



Cannabis Data Science

Meetup

December 15th, 2021

Research Question: What is the *underlying* relationship between dispensaries per capita and revenue per dispensary?

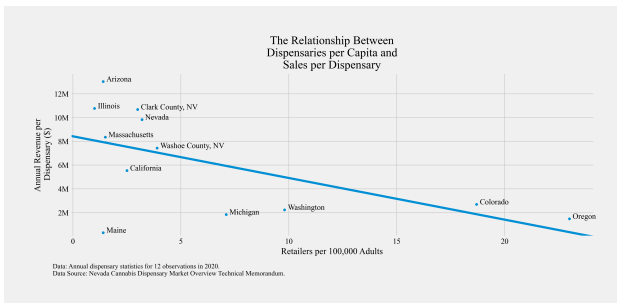
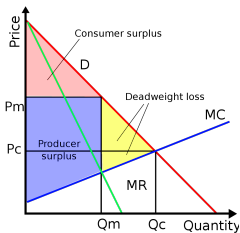


Table 2: Basic Analysis Data & Calculations, by State: 2020

State	Year Adult-Use Legalized	21+ Population	Revenue	Dispensaries (2021)	Dispensaries / 100,000	Revenue / Dispensary
Alaska	2014	542,152		145	26.7	
Arizona	2020	5,486,239	\$1,030,000,000	79	1.4	\$13,037,975
California	2016	30,131,464	\$4,101,540,638	740	2.5	\$5,542,622
Colorado	2012	4,347,644	\$2,191,091,679	812	18.7	\$2,698,389
Illinois	2019	9,570,274	\$1,034,790,099	96	1.0	\$10,779,064
Maine	2016	1,062,570	\$4,706,160	15	1.4	\$313,744
Massachusetts	2016	5,426,264	\$702,407,378	84	1.5	\$8,361,993
Michigan	2018	7,513,559	\$984,700,000	535	7.1	\$1,840,561
Montana	2020	811,418				
Nevada	2016	2,524,682	\$786,479,410	80	3.2	\$9,830,993
Oregon	2014	3,249,774	\$1,111,027,558	748	23.0	\$1,485,331
Vermont	2018	491,627		7	1.4	
Virginia	2021	6,473,738				
Washington	2012	5,783,473	\$1,266,224,177	566	9.8	\$2,237,145
Nevada Counties						
Clark	2016	1,878,401	\$409,167,054	57	3.0	\$10,687,141
Washoe	2016	387,180	\$111,585,750	15	3.9	\$7,439,050

Note: Blanks denote data not available.

Sources: Various



A market with a monopoly
SilverStar at en.wikipedia

Industrial Organization

- Seminal work by Edward S. Mason, Joe Bain, and George Stigler.
- Topics: Collusion, regulatory capture, antitrust policy, etc.
- Structure, Conduct, and Performance paradigm.

Market Structure

Market Structure	Firms	Barriers	Market Power	HHI
Perfect Competition	∞	None	None	0
Monopolistic Competition	Many	Low	Low	Below 2,500
Oligopoly	Few	High	Medium	Above 2,500
Monopoly	1	Blocked	High	10,000

“Transactions that increase the HHI by more than 200 points in highly concentrated markets are presumed likely to enhance market power under the Horizontal Merger Guidelines issued by the Department of Justice and the Federal Trade Commission.”

Source: <https://www.justice.gov/atr/herfindahl-hirschman-index>

Structure, Conduct, and Performance

- Measures:

- ▶ **N-firm concentration ratio**, the combined market share of the N largest firms in the market.

$$CR_N = \sum_{n=1}^N s_n$$

where s_n is the market share of the n th largest firm.

- ▶ **Herfindahl-Hirschman index**, a commonly accepted measure of market concentration:

$$HHI = s_1^2 + s_2^2 + \dots + s_n^2$$

where

- ★ n is the number of firms in the market,
- ★ s_n denotes the market share of the n th firm.

Panel Data

A panel has the form

$$X_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T,$$

where i is the individual dimension and t is the time dimension.

A general panel data regression model is written as

$$y_{it} = \alpha + \beta' X_{it} + u_{it}$$

where

$$u_{it} = \mu_i + v_{it}$$

Estimation with a **fixed effects** or **random effects** model depends on assumptions about μ_i , the individual-specific, time-invariant effects.



Thank you for coming.

Take some time and discuss any conclusions drawn.