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Memorandum

To: Nolan Langweil, Graham Campbell, Legislative Joint Fiscal Office
From: Tom Kavet
CC: Steve Klein, Legislative Joint Fiscal Office
Date: February 18, 2019
Re: Fiscal Impacts of Raising the Minimum Legal Age for Purchase of Tobacco Products to 21

Per your request, I have reviewed potential fiscal impacts associated with the proposal to raise the minimum legal age for purchase of tobacco products and their substitutes from age 18 to 21, effective July 1, 2019.

It should be noted that the statistical data upon which current Vermont tobacco product consumption by age may be estimated is highly uncertain. Of even greater uncertainty, is the degree of avoidance that may be likely with any given enforcement regimen. The prohibition of a highly addictive substance that has heretofore been legal for a given age cohort will be extremely difficult to enforce, especially with the relatively weak provisions in the currently proposed legislation. As a result of this, the revenue losses are likely to be very small, with the health benefits diminished accordingly.

Despite claims by some, there is no simple, statistically-valid basis for a state loss of revenue point estimate from the proposed change. There are no state-level, single age data for cigarette or tobacco products consumption. Most analyses of consumption reductions associated with changes in the minimum purchase age derive from national surveys regarding smoking prevalence and intensity. Some of the surveys are sufficiently large to generate meaningful data regarding initiation rates, use rates and measures of use intensity at the national level that should correlate with consumption, however, usage by expenditure, physical volume and detailed regional geography are rare.

One of the most widely-quoted sources of expected revenue decline associated with raising the minimum purchase age is a 398 page tome by the Institute of Medicine of the National Academies, published in 2015.¹ While it presents a strong case for the health benefits of raising the minimum purchase age, the estimates of consumption changes are highly subjective and far into the future. This study is widely quoted as projecting a 12% decline in overall smoking prevalence, relative to a baseline reduction, if the minimum smoking age were to be raised to 21, however, this decline (actually 11.2% to 12.0%) is projected for the year 2100, 85 years beyond the study date.

¹ Entitled, "Public Health Implications of Raising the Minimum Age of Legal Access to Tobacco Products", 2015, The National Academies Press. This study is also cited in Finding number 8, page 2, of the proposed Vermont legislation.

Although this estimate is based on two rigorous simulation models that factor smoking initiation rates, population changes and prevalence rates over time, critical model inputs were entirely subjective, based on “small,” “medium” or “large” expected behavioral changes by a panel of experts. These qualitative assessments were then assigned quantitative values along with subjective value ranges (5%-10% for small, 15%-20% for medium and 25%-30% for large) for various component changes from which the models would estimate longer term impacts. These data are summarized in Tables 7-3 and 7-4 from this publication on the following two pages.

Of note, these model inputs assume higher relative consumption losses in the 15 to 17 year old cohorts (large) than the 18-20 year old cohorts (medium), due to very low expected compliance among the latter group. The rationale behind this is that the more limited mobility and lower-age social circles of 15 to 17 year olds will make it more difficult to obtain tobacco products illegally than among older cohorts.

Two Vermont-specific issues missed in most national analyses, are the share of population ages 18-20 and the ease of purchase in nearby political jurisdictions with lower tobacco product taxes and/or lower minimum legal purchase ages, especially New Hampshire.

Despite having the third oldest population in the nation, with a median age of 42.9 (only lower than New Hampshire and Maine), Vermont has the highest share of 18-20 year olds in the nation (see chart on page 5). Due to the State’s large higher education sector, relative to total population, 5.0% of all residents are ages 18-20, versus a U.S. average of 3.9%.² This makes this component of the Vermont tobacco products market proportionately larger than any other state.

Cross-border sales are also a much more critical issue in Vermont than in states with large geographic territories and/or population centers that are far from competing political jurisdictions. Some of the lost tax revenue will not be due to lower consumption, but from purchases made out-of-state (see chart on page 7 for relative cigarette prices in Vermont border states). With 29 bridges across the Connecticut River and less than a 2 hour drive from almost anywhere in Vermont, the State already loses an estimated 10% to 20% of all cigarette sales to New Hampshire. These out-of-state purchases result in no health benefits to individuals or the State - and less tax revenue.

As a result of this, we have constructed a series of models that incorporate national single age (from 12 to 25) and 5 year cohorts (from ages 26 to 65+) propensities³ to purchase cigarettes and tobacco products and applied these to single age Vermont population estimates to derive maximum sales and revenue losses. We have then applied subjective

² In 2017, the latest available year for single age population estimates, according to the U.S. Census Bureau

³ These are based on the Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2017, estimates, and include both cigarette, smokeless and other tobacco products usage rates adjusted for intensity (daily use and more than one pack per day for cigarettes), by age. This also includes slightly higher “rebound” usage at age 21. It should also be noted that some studies, including those cited in footnote #6, have shown that raising the MLSA for e-cigarettes may slightly increase illegal cigarette consumption, providing a small net revenue offset.

TABLE 7-3 Committee Inputs to the Model for Each MLA Policy Option with Qualitative Descriptors, Numeric Estimates, and Upper and Lower Range Estimates

	MLA 19		MLA 21		MLA 25	
	Qualitative Descriptor and Numeric Estimate	Upper and Lower Estimates ^d	Qualitative Descriptor and Numeric Estimate	Upper and Lower Estimates ^d	Qualitative Descriptor and Numeric Estimate	Upper and Lower Estimates ^d
Change in Initiation						
Reduction in initiation for adolescents under age 15	small (5%)	(4.2%, 6%)	medium (15%)	(12.5%, 18%)	medium (15%)	(10.7%, 21%)
Reduction in initiation for adolescents ages 15–17	small (10%)	(8.3%, 12%)	large (25%)	(20.8%, 30%)	large (30%)	(21.4%, 42%)
Reduction in initiation for young adults age 18	small (10%)	(8.3%, 12%)	medium (15%)	(12.5%, 18%)	medium (20%)	(14.3%, 28%)
Reduction in initiation for young adults ages 19–20	n/a	n/a	medium (15%)	(12.5%, 18%)	medium (20%)	(14.3%, 28%)
Reduction in initiation for young adults ages 21–24	n/a	n/a	n/a	n/a	small (5%)	(3.6%, 7%)
Rebound	small (5%)	(4.2%, 6%)	small (5%)	(4.2%, 6%)	none (0%)	n/a
Duration of rebound (in number of years)	2	n/a	2	n/a	0	n/a

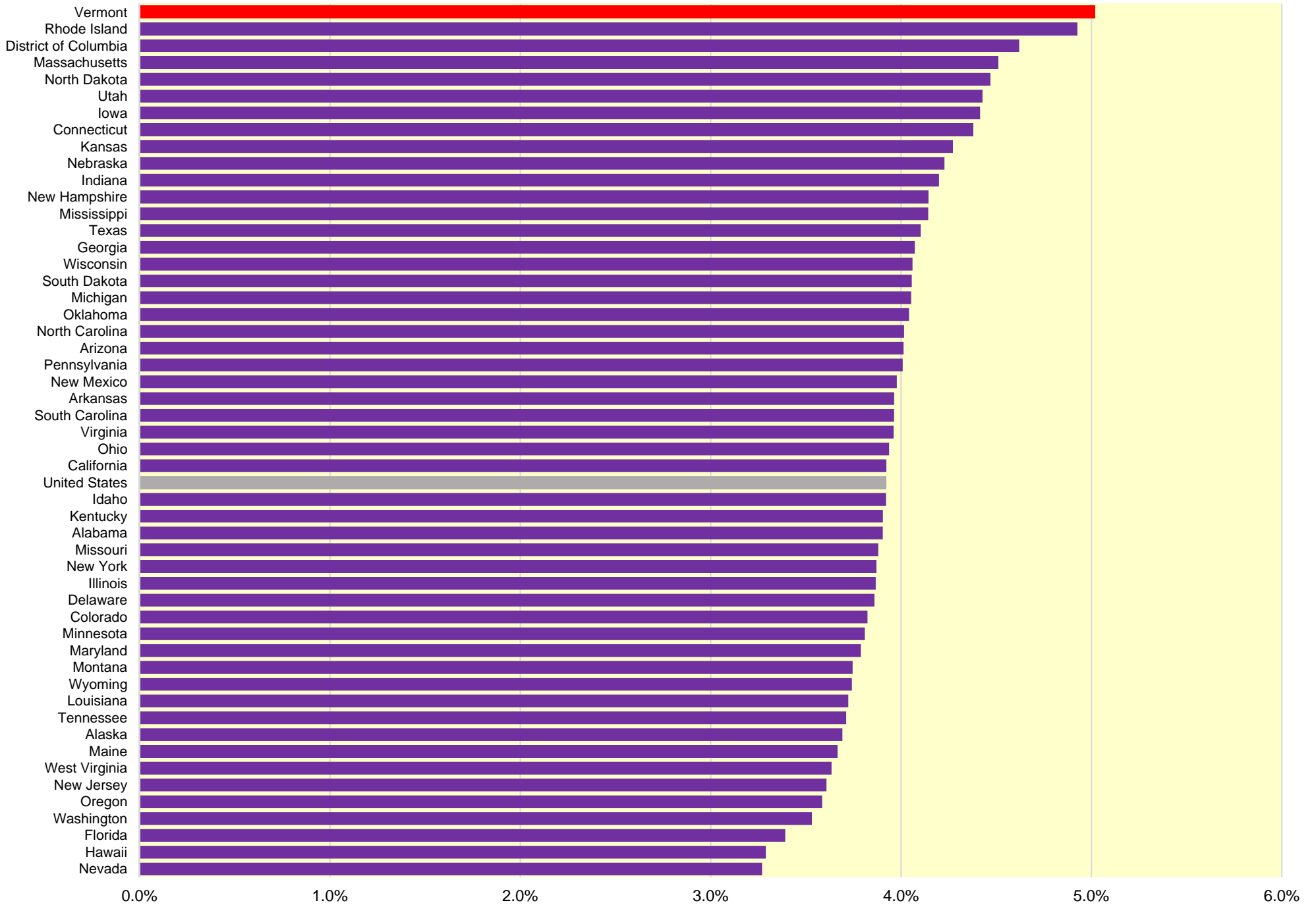
^a Upper and lower estimates reflect the uncertainty ranges, with a smaller range (1.2) for MLA 19 and MLA 21, and a larger range (1.4) for MLA 25. The mid-estimate is treated as a geometric mean, not an arithmetic mean, thus, upper estimates are calculated as 1.2(x) and lower estimates as x/1.2 for MLA 19 and MLA 21 and as 1.4(x) and x/1.4 for MLA 25, resulting in slightly nonsymmetric ranges around the mid-estimates. These ranges do not represent bounds or a measure of uncertainty in a classical statistical sense. Rather, these values reflect ranges that the committee deemed plausible as described in the text.

TABLE 7-4 Adult (18+) Smoking Prevalence (%) and Percentage (%) Reduction for Selected Years for the Mid-Estimates of Initiation Inputs from Table 7-3 (lower and upper estimate results shown in parentheses)

MLA/Outcome	2020	2040	2060	2080	2100
SQ (status quo)					
SimSmoke prevalence	15.7	13.1	12.7	12.7	12.7
CISNET prevalence	15.2	10.4	9.1	8.8	8.7
MLA 19					
SimSmoke prevalence	15.7	12.9	12.4	12.3	12.3
reduction versus SQ	0.4% (0.2, 0.6)	1.8% (1.3, 2.4)	2.7% (1.9, 3.5)	3.0% (2.1, 3.9)	3.0% (2.1, 3.9)
CISNET prevalence	15.2	10.2	8.8	8.5	8.4
reduction versus SQ	0.2% (0.14, 0.21)	1.8% (1.5, 2.3)	2.9% (2.4, 3.8)	3.3% (2.7, 4.3)	3.3% (2.7, 4.3)
MLA 21					
SimSmoke prevalence	15.4	12.2	11.4	11.3	11.2
reduction versus SQ	2.0% (1.5, 2.4)	8.3% (5.8, 8.9)	10.3% (8.3, 12.7)	11.2% (9.0, 13.7)	11.2% (9.0, 13.7)
CISNET prevalence	15.1	9.7	8.1	7.8	7.7
reduction versus SQ	0.4% (0.37, 0.53)	6.4% (5.4, 8.8)	10.6% (8.8, 12.9)	11.9% (9.9, 14.5)	12.0% (10.0, 14.7)
MLA 25					
SimSmoke prevalence	15.2	11.7	10.8	10.7	10.7
reduction versus SQ	3.4% (2.9, 4.8)	10.8% (9.2, 15.2)	14.8% (12.6, 20.9)	15.8% (13.4, 22.3)	15.8% (13.4, 22.3)
CISNET prevalence	15.1	9.5	7.8	7.4	7.3
reduction versus SQ	0.5% (0.36, 0.71)	8.3% (5.9, 11.7)	13.8% (9.8, 19.4)	15.6% (11.1, 21.9)	15.7% (11.2, 22.1)

Share of Total Population Ages 18 to 20 Years Old

(Source: 2017, U.S. Bureau of the Census)



compliance factors based on related studies,⁴ of 50% for those ages 12-17 and 15% for those ages 18-20, to derive initial revenue loss estimates.

Whereas revenue losses could exceed \$2 million per year with near-complete compliance, we expect revenue losses of only about \$400K to \$500K in fiscal year 2020, with losses diminishing slightly in subsequent years as overall tobacco products usage continues to decline across almost all age cohorts.

These estimates do not include losses from e-cigarette taxation currently contemplated. Because this product class is disproportionately purchased by lower age cohorts, relative to tobacco products, the revenue loss will be a much higher percentage of sales, possibly as much as 10%.⁵ Based on preliminary JFO estimates of about \$1M per year in potential e-cigarette revenues, and using higher compliance factors (75% for those 12-17 years old and 35% for those 18-20) than other tobacco products due to the smaller size of the secondary market for e-cigarettes,⁶ losses from the proposed e-cigarette tax associated with raising the minimum purchase age to 21 would probably be about \$50K, with a maximum loss of about \$110K per year.

Although this analysis was not tasked with estimating the fiscal impacts associated with improved health outcomes as a result of the proposed MLAS change, they could be substantial. Depending upon how these improvements are monetized, there could be significant beneficial fiscal flows that far outweigh the revenue reductions outlined herein.

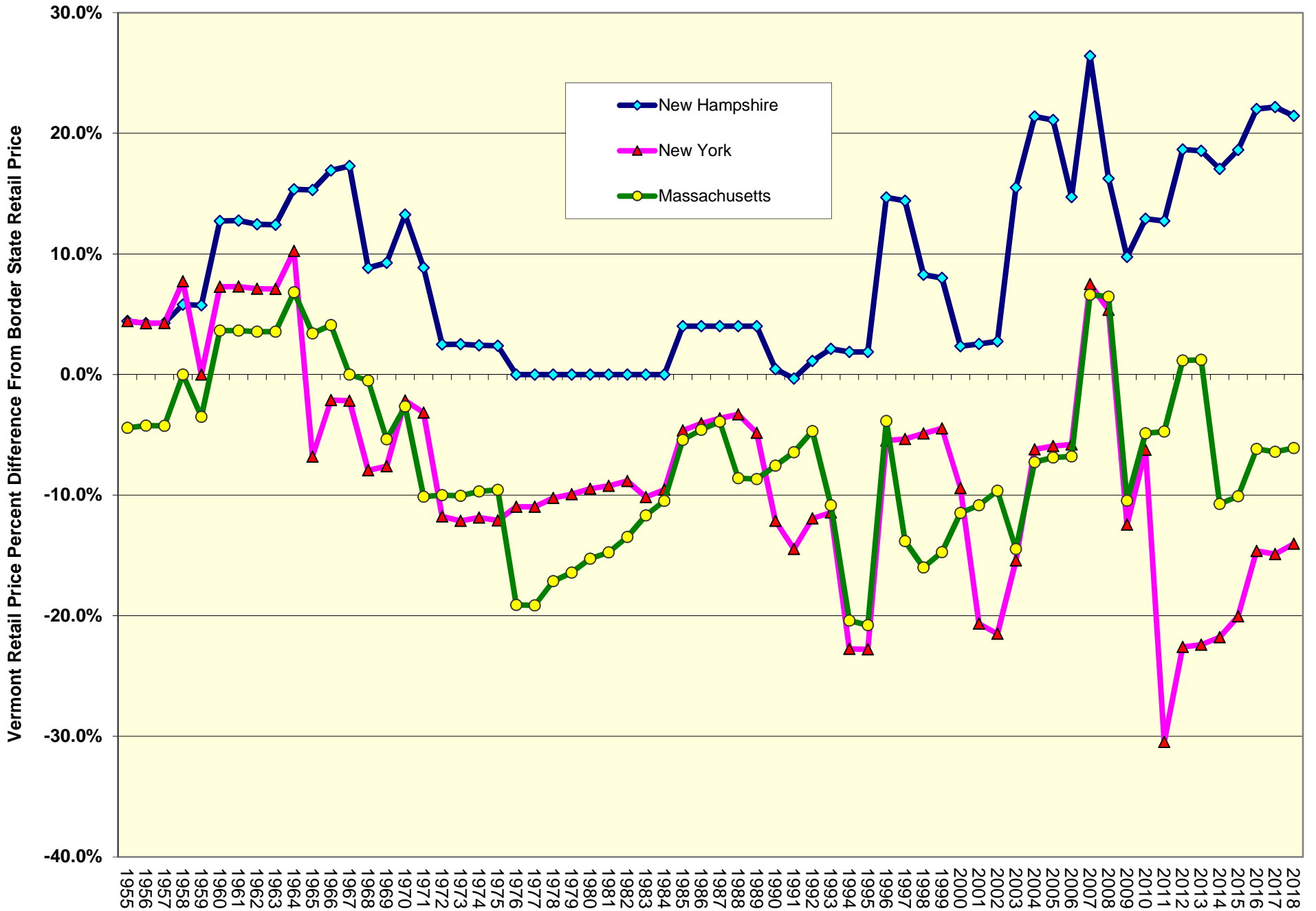
⁴ This is assumed in the prior-referenced IMNA study and related models estimating lagged consumption effects, as well as in: "Price, Tobacco Control Policies and Youth Smoking" NBER Working Paper 5740, Chaloupka and Grossman, 1996.; "Sources of Tobacco for Youths in Communities With Strong Enforcement of Youth Access Laws," Tobacco Control 2001;10, pages 323-328, DiFranza and Coleman, 2001; and "Do Minimum Legal Tobacco Purchase Age Laws Work?," Contemporary Economic Policy, pages 415-429, Yoruk and Yoruk, 2015.

⁵ Based on the same propensity to consume analysis based on 2017 SAMHSA NSDUH survey data on smokeless products.

⁶ See: "Electronic Cigarette Use Among Adults: United States, 2014," NCHS Data Brief No. 217, Schoenborn and Gindi, October 2015, which suggests that the secondary market for e-cigarettes may be considerably smaller than that for cigarettes, due to the much lower prevalence of vaping among adults, estimated at 3.7% in 2014 (and which we estimate at about 3.1% in 2017 using NSDUH survey data, versus 18.6% for cigarettes); and a recent June 2018 NBER Working Paper (#23313), "The Effects of E-Cigarette Minimum Legal Sale Age Laws on Youth Substance Abuse", by Dave, Feng and Pesko.

Border State Cigarette Price Differentials Relative to Vermont

(Cigarette Price Differentials Relative to Vermont - Expressed as a Percentage of Retail Price)



Source: Orzechowski and Walker, Vermont Joint Fiscal Office