

Observations About Market Trends in High-Potency Cannabis Products and (the Limitations of) Policy

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What is the Policy Choice We Seek to Inform?

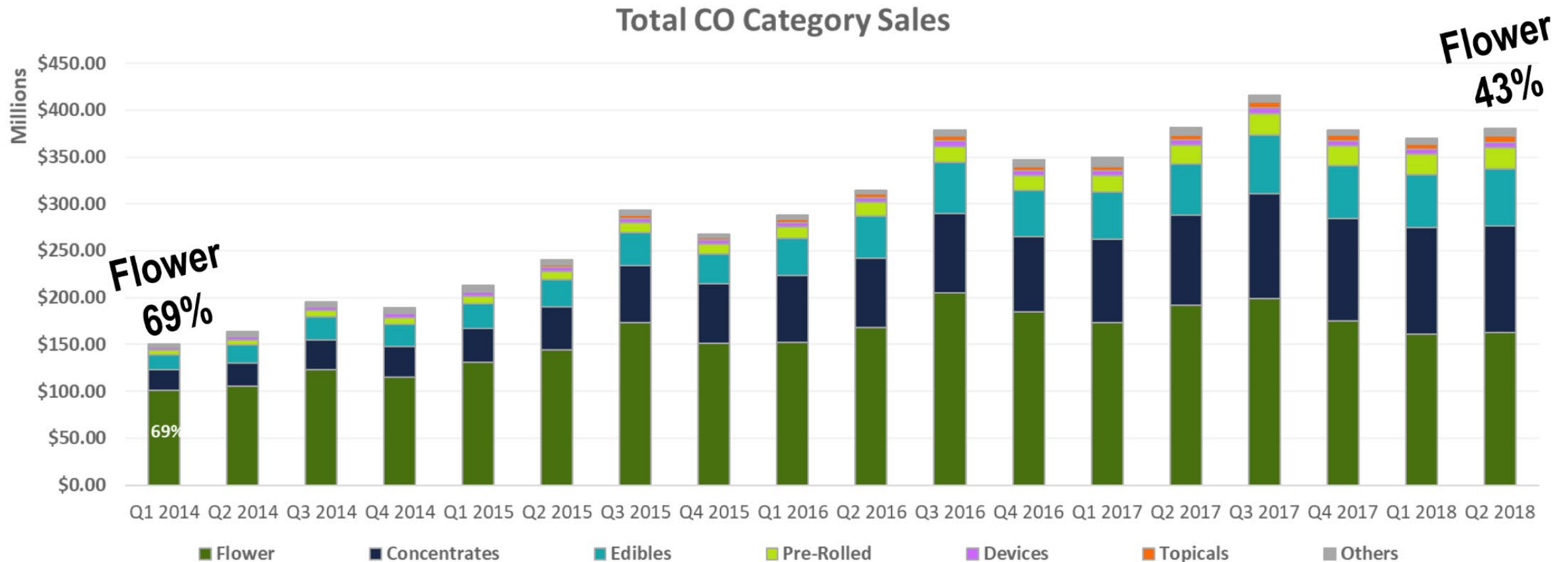
- **(False) Choice: Consumers take low- or high-potency cannabis**
 - That is not something PH or politicians get to decide
- **Choice #1: Legalize (commercial) supply**
- **(Dull) Choice #2: Given legal supply, do things you'd want to do even if high-potency cannabis was not a problem**
 - Require labeling, education, data collection & monitoring, etc.
- **(Hard) Choice #3: Try to seriously limit the legal market**
 - Ban some product classes (wax/dabs, vapes/vaping oils, edibles)
 - Potency caps (e.g., limit flower potency to 15%)
 - Higher taxes per unit THC on high-THC products

Preliminary Observation: #1

- **Legalization of commercial supply gives major impetus for expansion in high potency product options**
 - Leads to “professionalization” of cultivation
 - 1,000,000+ square foot growing facilities vs. 99 plants in a storage unit
 - Makes it safe to own and operate extraction machines
 - Not all of the recoverable THC in the plant is in the buds
 - Cheapest way to produce THC is via outdoor “industrial” agriculture
 - Legalization facilitates proliferation of product forms
 - Stores can carry more products than can a street dealer
 - Product differentiation is natural strategic response to commoditization and Bertrand price competition

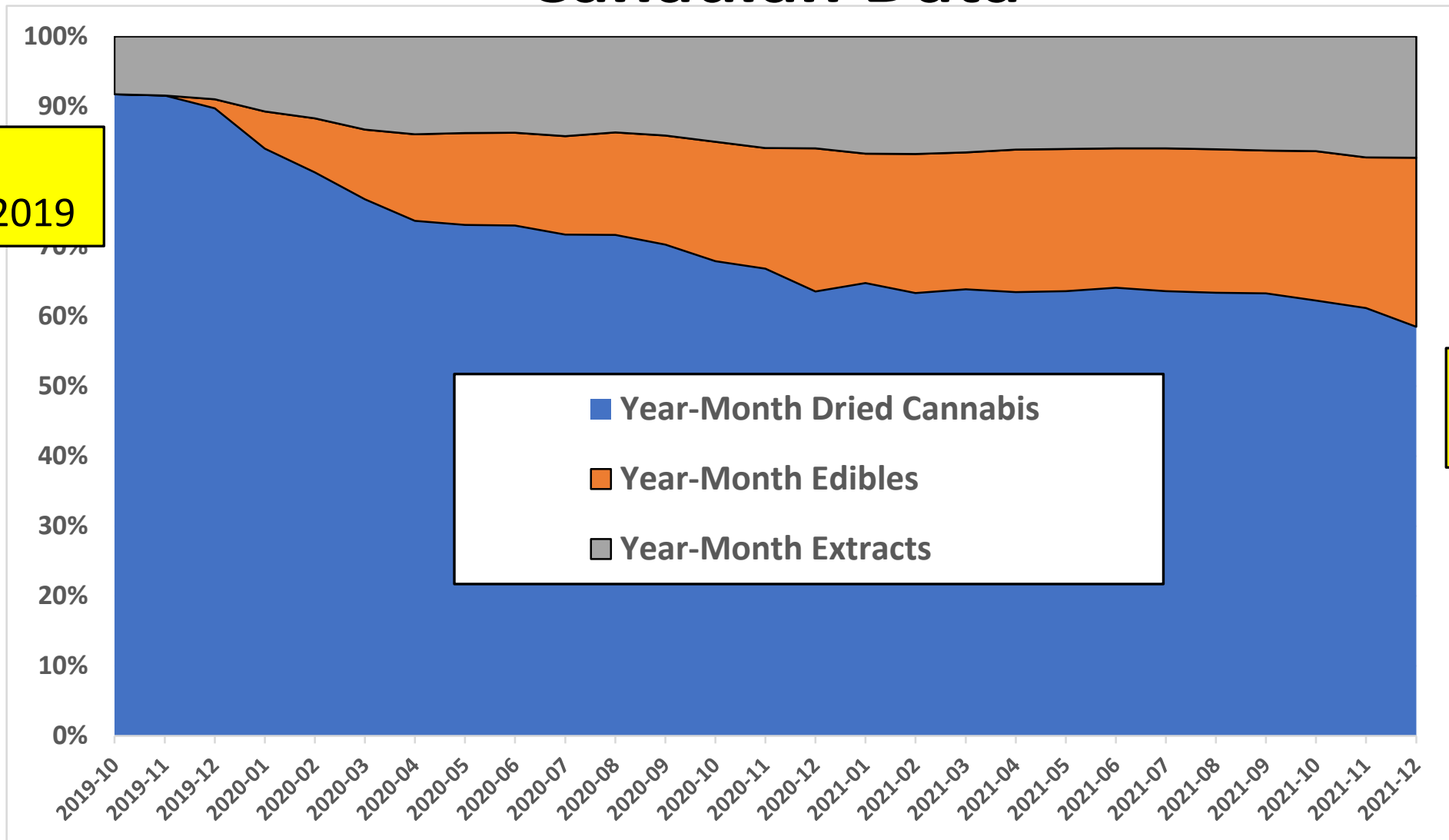
Legalization Expands Product Variety, CO Data

Market share is shifting, as seen in Colorado over the past 4+ years



*BDS Analytics GreenEdge POS Retail Data

Legalization Expands Product Variety, Canadian Data



92% in
October 2019

59% two
years later

Share of units sold in Canada, per Health Canada data site.

But Note: Potency Rises Even Without Legalization (French Data)

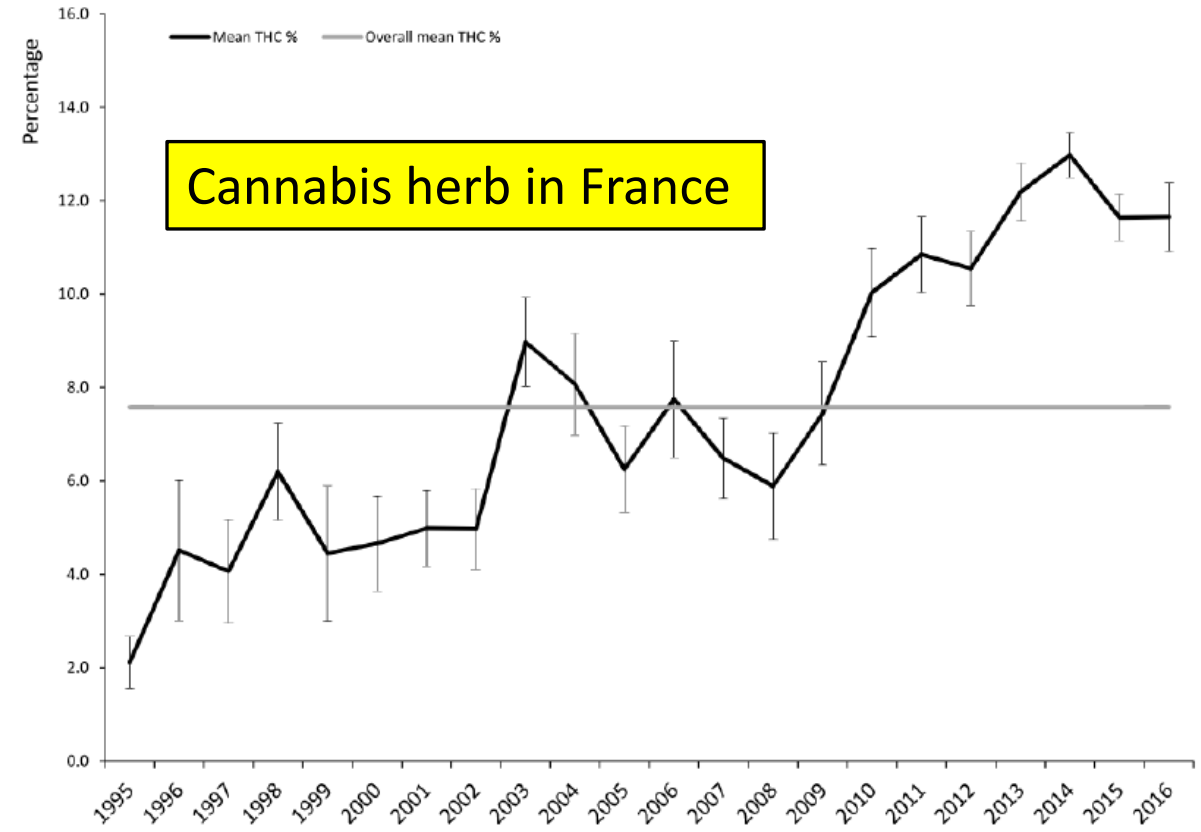
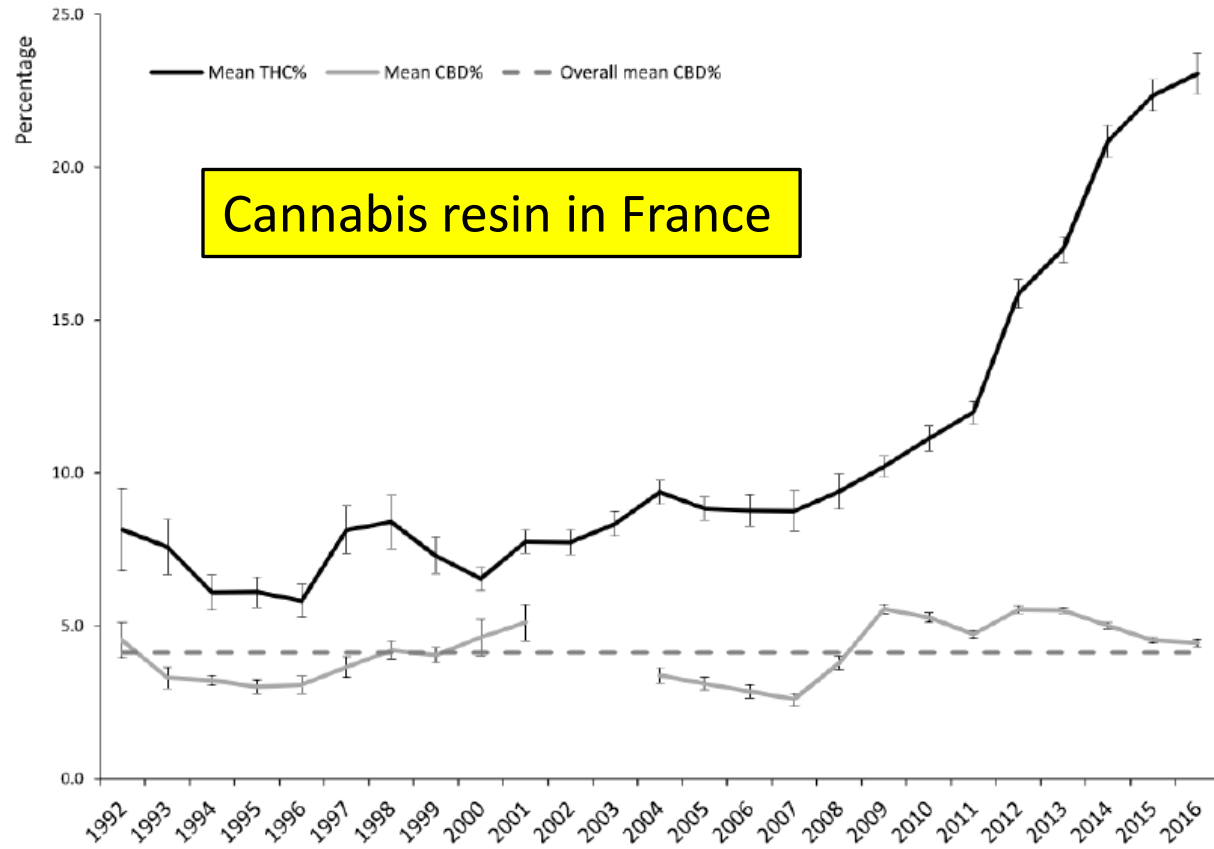
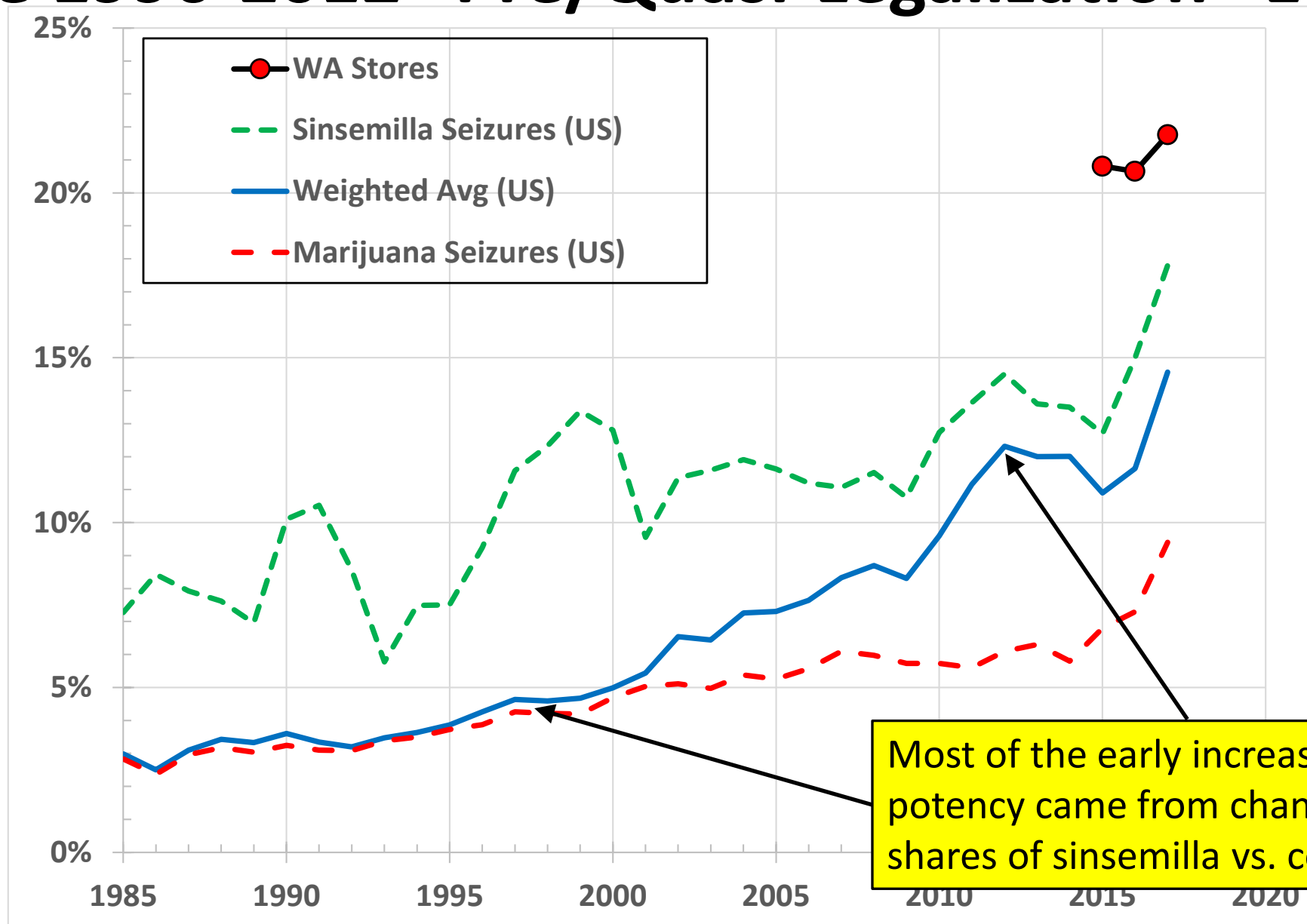


Fig. 9. Average THC concentration of samples by year, from 1995 to mid-2016. Overall mean = 7.6%.

And Flower Potency Rose in the U.S. Throughout the 1996-2012 “Pre/Quasi-Legalization” Era



Observation (Guess) #2: High Potency Is on the Top 10 but not the Top 5 List of Legalization's Dangers

1. Decline in price per unit of THC
2. (Eventual) Marketing power of industry
 - Will only really see that after national legalization
3. (Related) Repositioning of product in social functions/roles
 - E.g., expansion in daily use for wellness vs. weekend use for fun
 - C.f., marketing cigarettes to women, wine & friendship, canned spirits at games
4. Synergies with other product forms
 - Bundling as loss-leader for convenience stores or with on-site amenities
 - Products combining it with tobacco (or nicotine)
5. Normalization of use
6. Regulatory capture by industry

Prices Have Already Fallen ~80%

(All price inflation adjusted to 2022 USD but not adjusted for potency)

- **CA/National Wholesale prices down 82%**
 - 2010 wholesale price of sinsemilla in CA was \$5,500 per pound
 - Spot index wholesale price in Sept '22 was \$1,000 per pound
- **WA Wholesale prices down about 77%**
 - 2006 wholesale price of US/BC was \$4,085 per pound
 - Spot index wholesale price in March '22 was ~\$950 per pound
- **WA Retail prices down about 75%**
 - 2006 average for bud was \$40 per gram
 - Today about \$10 per gram (depends how one counts taxes)

Simple Math of Legal Production Costs

- **Historical retail cannabis price was ~\$10+ per gram**
- **Could production cost fall to ~\$10 per pound?**
 - Cannabis yields ~1,000+ pounds per acre
 - Production cost for tomatoes is \$10,000 per acre
 - That'd be ~\$0.02 per gm, or ~\$0.01 - \$0.02 per joint

Long-run profitability requires getting consumers to pay much more than it costs to produce the product. Parallels with Starbucks & bottled water.

Observation (Guess) #2: High Potency Is At Lower End of Top 10 List of Legalization's Dangers

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Public Health Message RE Policy Choice #1 & Potency

- “Among the 137.2* complicated factors the political process is considering when deciding (in a smoke-filled back room) whether to legalize cannabis supply, please try to remember that one of the myriad consequences will be greater availability and use of higher-potency forms of cannabis.”

*Yes, I know that 83.74% of all statistics are made up.

But you should know that even if we say “pretty please with sugar on top”, the risk of high-potency products will be far down the priority list in legalization debates, well below tax revenue, job creation, social equity, etc.

Observation #3: There Are (Understandable) Limitations of the Literature

- **Correlation does not establish causality**
 - That those who consume high-potency products suffer worse outcomes says little (nothing?) about dangers of those products
- **Hard to disentangle effects of high potency from effects of ...**
 - (Massive) decline in the cost per milligram of THC
 - Mode of administration
 - Total dose of THC reaching bloodstream
- **Titration research focuses on use-session, not career of use**
- **Policy recommendations rarely consider the dynamic/strategic response of industry**

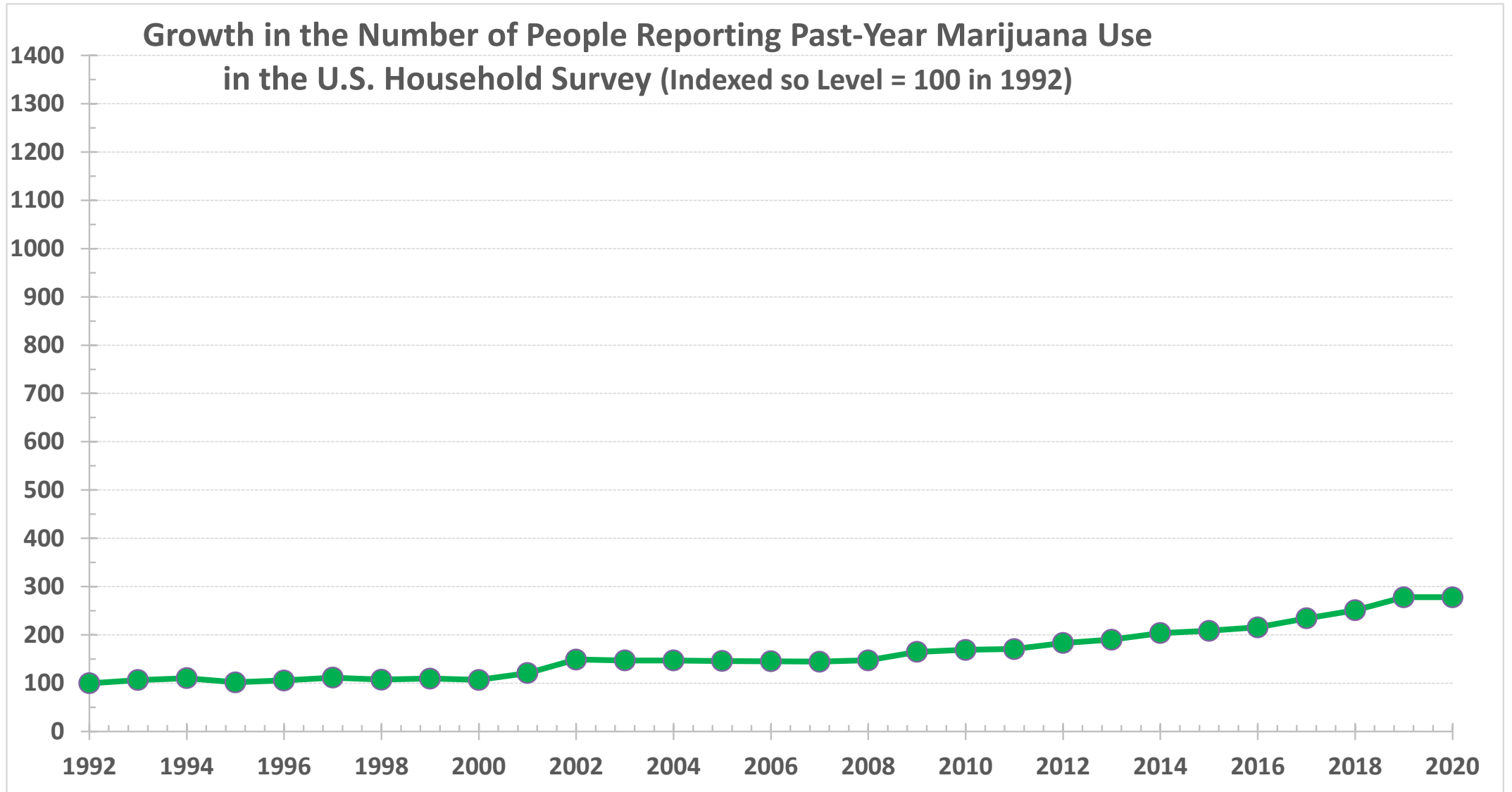
Recognition of Complexity

- **Imagine two hypothetical markets. Which is worse?**
 - \$20 per gram for 20% THC flower (10 cents / milligram of THC)
 - \$4.50 per gram for 15% THC (3 cents / milligram)
- **Not just THC?**
 - Carcinogens, tars, etc.
 - THC/CBD ratios
 - “Entourage effects”
 - Terpenes?

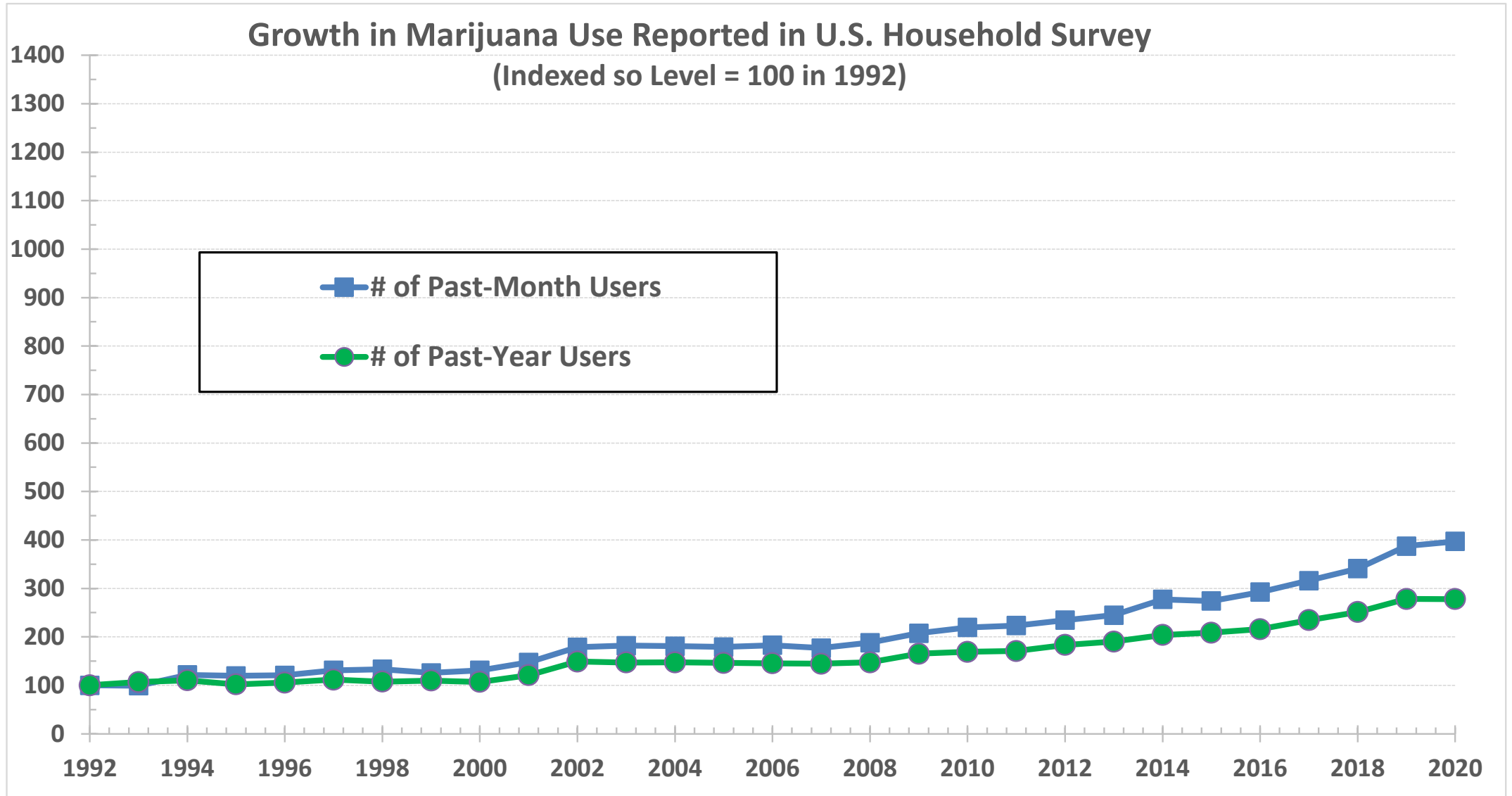
Observation #4: Frequency and Intensity (Dose) May Matter As Much As Potency?

- **Daily use has become dominant**
 - Roughly 80% of consumption is by daily or near-daily users
- **Most cannabis is now consumed by people consuming far more THC per day than the typical user did in the 20th century**
 - Note intentional double contrast
 - Now vs. then
 - Typical gram of cannabis vs. typical user

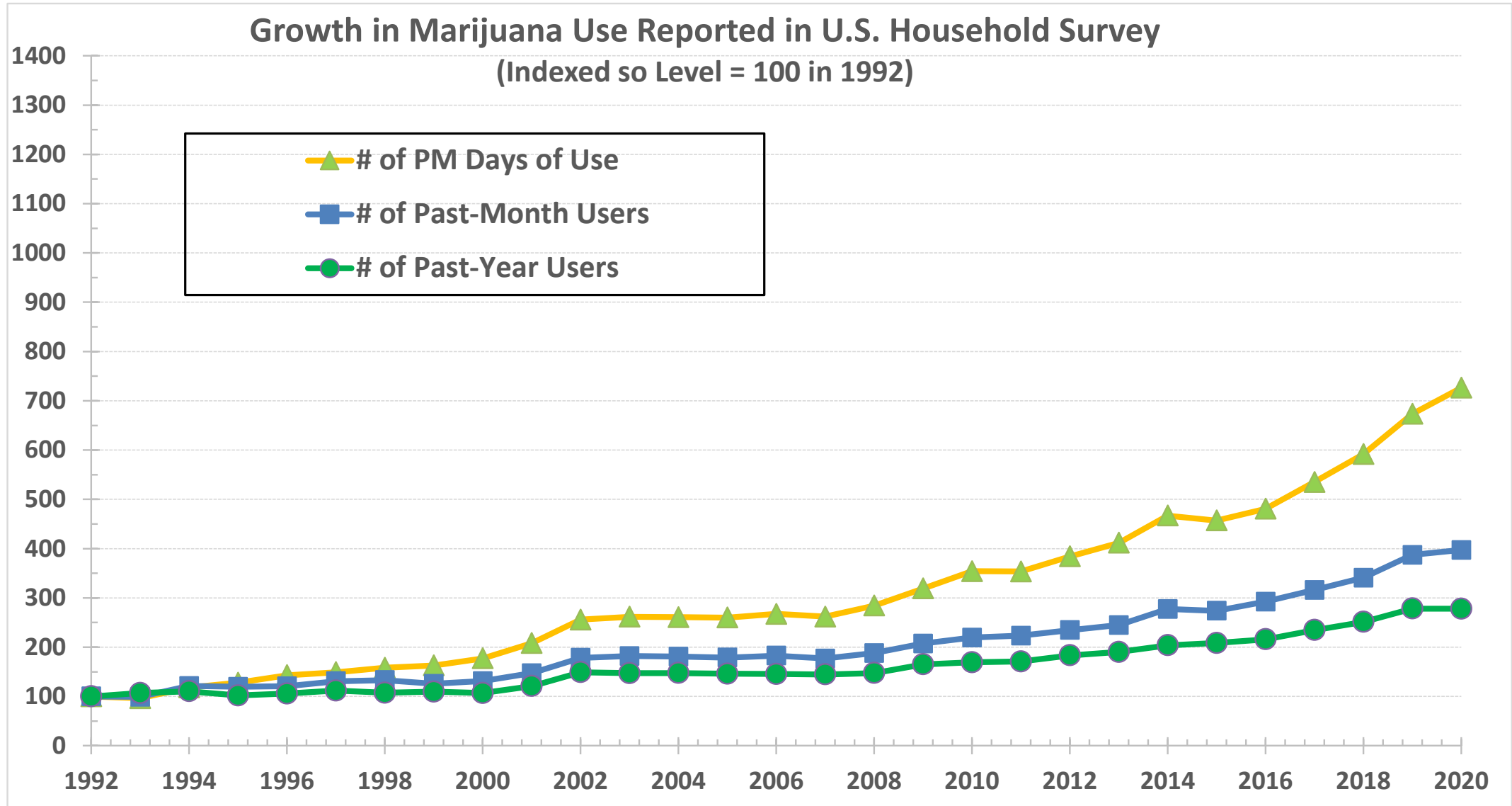
Since 1992 The Number Reporting Marijuana Use in the Past-Year to NSDUH Has Nearly Tripled



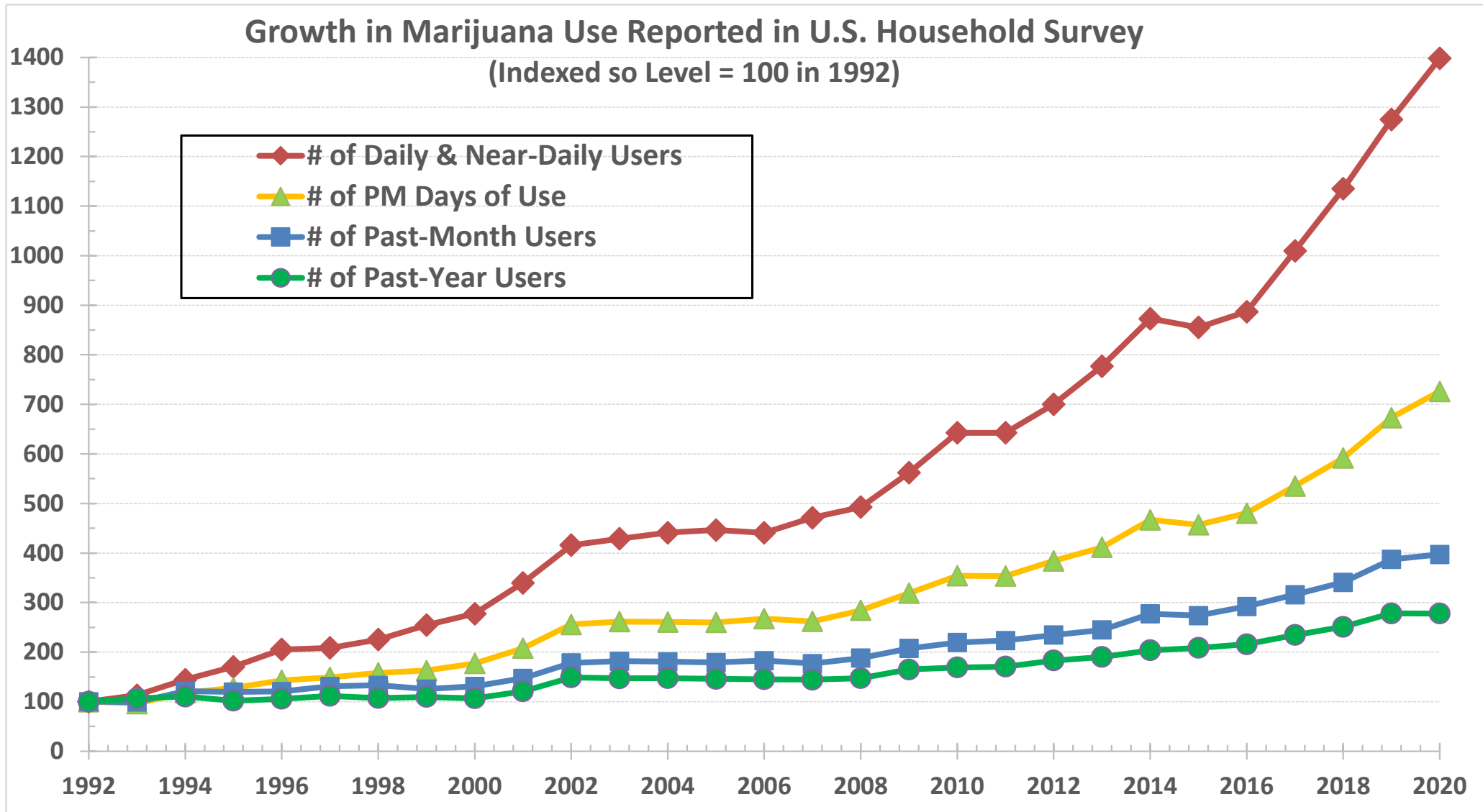
The Number of “Current” (Past-Month) Users Has Quadrupled



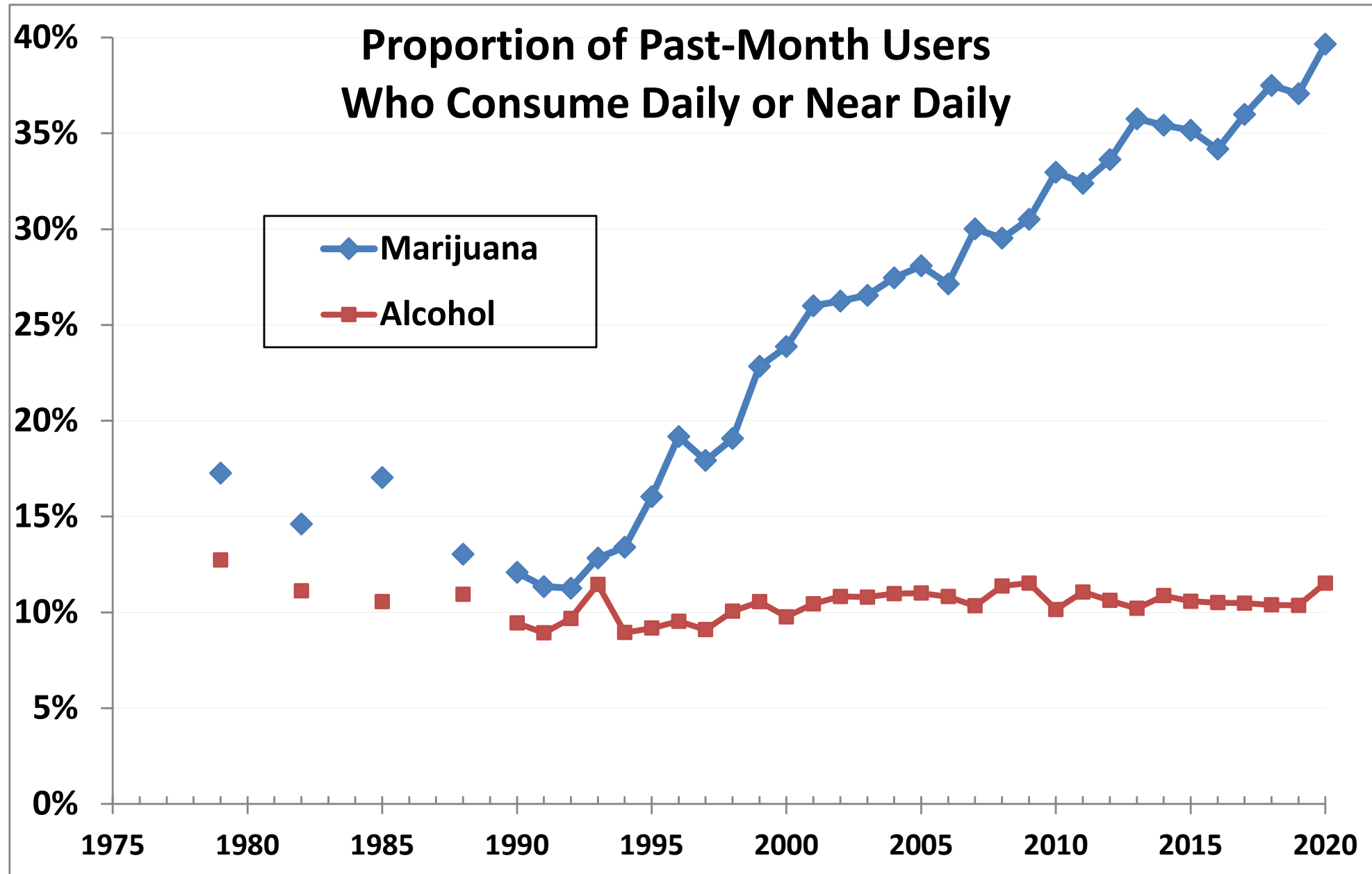
Days of Use Reported Has Increased Sevenfold (to 6 Billion per Year)



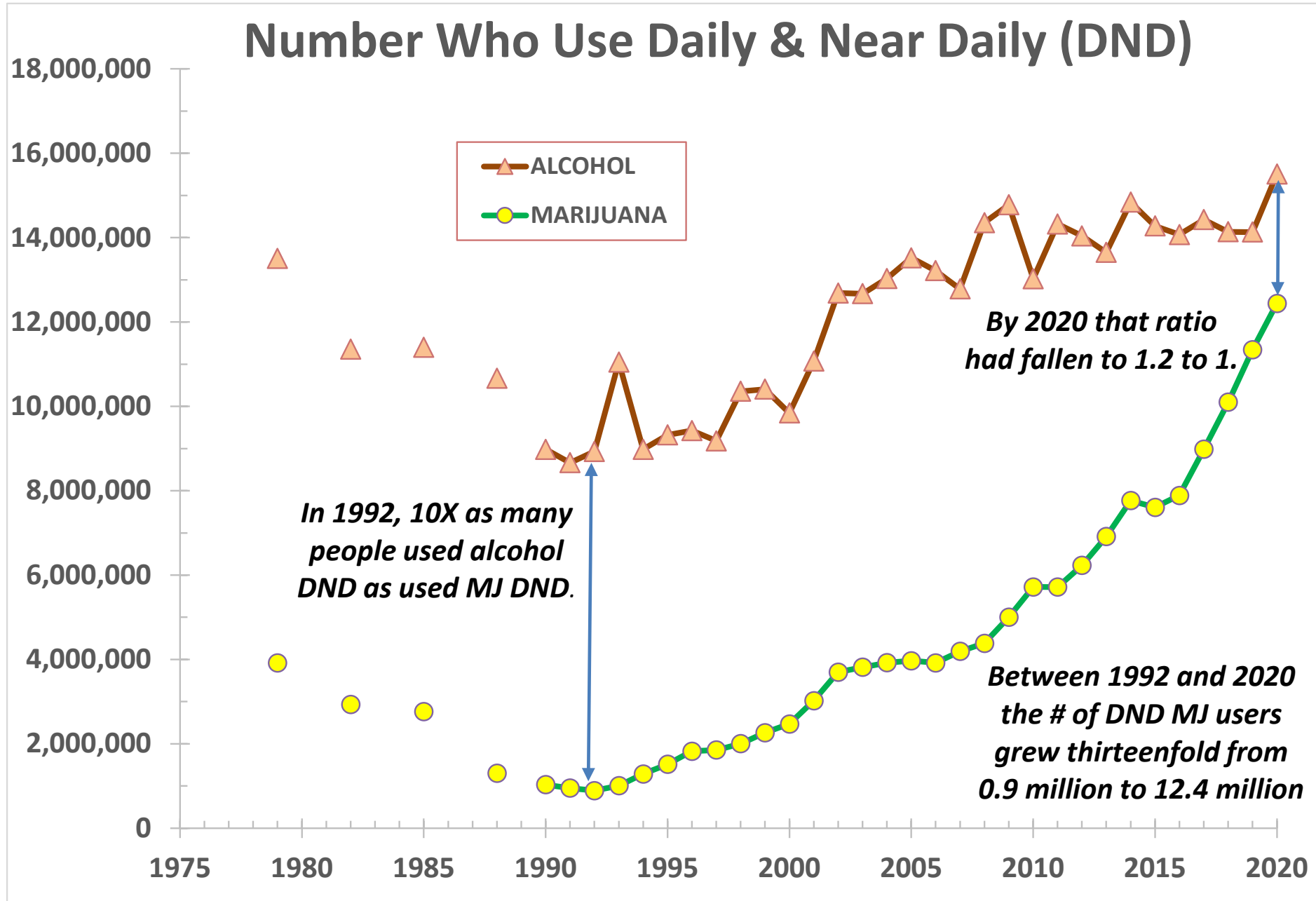
The Number Using Daily or Near-Daily Has Grown Fourteenfold from 0.9 to 12.4 Million



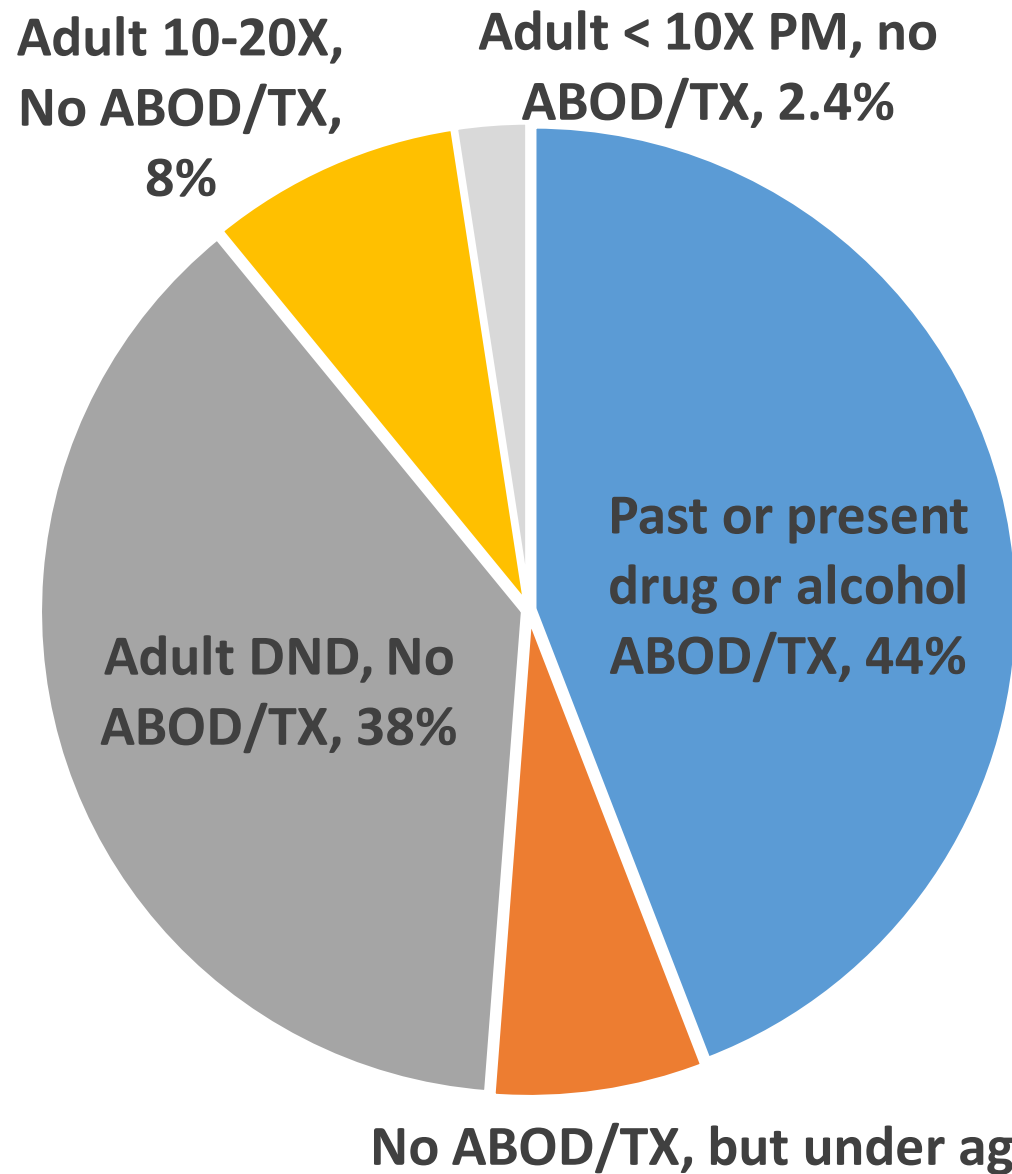
DND Cannabis Use is Relatively New



High-Frequency Use Approaching that of Alcohol



Heavy Users Dominate Consumption



In 2016, adults with no substance abuse or dependence (ABOD) issues and using fewer than 10X in past month (PM) accounted for only 2.4% of consumption.

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Contrast THC Consumption of Two Types of Users

- 1 joint each weekend night, pre-2000
 - Assuming 0.4 gms/joint, 4% THC
 - $(2/7) * 0.4 * 4\% = 4.6$ milligrams/day
- Average daily user in today
 - Assuming 1.6 gms/day, 20% THC
 - $1.6 * 20\% = 320$ milligrams/day
- That's ~70 times as much THC

Contrast **Cocaine** Consumption of Two Types of Users

- 1 cup of coca tea per day
 - 1 cup of tea contains 5 milligrams, most of it gets into water. **4.2 milligrams/day**
- Chronic cocaine user in 2005
 - Dividing 327 (pure) MT market total by 3.1 M chronic users implies less than **290 milligrams/day** (light users used some)
- **That's ~70 times as much cocaine**

Contrast **Caffeine** Consumption of Two Types of Users

- One 20-ounce bottle of Diet Coke
 - **76 milligrams**
- To get ~70 times as much caffeine need to ...
- Drink **35** grande Starbucks cappuccinos
 - Containing **5,320 milligrams**
 - Some guess lethal dose is 5-10,000 mgs

Contrast **Blueberry** Consumption of Two Types of Users

- One-sixth of a pint of blueberries
 - **Result: Happiness**
- 10 pints of blueberries
 - **Result: Stomachache**

Observation #5: Focus on Potency Feels “Convenient”

- **Few people are willing to say “daily cannabis use is not healthy”**
- **Politically palatable “compromise” #1: worry about youth**
 - E.g., “Among the critics' concerns is the worry that, despite age limits, legalization might make marijuana more accessible to young people. And adolescents' developing brains may be particularly vulnerable to lasting damage from the drug.”
- **Politically palatable compromise #2?**
 - Demonize high-potency products, but not frequent/heavy use

What is the Policy Choice We Seek to Inform?

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Will Banning (or Taxing Very Heavily) A Subset of Cannabis Products Create a Black Market?

- **A black market will exist if ...**
 - Illegal suppliers can make money selling their products at a price that consumers prefer relative to the legal price for legal alternatives.
- **That depends on ...**
 - Size of “enforcement tax” government imposes on illegal suppliers
 - Whether illegal suppliers can achieve economies of scale
 - Whether illegal supply is produced or merely diverted
 - Whether legal alternatives are close substitutes

Consider Three Scenarios

- **U.S. bans all vaping products nationwide**
 - Reasonable risk that illegal market would supply those products and, if it did, that would involve “real” drug trafficking from abroad.
- **WA bans vaping product, but OR sells openly**
 - Would probably see purchases across state lines, but mostly informal, not organized crime
 - Akin to (informal) smuggling of fireworks
- **WA bans flower with > 25% potency**
 - Most might view 20% potent flower as good enough; no illegal market

Key Tradeoff When Contemplating Product Bans

		Public Health Benefit		
		Low	Medium	High
Risk of Illegal Markets	Low	WA bans >25% THC flower		Are there options in the upper right?
	Medium		WA bans all vaping products (but OR sells them)	
	High			US bans all vaping products

Examples of Consumer Product Bans

- **Lawn mowers without a “dead man’s switch”**
 - In 1982, CFR Title 16, Part 1205 required walk-behind rotary mowers to have blade control systems. Incremental cost of ~\$35 per mower did not create an illegal market
- **Ferrero’s Kinder Surprise candy**
 - FDA bans candy that contains a “non-nutritive object”
- **Regulations on Class 1.4G (“safe and sane”) fireworks**
 - U.S. 1966 Child Protection Act & subsequent regs limited Class 1.4G explosives to 50 milligrams of powder (vs. up to 3,000 mgs before), mandated fuse times of between 3 and 9 seconds, and banned some items (cherry bombs, M-80s, etc.)



Drug & Alcohol Examples

- **Absinthe (various countries; U.S. from 1912-2007)**
 - Might have been useless, but the ban “worked”
- **Cuban cigars**
 - Banned in 1962 by JFK. Lifted by President Obama. Reimposed.
- **2010 ban on caffeinated alcohol drinks**
 - Worked, but various DIY workarounds (“rum and coke”)
- **FSPTCA led to FDA’s 2009 ban on flavored cigarettes**
 - Evidence of reduced use found by Courtemanche et al. (2014) with National Youth Tobacco Use data & Rossheim et al. (2020) with NSDUH data
- **Extension of that ban to menthol cigarettes? Nicotine cigarettes?**

More Examples

- **Lawn darts were banned by CPSC in 1988**

- YouTube has videos on DIY manufacture



- **1987 Montreal Protocol banning chlorofluorocarbons**

- Generally deemed a success despite the resulting black market

- **Other**

- Weapons: Switchblades, bump stocks, brass knuckles, butterfly knives

- Endangered species: Shark fin soup, Beluga caviar, foie gras in CA, ivory

- Food: Haggis, ackee fruit, raw milk, horse meat

- Gambling

Summary

Public Health Benefit

Risk of Illegal Markets

	Low	Medium	High
Low	WA bans >25% THC flower		
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High			US bans all vaping products

IMHO Should experiment with low-risk, low-reward bans. Lots of product bans have been wins despite risk of evasion. But OR limits what WA can do.