



# Forecasting Marijuana Excise Taxes

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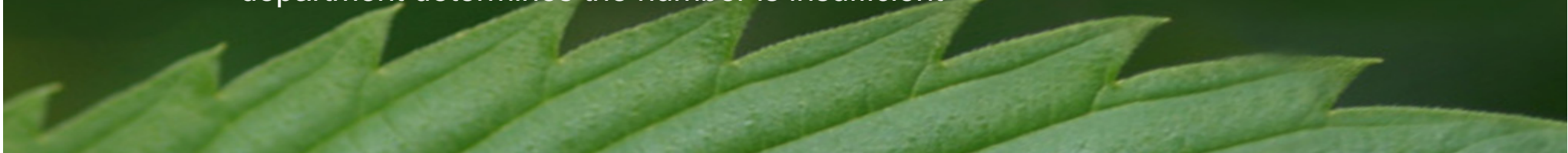
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# Before You Start

- Understand the goal(s) of legalizing marijuana for adult use:
  - Maximizing revenue (for education or other purposes)
  - Shutting out the black market
  - Ensuring a well regulated industry
- Understand your tax structure:
  - Nevada – 15% excise tax on fair market value at wholesale/10% excise tax on retail sales of adult use marijuana/regular state and local sales tax on medical and adult use marijuana and tangible goods/up to 3% local tax on retail sales
  - What is your effective tax rate at retail? Are all taxes passed through to consumers?

# Before You Start

- Understand the regulatory structure
  - Are any limits placed on licenses? May be inadvertently creating a monopoly or oligopoly
  - Five types of licenses in Nevada
    - Cultivation - unlimited but licensing periods controlled by department and regulations allow limiting amount of marijuana cultivated
    - Production – unlimited
    - Retail stores/medical dispensaries – limited by population of each county with maximum of 132 statewide – After 1st year counties may request additional licenses
    - Laboratories – unlimited
    - Distributors - licenses limited to alcohol distributors for first 18 months unless department determines the number is insufficient



# Before You Start

- Understand the regulatory structure
  - Medical and adult use licenses available in Nevada
    - Statutes require all medical licensees the opportunity to apply for an adult-use license in the first year
    - Medical license required before applying for adult-use license for first year



# Assumptions

- Nobody is an expert (yet).
- Prior to legalization the black market supplies all of the demand
  - There exists a supply curve and demand curve with an equilibrium price
- The price in the legal market will very likely be higher than the black market due to higher costs of production:
  - Application and license fees
  - Taxes
  - Regulatory requirements for production (e.g. lab testing, camera systems, etc.)
  - Advertising

# Assumptions

- The legal market may get off to a slow start
  - Businesses may not yet be licensed at state or local level
  - Cultivators may not have sufficient product ready when the market opens



# Methodology

- Inspired by a paper titled "Market Size and Demand for Marijuana in Colorado" prepared for the Colorado Department of Revenue by the Marijuana Policy Group and customized for Nevada



# Methodology – Resident Demand

- Estimated the number of Nevada residents 21 and older using the 2017 demographic projections from the State of Nevada Demographer.
- Estimated the number of Nevada residents 21 and older who have used marijuana in the past month and past year by multiplying population estimate from above by the percent respondents 26 and older who answered the appropriate question on the National Survey on Drug Use and Health (NSDUH) for 2014-2015 published by the Substance Abuse and Mental Health Services Administration
- The prevalence of marijuana use by Nevada residents was reported at 12.89% past year use and 7.85% past month use.



# Methodology – Resident Demand

- Estimate rates of consumption on a days-per-month basis by multiplying estimated number of residents 21 and older who used marijuana in the past month by percentages calculated from numbers calculated by the Marijuana Policy Group.

Days Per Month Marijuana Used	Calculation
<1	Yearly Users – Sum of Values Below
1 to 5	Monthly Users * 0.3333
6 to 10	Monthly Users * 0.1018
11 to 15	Monthly Users * 0.0433
16 to 20	Monthly Users * 0.0789
21 to 25	Monthly Users * 0.1196
26 to 31	Monthly Users * 0.3232

## Methodology – Resident Demand

- Categorize those who use less than once per month as “light users,” those who use 1 to 20 days per month as “moderate users” and those who use 21 to 31 days per month as “heavy users.”
- Apply an underreporting adjustment to each group of 22.2% except the groups “21 to 25” and “26 to 31” which each receive an adjustment of 11.1%. This is done based on a previous study and follows the method in the paper above. This accounts for survey respondents who may have been unwilling to self-disclose recreational marijuana use and assumes heavy users are more willing to self-disclose.

# Methodology – Resident Demand

- The average number of grams consumed per day ("flower equivalent") were estimated by the Marijuana Policy Group as follows:

Type of User	Grams Used Per Day		
	Low	Average	High
Light Users	0.2	0.3	0.6
Moderate Users	0.43	0.67	0.95
Heavy Users	1.3	1.6	1.9

# Methodology – Resident Demand

- Estimate the total demand for recreational marijuana (in metric tons) using the following formula:

$$D = \frac{\sum_{i=1}^7 \frac{\text{days}_i}{\text{year}} * \frac{\text{grams}_i}{\text{day}} * n_i}{1,000,000}$$

Where:

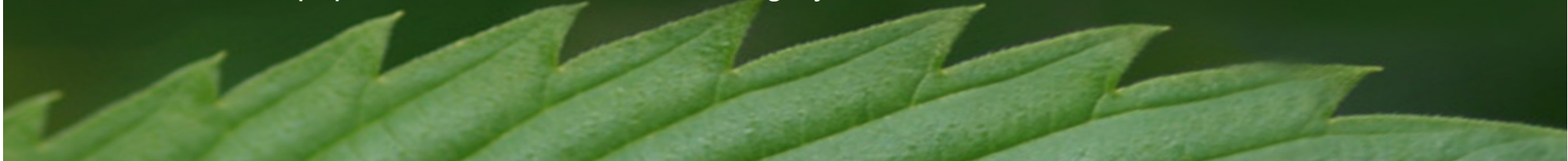
D = total marijuana demanded in one year

i = each category of days per month marijuana used

days = average number of days marijuana used per category

grams = number of grams used per category

n = the population estimate of each category



## Methodology – Resident Demand

- Estimate the demand for medical marijuana by performing the same calculations but using the number of medical marijuana cardholders 21 and older instead of the population estimate.
- Estimate the demand for recreational marijuana users 21 and older who may choose to grow their own by performing the same calculation but summing the estimated populations of the two heavy user groups, multiplying by 1.5% and using this number instead of the population estimate.



# Methodology - Visitor Demand

- Method 1 – Monthly visitors
  - Estimate visitor demand by obtaining numbers of average visitors to Clark County (Las Vegas) and Washoe County (Reno-Tahoe) and calculating demand using the equation above assuming they are all yearly users.



# Methodology - Visitor Demand

- Method 2 – Percent of retail sales
  - Estimated visitor demand by assuming sales of recreational marijuana will account for the same percentage of retail sales in each of Clark County, Washoe County, and Rest of Nevada as any other product. Using the equation above we calculated resident demand for each area and then determined the estimated sales by dividing the total calculated demand by  $1 - (\text{percent of retail sales})$  and subtracting the calculated demand from this number. Percent of retail sales made to visitors were estimated at 24 percent for Clark County and 9.8% for Washoe County according to the respective convention and visitor authorities. We used 9.8% for the Rest of Nevada since it is similar to Washoe County.

## Methodology - Final Calculations

- Calculated final demand by subtracting the estimates for demand for medical and “grow your own” marijuana and adding visitor demand for marijuana to the estimate.
- Divided resident demand by 12 for monthly estimates
- Multiplied visitor demand by monthly proportion of annual visitors (method 1) or monthly proportion of annual retail sales (method 2)





# Methodology - Final Calculations

- Final estimate represents the “flower equivalent” demand
- The tax revenue for the 15% wholesale excise tax was calculated by multiplying monthly demand in pounds by the fair market at wholesale value for flower and multiplying the result by 15%.
  - The fair market value at wholesale was calculated using arms length transactions from medical cultivators, removing outliers, and find the average price.
- The tax revenue for the 10% retail excise tax was calculated by assuming the retail price was roughly twice the wholesale price, multiplying the monthly demand in pounds by this assumed price, and multiplying the result by 10%.

# Other Considerations

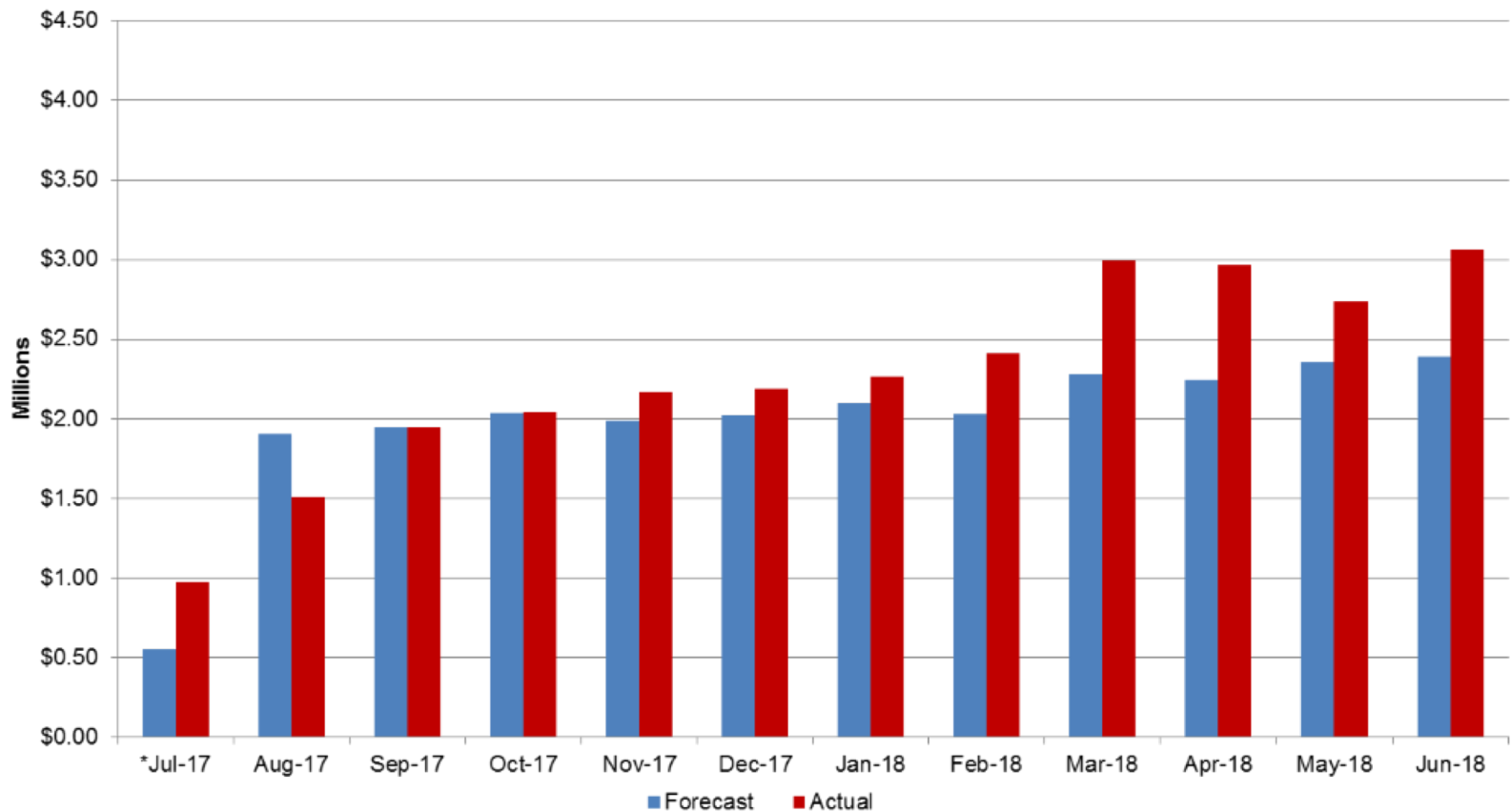
- Vertical integration – In Nevada the limited retail store licenses seem to be favoring vertically integrated companies
- Consumer data - retail stores are reluctant to gather consumer data due to privacy concerns but this data would help forecast visitor demand
- Product mix - flower vs other products such as pre-rolls, concentrates, edibles, etc. that may command a higher price
- Special events – In Nevada we have Burning Man in August and Electric Daisy Festival in May that seem to be driving revenue increases in those months
- The risk of a consumer breaking the law - transporting marijuana across state borders is still illegal but some consumers are probably okay with the risk
- Visitors may not necessarily be light users



**How did we do?**

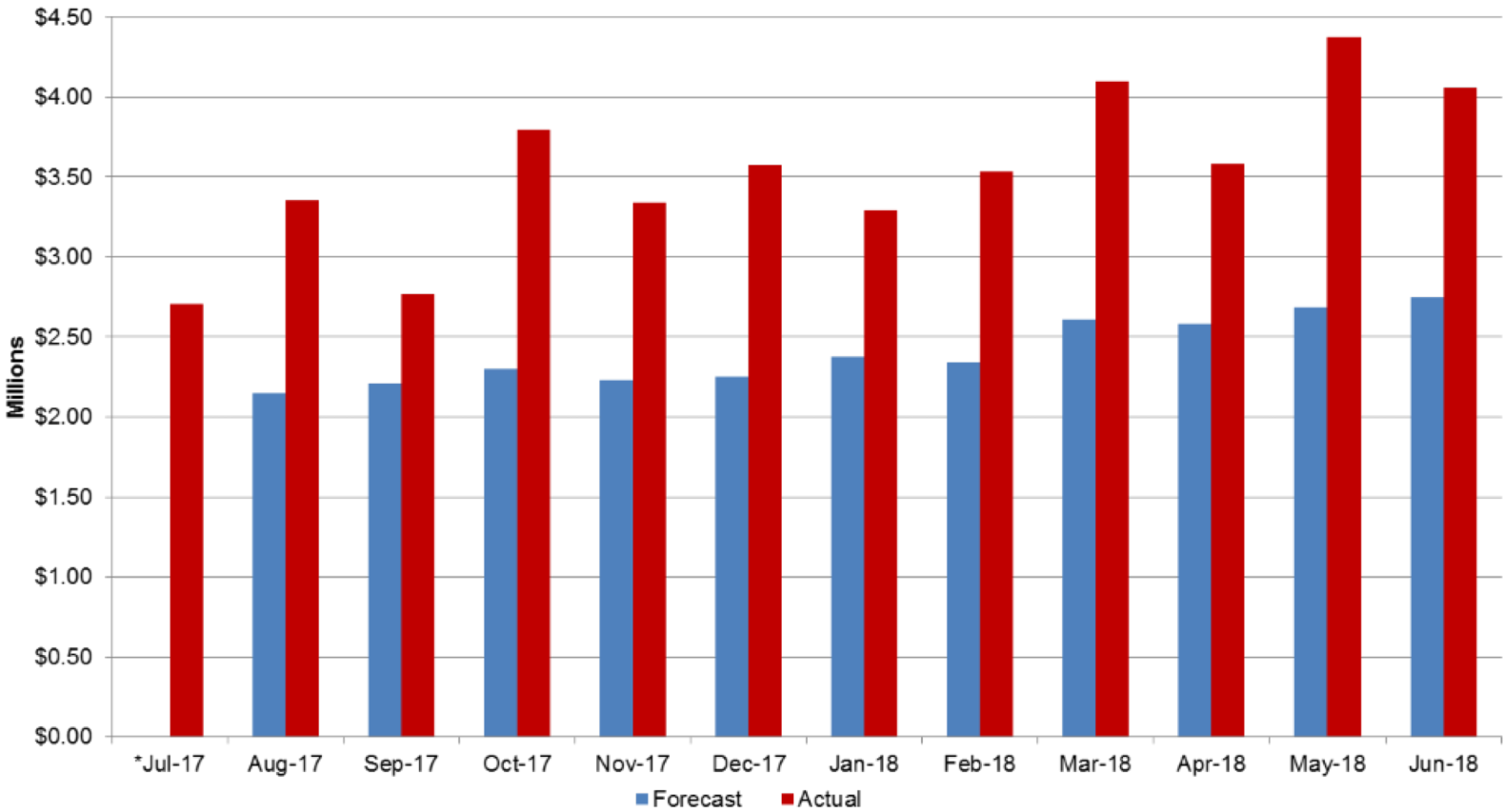


# First Year Revenues - 15% Wholesale Excise Tax



\*No revenue estimated in recreational market for July 2017 due to uncertainty of local governments issuing permits before July 1st.

# First Year Revenues - 10% Retail Excise Tax



\*No revenue estimated for July 2017 due to uncertainty of local governments issuing permits before July 1st.

# Sources

Light, M. K., et. Al. (2014). Market Size and Demand for Marijuana in Colorado. *The Marijuana Policy Group*. Downloaded 10/9/2018 from <https://www.colorado.gov/pacific/sites/default/files/Market%20Size%20and%20Demand%20Study%2C%20July%209%2C%202014%5B1%5D.pdf>

Substance Abuse and Mental Health Services Administration. (2017). 2014-2015 NSDUH State Estimates of Substance Use and Mental Disorders. Downloaded 10/9/2018 from <http://www.samhsa.gov/data/NSDUH.aspx>.

