even more difficult to project in the first months after full implementation, when compliance is still in flux and enforcement efforts are still not yet fully in place.

The data and assumptions used in simulations are in Table 1. These indicate the starting point for developing the Taxation Baseline and the economic impacts of Bureau proposed regulations that are applied to the Taxation Baseline. The initial quantities, prices and tax rates are those that apply in the hypothetical situation with both adult use and medicinal cannabis, but with none of the other features of the Taxation baseline incorporated. We assume initial quantity is 2.6 million pounds, price is $3,600 per pound and tax paid is 2.5%. These are related to but are distinct from estimates for 2017, when adult use retailing was still not operational and the 700,000 pounds of adult use was largely in the medicinal and illegal categories.

**Table 1. Summary of Important Data and Parameters for Establishing the Taxation Baseline and the Simulation of Impacts of Bureau Regulations**

| *Value* | *Medicinal* | *Adult use* | *Illegal* |
|---|---|---|---|
| **Initial quantities** (total flower-equivalent lbs) | 600,000 | 700,000 | 1,300,000 |
| **Initial retail prices** (per flower-equivalent lb) | $3,600 | $3,600 | $2,340 |
| **Initial effective tax rate** | 2.5% | 2.5% | 0% |
| **Own price supply elasticities**[1] | 5 | 5 | 5 |
| **Elasticity of substitution in demand**[1] | 5 | 2 | 2 |
| **Conditional expenditure elasticities**[1] | 1 | 1 | 1 |
| **Own price elasticity of demand, each segment**[1] | -2.5 | -2.6 | -1.3 |
| **Demand elasticity, all cannabis combined**[1] | -0.2 | -0.2 | -0.2 |
| **Income elasticity**[1] | 1.0 | 1.0 | 1.0 |
| **State cultivation taxes** (per lb) | $148 | $148 | $0 |
| **Local cultivation taxes** (per lb) | $128 | $128 | $0 |
| **Cultivation regulatory compliance** (per lb) | $50 | $50 | $0 |
| **Manufacturing taxes & compliance** (per lb) | $95 | $95 | $0 |
| **Excise tax rate** | 15% | 15% | 0% |
| **Sales tax rate** | 2.1% | 8.3% | 0% |
| **Local percentage taxes and fees** | 7.8% | 8.2% | 0% |
| **Local percentage taxes on testing revenue** | 4.9% | 4.9% | 0% |
| **Cost increase, testing regulations** (per lb, including lost inventory) | $257 | $257 | $0 |
| **Cost increase, other Bureau regulations** (per lb) | $151 | $151 | $0 |
| **Demand shifts (quantity) from legalization** | 0% | 30% | 0% |
| **Cost shifts due to legalization** | -10% | -10% | 10% |
| **Cost shifts due to regulations** | -2% | -2% | 0% |
| **Willingness to pay shifts from regulation & testing** | 6% | 6% | -6% |
| **Demand shifts from hours limits** | -2% | -2% | 1.5% |

[1] Unit-less elasticity parameters.

### 6.2 Economic impacts on price, quantity, revenue and tax

Summary results of economic impacts of the proposed regulations are reported in three tables of this section. (Detailed estimates of market prices, quantities, revenues and taxes are reported in Appendix Chapter 8.)

In each of these three tables, column 1 lists variables of interest: Retail price to buyers, quantity, total revenue, and various tax revenues from each of the categories of taxes imposed by the state government and local governments. The final row shows retail revenue net of tax payments. Note that taxes do not include costs of complying with state and local government regulations. Those costs are built into the supply and demand structure and are instrumental in determining prices and quantities.

Table 2a presents simulated outcomes for the medicinal cannabis segment. Column 2 labeled "Taxation Baseline," presents simulated values for estimates of prices, quantities, revenues, and taxes for medicinal cannabis, with legalization, taxation and non-Bureau regulation applied to both adult-use and medicinal sales, but without the Bureau's regulations in place. Column 3, "Taxation Plus Bureau Regulations," reports prices, quantities, revenues, and taxes with the proposed Bureau regulations imposed on the Taxation Baseline. Finally, Column 4, "Difference," shows the impact of regulations as measured by the difference between the Taxation Baseline and taxation plus Bureau regulations.

In Table 2a, the Taxation Baseline has a retail price of $4,439 per pound for medicinal cannabis with 594,319 pounds sold (in dried flower equivalent pounds). Total revenue is projected to be $2.638 billion, which includes six categories of taxes paid to state and local authorities. Total tax collections are $690 million so revenue net of tax payments is $1.948 billion. As discussed above, sales tax revenues are low for medicinal cannabis because we assumed that three quarters of the cannabis sold in this segment would qualify for the sale tax and use deductions.

The third column of Table 2a shows the results for medicinal cannabis under the situation of the Taxation Plus Bureau Regulations scenario. Retail price is now $4,841 per pound, or $402 higher, as shown in the fourth column, to reflect the complex impacts of regulations that raise costs but also have value to buyers. Despite the higher retail price, the quantity sold in the medicinal segment rises to 615,699 pounds, more than 21,000 pounds above the quantity with the Taxation Baseline. Tax payments and revenue are also higher with the Bureau regulations in place because the taxes are tied to revenues and quantities, both of which are higher. Retail revenue net of tax payments rises by $268 million to $2.216 billion, which is not enough to cover the direct costs of testing and other regulations, implying that companies use the regulation environment to achieve further cost economies.

**Table 2a. Medicinal Cannabis: Impacts of Bureau regulations on prices, quantities, revenues, and taxes compared to the Taxation Baseline**

| ***Variable*** | ***Taxation Baseline*** | ***Taxation Plus Bureau Regulations*** | ***Difference*** |
|---|---|---|---|
| Retail full price to buyers ($/lb.) | $4,439[1] | $4,841[1] | $402[1] |
| Quantity (lbs.) | 594,319 | 615,699 | 21,380 |
| | | ($ millions) | |
| Total Revenue | $2,638 | $2,981 | $343 |
| State cultivation tax revenue | $88 | $91 | $3 |
| State excise tax revenue (15% of base) | $317 | $358 | $41 |
| Sales tax, state revenue (1.8% average) | $39 | $44 | $5 |
| Sales tax, local revenue (.03% ) | $6 | $6 | $0 |
| Local cannabis tax (7.8% of base) | $165 | $186 | $21 |
| Local cultivation tax | $76 | $79 | $3 |
| State tax revenue | $444 | $493 | $49 |
| Local tax revenue | $246 | $271 | $25 |
| Tax revenue | $690 | $764 | $74 |
| Revenue without tax | $1,948 | $2,216 | $268 |

*Source: AIC simulations and calculations.*
[1] Averages, not totals.
Notes: Pounds are in dried flower equivalents. Rounding affects column sums.

Table 2b follows the same structure as Table 2a. In column 2, the simulated Taxation Baseline for adult-use cannabis shows that the retail price is estimated to be $4,698. The market quantity is 711,264 pounds and total revenue is $3.341 billion, which includes taxes paid. The various taxes are again listed by category. Total tax revenue is now simulated to be $997 million and revenue net of taxes is $2.345 billion.

The third column of Table 2b shows the simulated results when Bureau regulations are implements on top of the Taxation Baseline. Price and quantity both rise, with the price impact including the cost of the regulations as well as the other supply and demand responses. Quantity rises by 12,385 pounds. Total revenue rises by $352 million. All the various categories of taxes rise and total tax revenue rises by $87 million to $1.084 billion. Revenue net of taxes rises by $265 million or about 11% with the Bureau regulations compared to the Taxation Baseline.

Table 2c includes the simulated results for the combination of both the medicinal and the adult-use cannabis segments. The numerical columns include the summation of the numbers reported in Tables 2a and 2b. The exception is that the price row includes the weighted average of the prices in the first two tables.

With the Bureau regulations in place total cannabis sold in these two segments is projected to be about 1.34 million pounds, about 2.6% higher than under the baseline. Cannabis revenue is higher by about $695 million to $6.674 billion. About $1.85 billion of this amount is tax revenue ($162 million above the baseline) for a net-of-tax revenue of about $4.825 billion.

**Table 2b. Adult-Use Cannabis: Impacts of Bureau regulations on prices, quantities, revenues, and taxes compared to the Taxation Baseline**

| *Variable* | *Taxation Baseline* | *Taxation Plus Bureau Regulations* | *Difference* |
|---|---|---|---|
| Retail full price to buyers ($/lb.) | $4,698[1] | $5,104[1] | $406[1] |
| Quantity (lbs.) | 711,264 | 723,649 | 12,385 |
| | | ($ millions) | |
| Total Revenue | $3,341 | $3,693 | $352 |
| State cultivation tax revenue | $105 | $107 | $2 |
| State excise tax revenue (15% of base) | $381 | $421 | $40 |
| Sales tax, state revenue (7.25%) | $184 | $204 | $20 |
| Sales tax, local revenue (1.05% ) | $27 | $29 | $2 |
| Local cannabis tax (8.2% of base) | $208 | $230 | $22 |
| Local cultivation tax | $91 | $93 | $2 |
| State tax revenue | $671 | $732 | $61 |
| Local tax revenue | $326 | $352 | $26 |
| Tax revenue | $997 | $1,084 | $87 |
| Revenue without tax | $2,345 | $2,609 | $265 |

*Source: AIC simulations and calculations.*
[1] Averages, not totals.
Notes: Pounds are in dried flower equivalents. Rounding affects column sums.

**Table 2c. Totals of both Medicinal and Adult-Use Cannabis: Impacts of Bureau regulations on prices, quantities, revenues, and taxes compared to the Taxation Baseline**

| *Variable* | *Taxation Baseline* | *Taxation Plus Bureau Regulations* | *Difference* |
|---|---|---|---|
| Retail full price to buyers ($/lb.) | $4,580[1] | $4,983[1] | $403[1] |
| Quantity (lbs.) | 1,305,583 | 1,339,348 | 33,765 |
| | | ($ millions) | |
| Total Revenue | $5,979 | $6,674 | $695 |
| State cultivation tax revenue | $193 | $198 | $5 |
| State excise tax revenue (15% of base) | $698 | $779 | $81 |
| Sales tax, state revenue | $223 | $247 | $24 |
| Sales tax, local revenue | $33 | $36 | $3 |
| Local cannabis | $373 | $416 | $43 |
| Local cultivation tax | $167 | $171 | $4 |
| State tax revenue | $1,115 | $1,225 | $110 |
| Local tax revenue | $572 | $624 | $52 |
| Tax revenue | $1,687 | $1,849 | $162 |
| Revenue without tax | $4,292 | $4,825 | $533 |

*Source: AIC simulations and calculations.*
[1] Averages, not totals.
Notes: Pounds are in dried flower equivalents. Rounding affects column sums.

### 6.3 Summary of economy-wide impacts of proposed regulations on the cannabis industry in California

The effects summarized in Tables 2a, 2b, and 2c were introduced into a modified IMPLAN model in order to estimate economy-wide impacts. These economy-wide impacts are summarized in this section. More discussion and comparisons, including detailed multiplier tables and economy-wide impacts, are provided in Appendix Chapter 9.

The IMPLAN database, which uses U.S. industry classifications, does not have cannabis industry categories. Therefore, to approximate the economy-wide impacts, AIC first specified industries that were as close a match as possible to the cannabis sectors required for the analysis. Next, the economic ratios in these matching industries were modified based on data for the corresponding cannabis sectors. For dispensaries, AIC modified some of the ratios in the retail drug store industry (IMPLAN industry 401) to better reflect shares of costs of goods sold. The allocation of industry revenue minus costs of goods sold to taxes and other costs was then modified using data that were available from the AIC review of cannabis dispensary accounting costs, a process that is detailed in Appendix Chapter 3.

For cannabis distribution businesses, the IMPLAN wholesale trade industry (IMPLAN industry 395) was the closest match. We adjusted the ratio of price to distributors minus costs of goods sold to better fit AIC data on cannabis costs. We also considered the high share of taxes in the cannabis sectors relative to most other marketing. Note that the dollar value of output for retail and wholesale industries in IMPLAN is based on the difference of price minus cost of goods sold times quantity in the sector. That is, these companies provide output in terms of wholesale or retail services added to the cost of goods that pass through the industry.

The closest IMPLAN match for laboratory testing of cannabis was medical and diagnostic laboratories. We adjusted the economic ratios for that sector to reflect estimates of cost categories of cannabis testing companies. In particular, cannabis testing costs are less labor

intensive than medical and diagnostic laboratories, with more of the costs associated with capital and equipment.

As noted, AIC calculations in the IMPLAN analysis were based on the simulation model results for market prices and quantities (presented in Table 2a for medicinal cannabis, Table 2b for adult use cannabis, and Table 2c for combined legal cannabis). The model inputs included detailed data on costs of regulations, which were especially important for the testing sector. The IMPLAN results are presented as the change in the value of output, value added, and change in jobs compared to the baseline situation with adult-use cannabis legalization, but without the proposed Bureau regulations.

We first consider impacts based on the results of Table 2a for the medicinal segment. Based on the IMPLAN simulations, in the retail sector, the direct output in the sector (measured by revenue above costs of goods sold) rises compared to the no-regulations baseline by $107.1 million, value added rises by $83.3 million, labor income rises by $45.6 million, and direct jobs rises by 1,125 jobs. After considering multiplier impacts, the California economy-wide value added rises by $132.6 million, and 1,617 added jobs may be attributed to the increase in retail value of output. In the distribution sector (which includes transportation), margin rises by $39 million and number of direct jobs rises by 187. The total number of jobs in California attributable to the distribution sector rises by 421.

Under the regulations, the expanded laboratory testing sector is subject to significant new economic activity. Revenue rises by $34 million; direct value-added rises by $11.7 million; and the number of direct jobs in the sector rises by 111. Economy-wide value added attributable to the testing expansion rises by $109 million, and the number of jobs economy-wide rises by 360.

Overall, the economy adds 1,422 jobs in the medicinal cannabis sector. Overall, jobs in California attributable to medicinal cannabis rise by 2,399 due to the regulations.

Next we consider impacts associates with the adult-use cannabis sector as represented by the

economic activity shown in Table 2b. The results are proportional to those for the medicinal sector and may be presented in the same order.

Based on the IMPLAN simulations for the adult-use segment, in the retail sector, the output in the sector (measured by revenue above costs of goods sold) rises compared to the no-regulations baseline by $106.6 million, value added rises by $82.9 million, labor income rises by $45.4 million, and direct jobs rises by 1,119 jobs. After considering multiplier impacts, the California economy-wide value added rises by $131.9 million, and 1,609 added jobs may be attributed to the increase in retail value of output. In the distribution sector (which includes transportation), margin rises by $37.6 million and number of direct jobs rises by 180. The total number of jobs in California attributable to the distribution sector rises by 406.

Under the regulations, the expanded laboratory testing sector is stimulated, generating significant new economic activity. Revenue rises by $39.9 million; direct value added rises by $13.8 million; and the number of jobs in the sector rises by 130. Economy-wide value added attributable to the testing expansion rises by $128 million, and the number of jobs economy-wide rises by 423.

Overall, the economy adds 1,429 jobs in the adult-use cannabis sector. Overall, jobs in California attributable to the regulations of adult-use cannabis rises by 2,438 jobs due to the regulations.

It is informative to add the impacts for the medicinal and adult use segments to derive the impacts of proposed Bureau regulations on legal cannabis compared to the Taxation Baseline. These results are based on Table 2c and are simply the sum of the results for medicinal and adult use cannabis.

Based on the IMPLAN simulations for the full legal cannabis segment, the output in the retail sector (measured by revenue above costs of goods sold) rises compared to the Taxation Baseline, by $213.7 million, value added rises by $166.2 million, labor income rises by $91 million, and direct jobs rises by 2,244 jobs. After considering multiplier impacts, the California

economy-wide value added rises by $264.5 million, and 3,227 added jobs may be attributed to the increase in retail value of output. In the distribution sector (which includes transportation), direct output (margin) rises by $76.6 million and number of direct jobs rises by 368. The total number of jobs in California attributable to distribution sector rises by 827.

Under the regulations, the expanded laboratory testing sector is stimulated to significant new economic activity. Revenue rises by $73.9 million; direct value added rises by $25.5 million; and the number of jobs in the sector rises by 240. Economy-wide value added attributable to the testing expansion rises by $237.1 million, and the number of jobs economy-wide rises by 783.

Overall, the economy adds 2,852 direct jobs in the regulated cannabis sector. Overall, jobs in California attributable to the regulations of cannabis rises by 4,837 jobs.

These impacts are expected to be distributed geographically across California roughly in proportion with populations. Some evidence (discussed in Appendix Section 5) suggests that cannabis use is particularly prevalent among young adults. Thus, there may be some concentration of dispensaries and resulting multiplier effects in locations with more young people, including urban centers.

## 7. Assessment of whether the proposed regulations meet the "major regulation" standard in Government Code § 11342.548

After performing the analyses described in Section 6, we have determined that the total economic impact of the proposed regulations exceeds the one-year minimum threshold of $50 million in impact (as measured by costs or benefits) required for the proposed regulations to meet the standard for a "major regulation" for the purposes of Government Code § 11342.548, and thus require a SRIA.

This SRIA calculates the impact of the Bureau's proposed package of regulations by comparing the economic outcome in a hypothetical market situation without regulations in place against the economic outcome in the estimated situation with the proposed regulations also in place, holding other major economic factors constant. Using this definition of impact, we estimated that the effect on the total revenue, net of tax collections, on the legal cannabis segment is $533 million per year. We calculated that effects of Bureau regulations on total consumer expenditure for legal cannabis, including taxes, would be $695 million (because the tax revenue component is about $162 million); see Table 2c for details.[6] We also note that these estimated impacts apply after some initial dislocations in the market are settled. We have not attempted to estimate impacts during the period of dislocation and flux after full implementation of taxation, adult-use legalization, other regulations and the proposed Bureau regulations.

Measured benefits of the proposed regulations to buyers are reflected in higher willingness to pay per pound of medicinal cannabis with the proposed regulations in place. Note that quantity rises slightly with substantially higher prices, thus consumer expenditures (retail revenue) rise significantly when industry per-unit costs rise and additional taxes are applied.

The direct economic impacts on the medicinal cannabis segment do not include multiplier impacts, as changes in the medicinal cannabis segment ripple through the rest of the economy. If these were included the impacts would be larger. By either measure, the estimates of costs or benefits are sufficient to meet the "major regulation" standard in Government Code § 11342.548.

[6] An alternative, narrower method of calculating the impact of the proposed regulations in isolation would be to compare the economic outcome in the situation with a set of minimum statutory requirements against the economic outcome in the situation with the proposed regulations. That would require determining precisely the statutory minimum package of regulations and conducting a simulation of costs and benefits under a counter-factual baseline assuming those regulations applied.

## 8. Determination of the impact of the regulatory proposal on the state economy, businesses, and the public welfare (Government Code § 11346.3(c))

In Government Code § 11346.3(c), the markers to be used in assessing the economic impact of the proposed regulations in a SRIA are the following:

(1) The creation or elimination of jobs in the state;

(2) The creation of new businesses or the elimination of existing businesses in the state;

(3) The competitive advantages or disadvantages for businesses currently doing business in the state;

(4) The increase or decrease of investment in the state;

(5) The incentives for innovation in products, materials, or processes; and

(6) The benefits of the proposed regulations, including, but not limited to, benefits to the health, safety, and welfare of California residents, worker safety, environment and quality of life, and any other benefits identified by the agency.

Quantitative estimates in this section were based where possible on the IMPLAN projections of economy-wide impacts presented in Section 6.

### Assessment 8.1. *The creation or elimination of jobs in the state*

As noted in Section 6, we estimate that the proposed regulations will increase jobs by an estimated 2,244 total jobs in the cannabis retail sector. The total effect on jobs in the cannabis retail sector, including ripple effects generated by both the adult-use and medicinal retail sectors, is an increase of 3,227 jobs.

The other major increase in jobs is in the cannabis laboratory testing sector. The IMPLAN results based on the AIC simulations project that the proposed regulations will create 240 new jobs directly and 783 new jobs when multiplier impacts are included. In the distribution sector of the legal cannabis industry, which includes transportation, the IMPLAN results based on the AIC simulations project that the proposed regulations will create 368 new jobs directly and 827 new jobs in total when multiplier impacts are included.

Overall, we estimated 2,852 direct jobs added within the legal cannabis industry due to the proposed regulations, and 4,837 jobs added in California after including multiplier effects. We expect these jobs to move, likely to urban areas, especially for laboratory testing, and in places where cannabis consumption is more prevalent.

**Assessment 8.2.** ***The creation of new businesses or the elimination of existing businesses in the state***

AIC analysis of available data indicates that, on average, medicinal cannabis retailers sell about 600 pounds of cannabis each. If the total number of pounds sold increases by about 29,000 pounds and Table 2c, this would imply about 48 more retail operations state-wide due to the proposed regulations if average size of retail locations did not change. Of course, with significant new regulations many existing businesses may find their operations less suited to the regulatory environment and other businesses that may enter to replace some existing businesses that exit. That means many new businesses enter and existing business leave even if the number of retail and distribution businesses overall change little.

Both creation and elimination of businesses is a natural occurrence for any significant change to the business conditions. Regulations related to license holder characteristics may cause some business to leave the segment because the current business owners find it difficult to meet requirements. Exits from the industry will generally be accompanied by other business entering or current businesses expanding.

The discussion in Section 6 indicate a large increase in the size of the cannabis laboratory testing sector. Table 2c reported that about 1.3 million pounds per year were projected to be sold in the hypothetical Taxation Baseline, and testing revenue for testing businesses were projected to be only $2.6 million because testing is not required in that baseline. In the simulations with Bureau regulations added testing revenue is about $100 million. Assuming that on average laboratories have revenues of about $5 million, these figures imply about 20

laboratory testing businesses in the medicinal segment. We expect considerable variation with some very small operations and a few very large operations and more in the middle.

Information from industry sources indicates that in the middle of 2017, there were only a few medicinal cannabis testing laboratories operating in California that were equipped with the type of wet-lab facilities that would be necessary to conduct the required pesticide tests. Therefore, most testing businesses have been created as new businesses to help the industry comply with the proposed Bureau regulations. These businesses are expected to be located near distribution centers and spread across the state in major centers of retail sales.

MAUCRSA allows that a distribution license can be obtained by cultivators or retailers. We expect that with the Bureau regulations, as in 2017 in the medicinal cannabis segment, the distribution function be performed by a mix of cultivators, manufacturers, retailers, and micro-businesses, as well as specialized companies. Distribution cannot be done by testers. There is a large geographic spread of urban centers and rural areas with significant numbers of retailers around the state. Larger distribution businesses could realize cost advantages by locating near clusters of retailers. The scope of this SRIA is the one-year period after regulations are fully implemented. As the industry matures in later years there may be fewer distributors as scale economies are achieved.

Overall, we estimate that about 5,000 new businesses enter and 6,000 existing businesses exit due to the Bureau regulations. The calculations treat each licensee as a distinct business. Many businesses eliminated are those that had been operating without regulatory compliance. These estimates are more than usually uncertain.

**Assessment 8.3.** ***The competitive advantages or disadvantages for businesses currently doing business in the state***

AIC analysis indicates some advantages for businesses currently doing business in California. Recall that this SRIA shows estimates of the impacts of cannabis regulations imposed upon the cannabis industry relative to the baseline with taxation and adult-use legalization in effect. To be relevant, this sub-section therefore discusses competitive advantages and disadvantages relative to the counter-factual baseline, not relative to the situation in 2017 or before. Here, as elsewhere, we considered only the impact of the proposed regulations, with the baseline assumption that taxation, other regulation and adult-use legalization are in place.

AIC simulations did not include results that directly quantify the characteristics of businesses that may benefit or not from restrictions on vertical integration, and specifically, we have no quantitative information on how such restrictions may affect businesses currently in the industry relative to new entrants.

In general, the requirement that cannabis be transported to a distribution business before it is sent to a retailer changes current practices, but the ability for cultivators and retailers to also hold distribution licenses and for micro-business licenses to cover several activities reduces the impact of this requirement.

The MAUCRSA requires that current companies that own or operate both retail locations and testing labs either divest of one of the operations or set up new legal structures. This reduces the competitive advantages to a few businesses.

We expect that some businesses will adjust to the proposed regulations relatively easily, and that others will find adjustment too costly and will leave the industry. Given the nature of the adjustment costs, we expect businesses with strong management personnel and access to the capital and legal services necessary to meet the new regulatory standards, to adjust more readily, and thus to have a competitive advantage over new entrants. We expect that the

existing businesses without these qualities, however, will be placed at a competitive disadvantage.

Sections 6 and 8 documented an increase in economic activity including revenue and jobs in cannabis laboratory testing. Subsection 8.2 projected several new laboratory testing businesses. AIC discussions with industry sources indicated that medicinal cannabis testing laboratories as they currently operate in California would not be fully compliant with the proposed regulations for medicinal or adult-use cannabis. The existing business needed to make adjustments to comply and new entrants designed their operations to be compliant.

Current medicinal cannabis laboratory testing businesses already operate in what is likely to be an expanding sector. The main disadvantage of pre-existing labs is that their services will require substantial upgrading to meet proposed regulations, which is costly and time-consuming. (See Appendix Chapter 6 for details, and see Appendix Chapter 10 for a discussion of laboratory testing concerns and dislocations experienced in other states.)

Most medicinal cannabis distribution and transportation operations were integrated with upstream or downstream businesses. Thus, there are few current distinct businesses in these sectors that are advantaged or disadvantaged.

**Assessment 8.4.** ***The increase or decrease of investment in the state***

We estimated that the regulations will increase investment in California cannabis businesses relative to the baseline. As noted, overall legal cannabis revenue before tax will rise by about $634 million from the Taxation Baseline, and this added revenue would be accompanied by investment. Some additional investment (for example in security equipment) in the distribution business sector would likely follow directly from proposed regulations. Most retail locations would make additional investments to comply with the proposed regulations in that industry sector as well. Additional transport investment will likely be made mostly by business in the other business sectors that we anticipate would conduct much of the transporting.

As documented in Sections 6 and 8, many of the added costs of the proposed regulations are associated with laboratory testing. In order to generate about $100 million in annual revenue, the laboratory testing sector will require a substantial increase in investment in equipment.

**Assessment 8.5.** ***The incentives for innovation in products, materials, or processes***

MAUCRSA mandates that the proposed regulations include substantial new cannabis testing requirements. Information provided by government laboratory testing specialists and industry sources indicated that proposed regulations are likely to create incentives for innovations in testing procedures. For example, the proposed regulations create incentives for innovation to reduce costs for wet-lab testing machinery, perhaps including mobile testing laboratories. (More information on the testing requirements, incentives and potential innovations are provided in Appendix Chapter 6.) The proposed regulations create a few direct incentives for innovations in the other business sectors (distribution and retail). For example, packaging requirements will stimulate innovations in packages that are not accessible by children but attractive to customers.

**Assessment 8.6.** ***The benefits of the proposed regulations, including, but not limited to, benefits to the health, safety, and welfare of California residents, worker safety, environment and quality of life, and any other benefits identified by the agency***

8.6.1 Public safety benefits. The proposed regulations include a number of specific items related to public safety. These are discussed more fully in Section 12 and described in more detail in Appendix Chapters 6 and 12. In summary, video surveillance and archival requirements benefit public safety by improving the ability of licensing agencies to investigate bad actors, and by improving the ability of the Bureau and other agencies to document violations, collect penalties, and enforce sanctions on unlawful operations.

The proposed regulations may also benefit public safety insofar as they are able to help law enforcement apprehend criminals who are outside the jurisdiction of the Bureau. These security measures apply to transport, testing, distribution, and retail sectors of the cannabis industry.

The proposed track-and-trace system and other regulations that guard the integrity of the product as it makes its way through the supply chain benefit public safety by preventing the diversion of cannabis into the illegal market and becoming a source of income for criminal enterprises. We expect general safety benefits from careful regulation of an enterprise that has historically been linked with violent and harmful activity. In addition, we expect some deterrence of criminal activity due to the enhanced security measures from the proposed regulations. These benefits apply to security measures in the proposed regulations in all four industry sectors of the regulated cannabis segments, including transport and distribution, testing and dispensing. AIC has not quantified these benefits.

8.6.2 Public health benefits. As noted, the MAUCRSA and the proposed regulations include requirements for laboratory testing of medicinal cannabis. The proposed regulations may benefit the public by protecting consumers against the possibility of purchasing contaminated cannabis that many consumers wish to avoid. As noted above, our simulation model assumed an increased willingness to pay for cannabis that has been regulated and tested. The assumption was that this willingness to pay for testing offsets the cost of the proposed regulations such that quantity sold in the medicinal market is little affected by regulatory costs.

By comparison, relevant examples are abundant in the food sector. USDA's regulation of meat and poultry production and FDA's regulation of food manufacturers have been shown to increase willingness to pay in food markets. We anticipate that some buyers will pay the much higher prices in the taxed and regulated segments because of the safety and security of the product and the purchase environment.

In addition to testing, proposed regulations concerning the track-and-trace system may provide additional security against contamination and therefore public health benefits. Proposed Bureau regulations apply to both distribution businesses, and retailers. Appendix Chapter 6 provides more information on proposed regulations in this area. Appendix Chapter 8 contains discussion and references on demand effects of food safety and traceability regulations. The safety assessment is limited by incomplete scientific evidence on safe levels of potential contaminants that is specific to cannabis.

A public health concern related to regulations relate to added costs and limited hours of availability that may reduce purchases of cannabis in the regulated market and increase use of illegal cannabis or substitute drugs that are much less safe. A common consideration of regulations that make buying the regulated product more costly or less available is the shift to unregulated products.

8.6.3 Worker safety. The proposed regulations include measures that reduce the risk of crime, thereby enhancing worker safety while improving public safety.

8.6.4 Environmental and other quality-of-life benefits. AIC analysis did not quantify specific environmental or other quality of life benefits of the proposed Bureau regulations. Recall that the proposed Bureau regulations have small impacts on the total quantity of cannabis produced or consumed in California. General quality-of-life benefits may occur in locations near to the regulated retailers because these licensed businesses will have more incentives to operate in ways conducive to good neighbor practices. With respect to environmental issues, some small additions to transport fuel use may follow from required transport to and from distribution businesses and to testing facilities.

There may also be environmental or quality-of-life benefits in neighborhoods where licensed retailers are located as they comply with security and related regulations and have an incentive to minimize environmental impacts that might be attributable to them. We expect that any such environmental impacts are likely to be relatively small. More significant environmental impacts

may follow from regulations of the cultivation industry, which have been investigated in the context of those proposed regulations.

**9. Benefits of the proposed regulations, expressed in monetary terms to the extent feasible and appropriate**

Section 6 above described the overall economic impact of the regulations and highlighted perceived benefits of regulations to consumers in terms of higher willingness to pay per flower-equivalent pound of cannabis. As shown in Tables 2c in Section 6, there is an almost 3% increase in aggregate quantity of regulated cannabis sold with the proposed Bureau regulations.

We estimate that consumers are willing to buy more legal and regulated cannabis and pay approximately $695 million more per year for about the same quantity of cannabis for benefits derived from the proposed Bureau regulations, compared to the Taxation Baseline. This monetary value indicates that consumers draw quantifiable benefits from the regulations.

These figures apply to the impacts within one year after the proposed Bureau regulations have been fully implemented and initial flux has settled down. For a longer time horizon—for example for the lifetime of the regulation—the impact would be far larger. Using a discount rate of 5% and assuming these benefits continue indefinitely, the present value of the sum of discounted benefits accrued into future years is given by: $695 million/0.05 = $13.9 billion.

**10. Types of costs considered for implementation of the proposed regulations**

The costs to the industry necessary to comply with the proposed regulations comprise the most immediate, first-order costs. These costs are provided in detail below where we discuss regulatory alternatives in Section 12. Added costs include additional product testing, safety, and

security measures that are discussed in Sections 6, 8, and 12. Fees to support the regulatory program compose a relatively small share of the whole.

AIC projected that the proposed Bureau regulations would have very small effects on the quantity of regulated cannabis consumed (Table 2a). Therefore, any social costs associated with the changes in the use of cannabis from proposed regulations would be small.

**11. Effects on the General Fund, special state funds, and affected local government agencies attributable to the proposed regulations**

As shown in Section 6, especially Table 2c, the proposed regulations increase sales revenue of retailers. Overall tax receipts are substantial and rise with the proposed Bureau regulations. AIC simulations, reported in Table 2a, 2b, and 2c, estimate that the proposed Bureau regulations would increase total state tax receipts by about $49 million for medicinal cannabis, $61 million for adult-use cannabis, and $110 million for all legal cannabis. Local government taxes on cannabis retail sales are also estimated to be substantial and, as shown in table 2c, rise with the regulations and retail revenues.

To estimate full economic and fiscal impacts of proposed regulations requires estimates of licenses fees associated with proposed Bureau regulations. We develop an estimated license costs of about $60 million which is estimated to cover the expenses of the Bureau in operating the regulatory system for which it is responsible. With about 1.33 million pounds sold, the cost of license fees is about $45 per pound.

## 12. Evaluation of two reasonable alternatives to the proposed regulations

This section introduces and provides analysis of two alternative regulations: a lower-cost package and a higher-security package of regulations. This section compares these alternatives relative to the proposed Bureau regulations. Summary description is provided in Table 3. Next, in Table 4, we assess testing costs in detail for each of the three packages of alternatives and provide the summary costs.

In Table 5, we add other regulatory costs in order to compare the total cost of each of the three packages of alternatives with the total cost of the proposed regulations. (Detailed calculations of the costs of the package of proposed regulations and the two alternative packages of regulations can be found in the Appendix Chapter 6.) Finally, simulations of economic impacts with the two alternative packages of regulations are compared to the proposed regulations.

### 12.1. Alternatives summarized

The two alternative sets of regulations can be compared to the proposed regulations in terms of three features of the packages, which are summarized in Table 3. With respect to item 4, hours of operation restrictions, we do not vary the higher-security alternative from the proposed regulations due to the fact that the proposed regulations are already as restrictive as any US state with an adult-use or cannabis industry.

**Table 3. Major differences between the proposed regulatory package and two alternative regulatory packages with implications for direct costs of compliance**

| *Impact Variable* | *Lower-cost alternative* | *Proposed regulations* | *Higher-security alternative* |
|---|---|---|---|
| **1. Maximum batch size for mandatory testing** | • No maximum batch size | • 50 lb maximum batch size | • 10 lb maximum batch size |
| **2. Retailer-to-consumer delivery restrictions** | • No restrictions on vehicle type<br>• No lockboxes required<br>• No restrictions on number of employees | • Cars only<br>• Lockboxes required<br>• No restrictions on number of employees | • Cars only<br>• Lockboxes required<br>• Deliveries must be made by 2 or more employees |
| **3 Security video archival requirements** | • No requirements | • 1280x720, 15fps[1]<br>• 90 days archive | • 1280x1024, 20fps[1]<br>• 90 days archive |
| **4. Cannabis waste storage and disposal requirements** | • No requirements | • Before disposal, all cannabis waste must be:<br>1. Rendered unrecognizable and unusable<br>2. Disposed of by a licensed waste hauler, with documentation | • Before disposal, all cannabis waste must be:<br>1. Disguised by blending with solid waste or soil<br>2. Weighed and labeled with bill of lading<br>3. Quarantined in a dedicated area on camera for 72 hrs |
| **5. Hours-of-operation retail restrictions** | • No restrictions | • 6am-10pm | • 6am-10pm |

Source: AIC analysis of proposed regulations, MAUCRSA statutes, and AIC interviews with Bureau and CDPH.

[1] The terms "1280x720" and "1280x1024" indicate pixel resolution; the terms "15 fps" and "20 fps" indicate frames per second of recorded video; term "90 days archive" indicates length of time the business is required to store video.

As noted above, effects of the hours-of-operation restrictions reduce demand for legal cannabis and this affects the projected prices and quantities in the simulations (via a 2% increase in demand for legal medicinal and adult-use cannabis and a 1.5% increase in demand for illegal cannabis). Thus the hours restriction is incorporated into our total calculated impacts of the three alternatives as reported at the end of Section 12.

All the alternative regulatory packages include components of compliance costs for retailers and distributors that do not vary between packages, because for those components the proposed Bureau regulations not varying substantially from the minimum required under MAUCRSA.

The largest component of these additional compliance costs that are not varied in our packages of alternatives is the cost of child-resistant packaging, which is required by MAUCRSA. This cost is applied to distributors. We estimate the cost of compliance with this requirement at about $43 per pound. As detailed in Appendix Section 6.4.3, we obtained this estimate by making assumptions about the distribution of package sizes at retail and comparing the cost of basic packaging (zip-lock plastic bags) without regulations vs. the cost of compliant packaging (plastic containers with ASTM-approved child-resistant push-and-turn lids) for each package size.

12.1.1 Testing. As required by MAUCRSA, with certain roles played by CDPH and DPR, the regulations include an array of contaminant, pesticide, and other tests that we estimate to cost approximately $1,062 per test. Tests must be conducted by statute, so the cost per test does not vary between alternatives.

According to AIC's analysis, proposed regulations impose contamination and pesticide tests that raise the cost of cannabis by approximately $235 to $414 per pound vs. the unregulated situation, including the value of lost inventory due to failure. For these calculations, we assume that 25% of product is pre-tested, 16% fails initial testing, 50% of initially failed product is remediated, and 50% of remediated product passes second-round testing. Itemized testing compliance costs are shown in Table 4. Note that our testing cost estimates also include the costs of associated labeling, although those costs may be borne partly by testers and partly by distributors.

| Table 4. Itemized testing compliance costs | Lower-cost alternative | Proposed regulations | Higher-security alternative |
|---|---|---|---|
| Max batch size to be tested | None | 50 | 10 |
| **Lab costs** | | | |
| Lab costs per lb passing and marketed | $35.28 | $57.31 | $214.88 |
| **Lost inventory costs** | | | |
| Total lbs lost due to samples submitted for testing plus failed and destroyed product | 180,408 | 180,408 | 180,408 |
| Cost of lost inventory, per lb passing | $199.84 | $199.84 | $199.84 |
| **Remediation costs** | | | |
| Cost of remediation per lb passing | $1.82 | $1.82 | $1.82 |
| **Total cost per lb passing testing** | **$236.94** | **$258.97** | **$416.54** |
| **Cost per lb without regulations** | **$2.12** | **$2.12** | **$2.12** |
| **Per lb difference vs. unregulated situation** | **$234.82** | **$256.85** | **$414.42** |

*Note: Assumes that the costs of logistics, materials, procedures within the lab, labor hand, and margin are internalized within test price.*

Maximum testing batch size also affects the cost of testing per pound of cannabis sold, especially for cultivator businesses capable of producing large batches for testing. There is no requirement in MAUCRSA regarding batch size. Therefore, we set the lower-cost alternative with no maximum batch size. We estimate that the cost impact of the lower-cost alternative regulations (difference between the regulated and unregulated scenarios) would be approximately $235 per pound.

The proposed testing regulations institute a more stringent set of pesticide tests than those in the lower-cost alternative and establish a 50-pound maximum batch size for testing. These requirements raise the cost of cannabis by $257 per pound (against the unregulated situation), or about $22 more per pound than the lower-cost alternative.

The higher-security alternative, which keeps the same set of tests in place but lowers the maximum batch size to 10 pounds, raises the estimated cost impact per pound of cannabis testing to about $414. This is approximately $157 per pound more than the proposed Bureau

regulations. A smaller batch size may allow for more accurate testing. (More on testing and background on cost estimates is included in Appendix Chapter 6.)

12.1.2 Delivery methods. Retail cannabis deliveries are typically done by car. However, some urban dispensaries make deliveries on foot, bicycle, electronic bicycle (e-bike), or scooter at a significant cost savings. The proposed regulations prohibit on-foot, bicycle, e-bike, or scooter deliveries.

The lower-cost alternative places no regulatory restrictions on delivery methods. Delivery costs currently add approximately $150 per pound to the average cost of cannabis. This estimate relies on the AIC price survey data that 40% of cannabis is transferred to consumers via delivery services. (See Appendix Chapter 4 for details on that estimation.) Allowing the lower-cost delivery methods lowers the average cost of cannabis in the state by approximately $25 per pound compared with the proposed regulations.

Unenclosed vehicles do not allow as much security as enclosed vehicles. Attaching a lock-box to a person would be impossible, and attaching a lock-box to a bicycle, e-bike, or scooter would likely be impractical. With these delivery vehicles allowed, the security objectives of the proposed lock-box regulatory provisions would be ineffective at the delivery stage, increasing the potential for criminal activity in neighborhoods surrounding dispensaries.

A higher-security alternative is to require two employees to be in each delivery vehicle (one driver and one delivery representative), which would enable one employee to be with the cannabis inventory at all times. This would provide an additional level of security. The additional labor costs that would result from the higher-security alternative would increase the cost of cannabis by approximately $138 per pound relative to the proposed regulations. (Appendix Chapter 6 provides details on the calculations of delivery costs with lower-cost and higher-security alternatives.)

12.1.3 Security video archival requirements. The MAUCRSA does not contain specific security video or archival requirements. The proposed regulation includes the requirement that licensees maintain security cameras with high enough quality for facial recognition (proposed to be 1280 x 720 pixels at 15 frames per second) covering many areas of the inside of and entrances to the building, and to maintain a 90-day video archive of footage from these cameras. The 90-day video archival requirement achieves the Bureau's enforcement objectives as well as law enforcement objectives not directly related to the Bureau's activities, but which have benefits to the public safety as discussed above.

We estimated that the average retail location will require either five or six cameras to achieve coverage. We estimated the cost per pound of retail cannabis (both medicinal and adult-use) to rise by approximately $25 per pound ($19.97 for the retail function, plus $5.46 for the distribution and testing functions) compared with the lower-cost alternative, which requires no surveillance archive storage. We increase the proposed regulations' video surveillance requirement to 1280 x 1024 pixels at 20 frames per second in the higher-security alternative. (Appendix Chapter 6 provides our interpretation of the video requirements.)

### 12.2 Simulation results for alternatives

We introduced the two alternative regulation packages into the simulation model that we used to analyze impacts of the proposed regulations. Recall that the proposed regulations were assumed to shift out demand by 6% compared to the Taxation Baseline. Likewise, each of the alternative regulations were also assumed to raise demand relative to the baseline. The lower-cost alternative was assumed to shift out demand by 5% relative to the baseline. The higher-security alternative was assumed to shift out demand by 6% relative to the baseline.

We have outlined the explicit regulatory cost of each option. We also incorporate a 2% reduction in basic operating costs (as shown in Table 1) to recognize advantages of retailers operating in a regulated environment that has better enforcement, safety and security for

retailers. This cost reduction partly offsets the higher cost impact of the proposed Bureau regulations compared with the Taxation Baseline.

**Table 5. Estimated compliance costs per pound of alternative regulatory packages**

| Cost/lb dried-flower equivalent | Lower-cost alternative | Proposed regulations | Higher-security alternative |
|---|---|---|---|
| License fees, distribution and retail | $44 | $44 | $44 |
| Distribution and transport compliance, including child-proof packaging | $46 | $48 | $52 |
| Retail-delivery-methods restrictions | None | $10 | $148 |
| Retail compliance, including waste storage and disposal, video surveillance archive, and other MAUCRSA-mandated regulations | $25 | $49 | $86 |
| Testing compliance, including cost of license, pre-testing, testing and remediation, plus inventory lost due to testing samples and failed tests[1] | $235 | $257 | $414 |
| Hours of operation restrictions (closing at 10pm) | Not calculated on a per-pound basis. Included in simulation as: (1) a -2% shift in demand in medicinal cannabis segment; (2) a -2% shift in demand in adult-use cannabis segment; and (3) a +1.5% shift in demand in illegal cannabis segment. See Section 6.4.5 for details. | | |
| **Total compliance costs per pound** | **$350** | **$408** | **$744** |

*Notes: Numbers in rows were rounded to the nearest $1. See Appendix Chapter 6 for details. Cost components do not add up exactly to total costs, because of rounding.*
[1]See Table 4 for details.

The key results of simulations in the two alternative regulation packages are as follows. With the lower-cost alternative regulations, legal cannabis retail revenue is higher than the Taxation

Baseline by $665 million, and quantity sold is higher than the baseline by 43,755 pounds. With the higher-security alternative regulations, legal cannabis retail revenue is higher than the baseline by $641 million, but quantity is lower than the baseline by 57,549 pounds, or about 4.4%. In our estimation, the higher-security option would provide relatively little benefit as assessed by businesses and their customers, but imposes substantial extra costs. The implication is substantially smaller sales of medicinal or adult-use cannabis (and more sales in the illegal market) because the price is substantially higher.

These results can be compared with AIC simulation results for the proposed Bureau regulations as presented in Tables 2a–2c. Legal industry revenue is higher than the baseline by $695 million, and quantity sold is higher than the Taxation Baseline by 33,765 pounds. Note that under both alternative sets of regulations, the increase in legal cannabis retail revenue relative to the baseline is less than the increase in revenue under the proposed regulations. Detailed calculations underlying these conclusions are reported in Appendix Chapter 8 and 9.

## 13. Final remarks

This SRIA summarized the AIC economic analysis of proposed regulation of the cannabis industry in California. Specifically, we considered regulations governing retailing, testing, and distribution. The proposed Bureau regulations were projected to affect economic costs or benefits to industry participants by more than $50 million within the first year after taking full effect and the market had settled, compared with the baseline relevant to implementation of Bureau regulations. As discussed in some detail, the relevant baseline assumes adult-use legalization, taxation and other regulations, but not the proposed Bureau regulations.

Among the most costly aspects of the proposed regulations is laboratory testing, especially the loss of valuable product that fails to pass the stringent required tests. However, the assessment presented in this SRIA was that such testing also is likely to raise willingness to pay for medicinal cannabis, and that benefits thus offset costs. Other aspects of the proposed Bureau regulations

that add to costs and thereby reduce quantity of cannabis sold in the regulated segments include license fees, track and trace, and child-resistant packaging. In addition, the prohibition on retail operations after 10pm is also estimated to have a significant negative impact on demand for legal cannabis relative to the Taxation Baseline without Bureau regulations.

The proposed Bureau regulations increase economic activity and jobs in the legal and regulated cannabis segments. The analysis used a standard approach to assess economy-wide “multiplier” effects, and found that the added economic activity in the cannabis segment raises economic activity broadly in the state.