Investigating the Impact of Advertising on Smoking Cessation: The Role of DTC Prescription Drug Advertising

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Disclosure

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- Further, at no times have the authors of this work received funding from sources including (but not limited to) tobacco companies, pharmaceutical companies, advocacy groups, consulting firms, etc.
- Researcher(s)' own analyses calculated (or derived) based in part on (i) retail measurement/consumer data from Nielsen Consumer LLC (``NielsenIQ''); (ii) media data from The Nielsen Company (US), LLC (``Nielsen''); and (iii) marketing databases provided through the respective NielsenIQ and the Nielsen Datasets at the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business. The conclusions drawn from the NielsenIQ and Nielsen data are those of the researcher(s) and do not reflect the views of Nielsen. Nielsen is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported herein.

Outline

1. Introduction and related literature
2. Data
3. Empirical analysis
4. Role of insurance
5. Conclusion

Introduction

Cigarette Smoking is a significant public health challenge

- Approximately half a million annual deaths are attributed to tobacco-related illnesses (CDC 2023)
- Direct economic cost exceeding $225 billion annually (Shrestha et al., 2022)

A range of smoking cessation products have emerged

- 7 FDA-approved:
  - Five types of Nicotine Replacement Therapies (NRTs)
  - Two non-nicotine prescription medications

    Chantix/Varenicline and Bupropion
- Electronic cigarettes

Introduction (cont.)

Goal:

How does advertising smoking cessation products influence consumer behavior and cigarette sales?

While there is extensive research on the clinical efficacy of smoking cessation products in clinical trials, we focus on a related but distinct question.

- How effective *advertising* these products are
- Rather than investigating the effect of *using* them

Why advertising?

Medical literature

- Prescription drugs are more effective than OTC options (Aubin et al., 2008; Taylor et al., 2017)

Advertising might have different effects because access to these products is different

- Prescription drugs vs OTC products

Some of these products could act as both:

- Complements
  - Co-prescription of NRTs and prescription drugs
- Substitutes
  - Consumers can opt for NRTs because of *easier access*

These spillover, substitution, and complementarity effects highlight the complexity of advertising's role in the smoking cessation market.

What could happen in response to advertising?

Direct-to-consumer advertising (DTCA) for prescription drugs like Chantix can

- Reduce cigarette consumption for people who can obtain prescriptions
- Barriers like insurance coverage and prescription requirements can push consumers to more accessible products

Advertising For NRTs

- While promoting over-the-counter cessation aid
- It might reduce the likelihood of seeking more effective prescription options

Research Questions

1. How does advertising for various smoking cessation products affect consumer demand across multiple categories?
   - DTCA for prescription drugs: Affects drug consumption and is the most effective in reducing cigarette sales
   - Various spillover effects beyond advertised products
2. What is the role of insurance coverage on the effectiveness of advertising?

Approach

- Combine claims, retail, advertising and detailing data from the 2011-2019 period to measure how advertising affects tobacco users' choices

Tobacco-related products

Product	Description	Types	Can Advertise on TV
Cigarettes	Combustible cigarettes	Various types and brands	No
ENDS	Electronic Nicotine Delivery Systems as alternatives to traditional cigarettes and cessation aid	Disposable e-cigarettes, Vapes, Cartridges	Yes
NRTs	Nicotine Replacement Therapies provide small doses of nicotine to help smokers quit	Patches, Lozenges, Gums, Nasal sprays, Oral inhalers	Yes
Prescription Drugs	Substances that require a prescription and affect the brain and mind to reduce craving and withdrawal symptoms	Varenicline (Chantix), Bupropion (Zyban)	Yes

Table 1: Overview of Smoking-Related Product

Broader Related literature (Illustrative not comprehensive)

- **Tobacco marketing**
  - Avery (2007); Wang et al. (2016); Tuchman (2019); Goli and Chintagunta (2021); Wang, Lewis, Singh (2021); Cotti et al. (2022); Goli et al. (2023).
- **DTC prescription drug advertising**
  - Narayanan et al. (2004); Wosinska (2005); Liu et al. (2017); Shapiro (2018); Ling, Berndt, and Kyle (2002); Kim and KC (2020); Kim et al. (2016), Shapiro (2022).
- **Advertising spillover effects**
  - Anderson and Simester (2013); Sahni (2016); Chae et al. (2017); Shapiro (2018); Shapiro et al. (2021)

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Data

Nine years worth of data: 2011-2019

- **Advertising exposure:** Nielsen AdIntel
- **Detailing:** Open Payments Database from the Centers for Medicare and Medicaid Services (CMS) August 2013-December 2019
- **Retail sales:** NielsenIQ Retail Measurement Service (RMS)
- **Claims data:** Merative MarketScan Commercial Database
- **Insurance coverage:** Public Use Microdata Sample (PUMS)

TV Advertising Data

- **Data for each advertising occurrence**
- **210 DMAs (Designated Market Areas)**
  - 131 Full Discovery Markets
- **Impression estimates at occurrence-DMA level**
- **Advertisers can purchase ads at**
  - National level
  - More narrowly at the local level (spot)

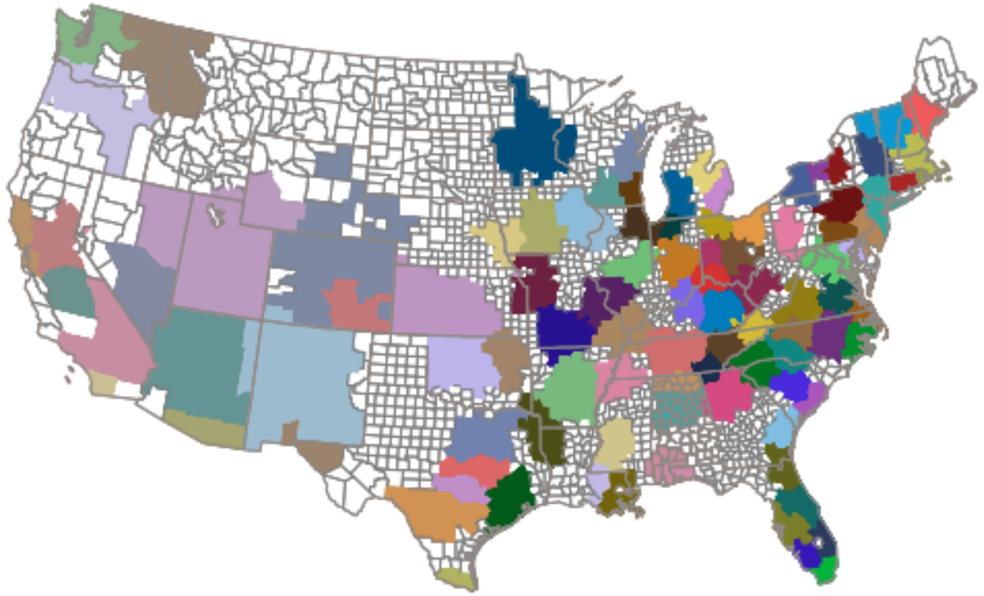


Figure 1: Top 100 DMAs (Tuchman 2019)

Advertising Exposures

- **Occurrence-DMA level**
- **Measure of impressions**
  - Gross Rating Points (GRP)

$$a_{\mathrm{D}t,c} = 100 \times \frac{\sum_{o \in \mathcal{O}_{\mathrm{D}t,c}} \text{number of viewing households}_{o\mathrm{D}t}}{\text{total number of households}_{\mathrm{D}t}}$$

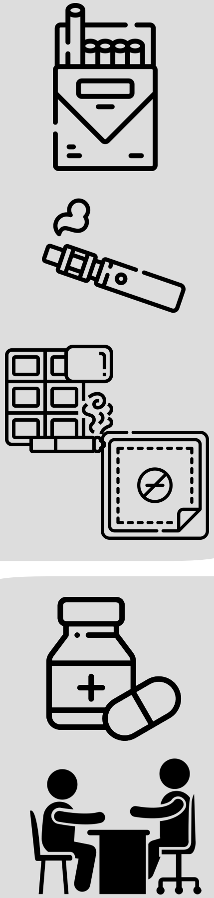
Category	Brand	Mean	Std
Prescription drugs	Chantix	51.8737	50.7936
NRTs	Nicorette	39.7357	52.0753
	Nicoderm	39.4228	60.3115
	Other	0.2113	4.8124
PSA	-	4.7171	34.4931
E-Cigarette	JUUL	0.4472	2.5555
	BLU	0.4047	4.1642
	VUSE	0.2969	6.1764
	EZSmoker	0.2758	3.7633
	CUE	0.2560	4.0379
	Other	0.6565	5.5836

Table 2: Summary statistics of weekly DMA-level GRP over the period of study (2010-2019)

Retail Demand & Healthcare Outcomes

Retail

- NielsenIQ Retail Measurement Service (**RMS**)
  - Prices, quantity sold, feature, and display at the UPC-week level
- Consider the demand for three categories of products:
  - Cigarettes
  - E-cigarettes
  - Over-the-Counter NRTs



Healthcare Outcomes

- **Marketscan**: Individual-level medical
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a (MSA) level
iption records
  - Outpatient visits for mental health and substance abuse

Outline

Empirical Approach

Using geographic variation in occurrences and impressions of ads to estimate the causal effect of different forms of advertising on tobacco-related products and outcomes

Endogeneity concern

- Firms advertise more in markets where lift (from ads) might be higher
- Spurious correlation between local smoking prevalence and trends

Empirical Approach: Identification

Coarse Targeting

- Approximately 80% of television advertising is purchased in “upfront” markets annually in the spring, well before the advertisements are broadcast
- The remaining advertising slots are offered through the “scatter” market, enabling advertisers to purchase inventory closer to the air date, either monthly or quarterly, albeit at higher prices. (Lotz, 2007, Hristakeva and Mortimer, 2023)

Sampling Frequency (Rossi 2018)

- Use weekly data while advertising decisions are typically made annually or quarterly.

High-dimensional fixed effects

- To absorb the impact of confounds (Shapiro et al., 2021)

Validate the results using the **border method strategy** (Shapiro 2018, Wang et al., 2018; Tuchman, 2019)

When applicable, use **placebo regressions** to show that the effect is limited to relevant outcomes

Estimation for healthcare outcomes

$$\log(O_{mt} + 1) = \boldsymbol{\beta}^\top \log(\boldsymbol{A}_{\mathsf{D}_m t} + 1) + \gamma_{mY(t)} + \gamma_{\mathsf{S}(t)} + \gamma_{\mathsf{T}(t)} + \epsilon_{mt}$$

Left

$$O_{mt}$$

Outcome at MSA m, week t

Right

$$\boldsymbol{A}_{\mathsf{D}t} = \sum_{\tau=t-L}^{t} \delta^{t-\tau} \boldsymbol{a}_{\mathsf{D}\tau},$$

Advertising Stock (goodwill)
Long-run measure of exposure
$\boldsymbol{a}_{\mathsf{D}t}$: vector of GRPs at DMA D, week t

$$\gamma_{mY(t)} + \gamma_{\mathsf{S}(t)} + \gamma_{\mathsf{T}(t)}$$

FEs to account for: Seasonality, cross-sectional differences across MSAs, and general trends

Robustness: Detailing | Robustness: Border

Advertising Effect on Prescription Drug

- Include both log-log functional form and Poisson
  - 15% of MSA-week observations are zeros
- Significant direct effect of Chantix advertisements
- Category expansion
- NRT ads reduce prescription drug usage

	Full Sample			
	Varenicline		Bupropion	
	Log-Log	Poisson	Log-Log	Poisson
$\beta_{Chantix\ Ads}$	**0.0564*****	**0.0735*****	**0.0357*****	**0.0360*****
	(0.0123)	(0.0152)	(0.0106)	(0.0097)
$\beta_{NRT\ Ads}$	-0.0159	**-0.0444*****	**-0.0281****	**-0.0476*****
	(0.0116)	(0.0148)	(0.0113)	(0.0100)
$\beta_{PSA\ Ads}$	0.0037	0.0050	0.0028	0.0021
	(0.0032)	(0.0035)	(0.0030)	(0.0023)
$\beta_{E-Cig\ Ads}$	0.0030	0.0031	0.0019	0.0029*
	(0.0022)	(0.0029)	(0.0017)	(0.0016)

Table 3: Advertising effect on prescription drug usage

Full Table

Advertising Effect on Office Visits

- Chantix ads have effects beyond the drug usage
- Ads encourage individuals to seek professional healthcare support

	Full Sample	
	Log-Log	Poisson
$\beta_{Chantix\ Ads}$	$\mathbf{0.0342}^{**}$	$\mathbf{0.0362}^{***}$
	(0.0155)	(0.0112)
$\beta_{NRT\ Ads}$	-0.0183	$\mathbf{-0.0257}^{**}$
	(0.0138)	(0.0107)
$\beta_{PSA\ Ads}$	-0.0018	-0.0017
	(0.0049)	(0.0026)
$\beta_{E-Cig\ Ads}$	-0.0047^{*}	$\mathbf{-0.0046}^{**}$
	(0.0027)	(0.0019)

Table 4: Advertising effect on office visits

Placebo

Estimation for retail sales

$$\log(Q_{st}+1) = \boldsymbol{\beta}^\top \log(\boldsymbol{A}_{\mathrm{D}_s t}+1) + \alpha \log(p_{st}) + \gamma_{sY(t)} + \gamma_{\mathrm{S}(t)} + \gamma_{\mathrm{T}(t)} + \boldsymbol{\eta}^\top \boldsymbol{x}_{st} + \epsilon_{st}$$

Left

$$Q_{st}$$

Category Demand at Store s, week t

Right

$$\boldsymbol{A}_{\mathrm{D}t} = \sum_{\tau=t-L}^{t} \delta^{t-\tau} \boldsymbol{a}_{\mathrm{D}\tau},$$

Advertising Stock (goodwill)
Long-run measure of exposure
$\boldsymbol{a}_{\mathrm{D}t}$: vector of GRPs at DMA D, week t

$$p_{st}$$

Category Price

$$\gamma_{sY(t)} + \gamma_{\mathrm{S}(t)} + \gamma_{\mathrm{T}(t)}$$

FEs to account for: Seasonality, cross-sectional differences across stores, assortment changes and general trends

$$\boldsymbol{x}_{st}$$

Feature, Display

Advertising Effect on Cigarette Sales

- Only Chantix ads show clear evidence of reducing cigarette sales

	Full Sample		
	Cigarettes	E-Cigs	OTC NRTs
$\beta_{Chantix\ Ads}$	**-0.0220***** (0.0054)	**0.0514**** (0.0257)	-0.0046 (0.0077)
$\beta_{NRT\ Ads}$	-0.0008 (0.0039)	-0.0173 (0.0195)	**0.0166***** (0.0056)
$\beta_{PSA\ Ads}$	0.0019 (0.0017)	**0.0145**** (0.0060)	**0.0045**** (0.0018)
$\beta_{E-Cig\ Ads}$	-0.0005 (0.0012)	0.0084* (0.0051)	-0.0017* (0.0010)

Table 5: Advertising effect on retail sales

Full Table

E-cigarettes role as smoking cessation

- Demand for e-cigarettes rises with
  - Chantix advertisements
  - PSAs
- Suggests that removing e-cigarettes from the market could reduce the options available for smokers seeking to quit

	Full Sample		
	Cigarettes	E-Cigs	OTC NRTs
$\beta_{Chantix\ Ads}$	**-0.0220***** (0.0054)	**0.0514**** (0.0257)	-0.0046 (0.0077)
$\beta_{NRT\ Ads}$	-0.0008 (0.0039)	-0.0173 (0.0195)	**0.0166***** (0.0056)
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Table 5: Advertising effect on retail sales

Advertising effect on NRT sales

- Near-zero effect for Chantix ads on NRTs
  A. Substitution effect for individuals with insurance access
  B. The category expansion effect for individuals without insurance access

	Full Sample		
	Cigarettes	E-Cigs	OTC NRTs
$\beta_{Chantix\ Ads}$	**-0.0220***** (0.0054)	**0.0514**** (0.0257)	-0.0046 (0.0077)
$\beta_{NRT\ Ads}$	-0.0008 (0.0039)	-0.0173 (0.0195)	**0.0166***** (0.0056)
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Table 5: Advertising effect on retail sales

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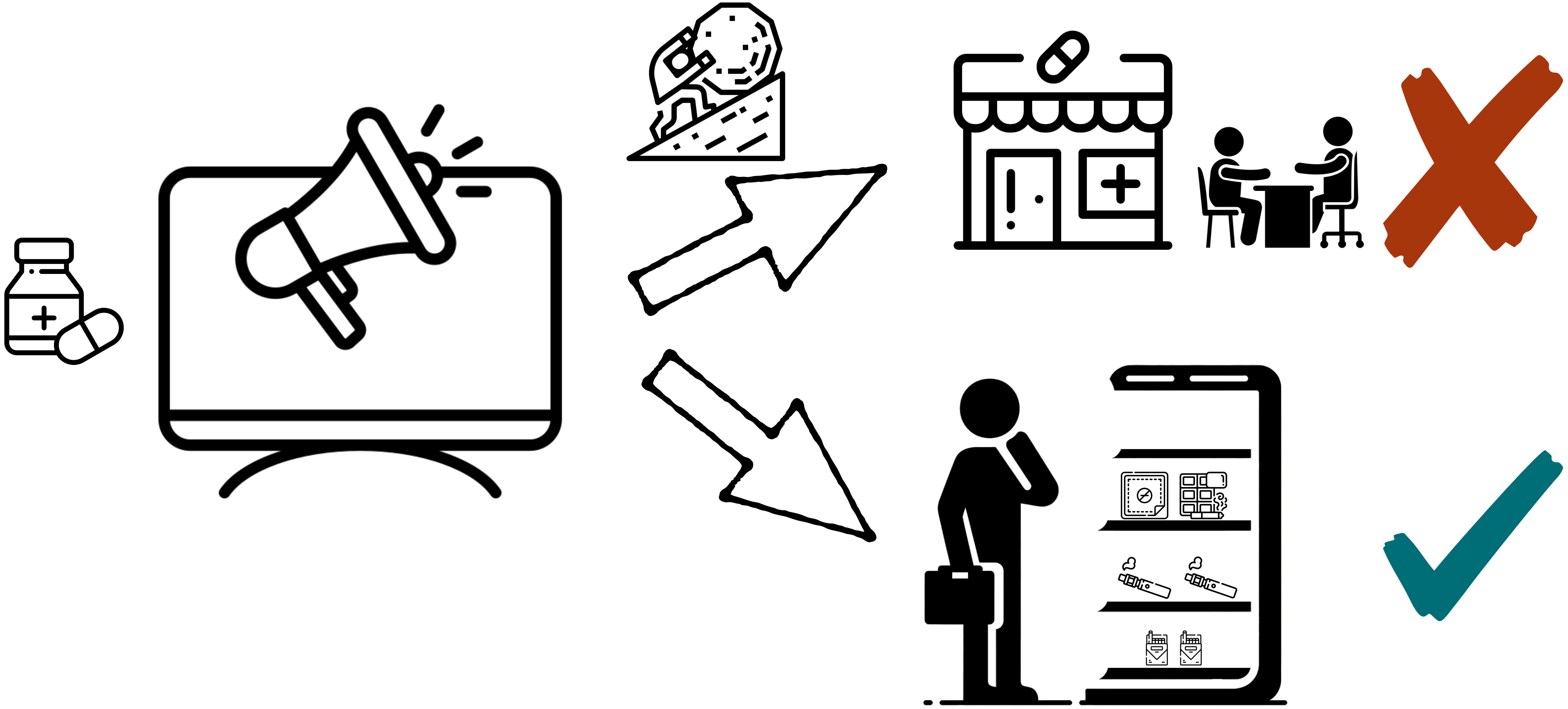
Takeaways so far

No Variation in Insurance Coverage



Role of Insurance Coverage on Retail Demand

- Use geographic variation on insurance coverage
- Using PUMS, we measure yearly estimates of
  - Access level to Varenicline through insurance
  - Number of relevant providers per capita
  - Other demographic variables

$$
\begin{aligned}
\log(Q_{st}+1) = \boldsymbol{\beta}^\top \log(\boldsymbol{A}_{\mathcal{D}_s t}+1) \\
&+ \beta_{Chantix\ \ Ads,Coverage} \cdot \log(A_{Chantix,\mathcal{D}_s t}+1) \cdot V_{Coverage,\mathcal{C}_s Y(t)} \\
&+ \beta_{Chantix\ \ Ads,Provider\ \ per\ \ Capita} \cdot \log(A_{Chantix,\mathcal{D}_s t}+1) \cdot V_{Provider\ \ per\ \ Capita,\mathcal{C}_s Y(t)} \\
&+ \beta_{Chantix\ \ Ads,Income} \cdot \log(A_{Chantix,\mathcal{D}_s t}+1) \cdot V_{Income,\mathcal{C}_s Y(t)} \\
&+ \beta_{Chantix\ \ Ads,PercentMale} \cdot \log(A_{Chantix,\mathcal{D}_s t}+1) \cdot V_{PercentMale,\mathcal{C}_s Y(t)} \\
&+ \beta_{Chantix\ \ Ads,PercentBlack} \cdot \log(A_{Chantix,\mathcal{D}_s t}+1) \cdot V_{PercentBlack,\mathcal{C}_s Y(t)} \\
&+ \beta_{Chantix\ \ Ads,PercentAsian} \cdot \log(A_{Chantix,\mathcal{D}_s t}+1) \cdot V_{PercentAsian,\mathcal{C}_s Y(t)} \\
&+ \beta_{Chantix\ \ Ads,PercentHispanic} \cdot \log(A_{Chantix,\mathcal{D}_s t}+1) \cdot V_{PercentHispanic,\mathcal{C}_s Y(t)} \\
&+ \beta_{Chantix\ \ Ads,PercentAbove45} \cdot \log(A_{Chantix,\mathcal{D}_s t}+1) \cdot V_{PercentAbove45,\mathcal{C}_s Y(t)} \\
&+ \alpha_{Price} \cdot \log(p_{st}) + \gamma_{sY(t)} + \gamma_{\mathcal{S}(t)} + \gamma_{\mathcal{T}(t)} + \boldsymbol{\eta}^\top \boldsymbol{x}_{st} + \epsilon_{st},
\end{aligned}
$$

Sources of Variation

DTCA Endo.

Heterogeneous Effect on DTCA Effectiveness

- DTCA for Chantix is more effective in terms of reducing cigarette sales in areas with
  - Higher insurance coverage
  - Higher number of providers

	Cigarettes	E-Cigs	OTC NRTs
$\beta_{Chantix\ Ads}$	**-0.0211***** (0.0060)	0.0281 (0.0275)	0.0066 (0.0070)
$\beta_{Chantix\ Ads,Coverage}$	**-0.0124***** (0.0023)	**-0.0232**** (0.0093)	**-0.0165***** (0.0036)
$\beta_{Chantix\ Ads,Provider\ per\ Capita}$	**-0.0031**** (0.0014)	0.0095 (0.0063)	**-0.0081***** (0.0024)
$\beta_{NRT\ Ads}$	0.0023 (0.0039)	-0.0152 (0.0196)	**0.0233***** (0.0057)
$\beta_{PSA\ Ads}$	0.0015 (0.0018)	**0.0135**** (0.0062)	**0.0037**** (0.0018)
$\beta_{E-Cig\ Ads}$	-0.0005 (0.0012)	0.0092* (0.0051)	**-0.0024**** (0.0009)

Table 6: Heterogeneous effect of DTCA

Heterogeneous Effect on DTCA Spillover to NRTs

- The spillover to NRTs is higher in areas with
  - A higher insurance coverage
  - A higher number of providers

	Cigarettes	E-Cigs	OTC NRTs
$\beta_{Chantix\ Ads}$	**-0.0211*****	0.0281	0.0066
	(0.0060)	(0.0275)	(0.0070)
$\beta_{Chantix\ Ads,Coverage}$	**-0.0124*****	**-0.0232****	**-0.0165*****
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	(0.0039)	(0.0196)	(0.0057)
$\beta_{PSA\ Ads}$	0.0015	**0.0135****	**0.0037****
	(0.0018)	(0.0062)	(0.0018)
$\beta_{E-Cig\ Ads}$	-0.0005	0.0092*	**-0.0024****
	(0.0012)	(0.0051)	(0.0009)

Table 6: Heterogeneous effect of DTCA

Spillover to OTC Options

- More evidence of DTCA spillover to OTC options

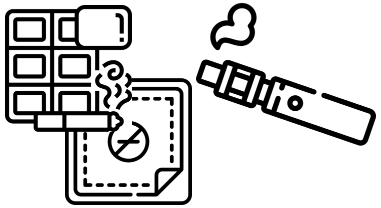

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Table 6: Heterogeneous effect of DTCA

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Implications of restricting DTCA

The efficacy of DTCA remains widely debated

We evaluate the response to a hypothetical **10% DTCA reduction** for smoking cessation in 2019

- **Increase in cigarette consumption:**
  - An estimated 23.56 million additional packs of cigarettes sold
- **Decrease in e-cigarette consumption:**
  - Approximately 1.13 million fewer cartridges of e-cigarettes sold
- **The net effect on nicotine intake*:**
  - An overall increase of 21.3 million packs of cigarettes in terms of nicotine content

* from non-FDA approved sources

Main Findings

- **DTCA of Prescription Drug**
  - Is the only advertising type with clear evidence of effectiveness
- **Spillover Effect of DTC**
  - Chantix ads spillover to over-the-counter options
- **Variability of Spillover**
  - Larger spillover to NRTs in regions with higher insurance access and access to prescriptions
- **Potential Risks of Advertising Bans:**
  - A ban on DTC advertising may lead to increased cigarette sales and nicotine use

Thank you!

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Empirical Approach

Using geographic variation in occurrences and impressions of ads to estimate the causal effect of different forms of advertising on tobacco-related products and outcomes

Sources of Variation

1. The level of impression to the same ad could vary geographically:
    - TV viewing habits
    - Channel position changes
    - Differences in broadcast schedules
2. Ads purchased locally at the spot market

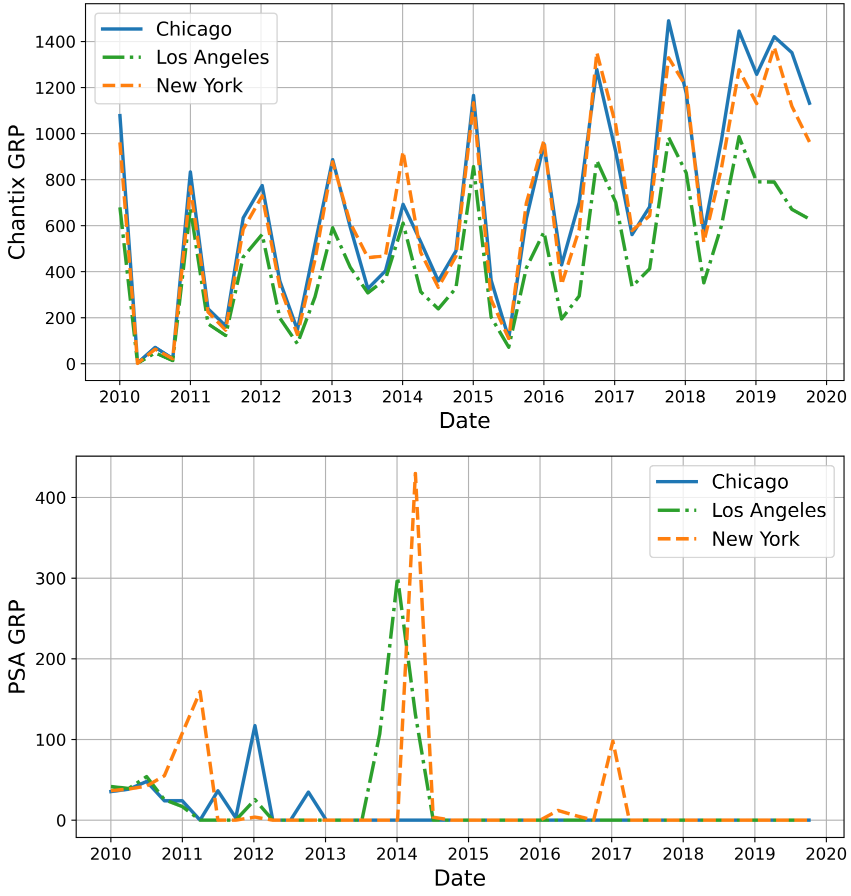

Figure 2: Quarterly advertising gross rating points for Chantix and PSA advertising across three DMAs.

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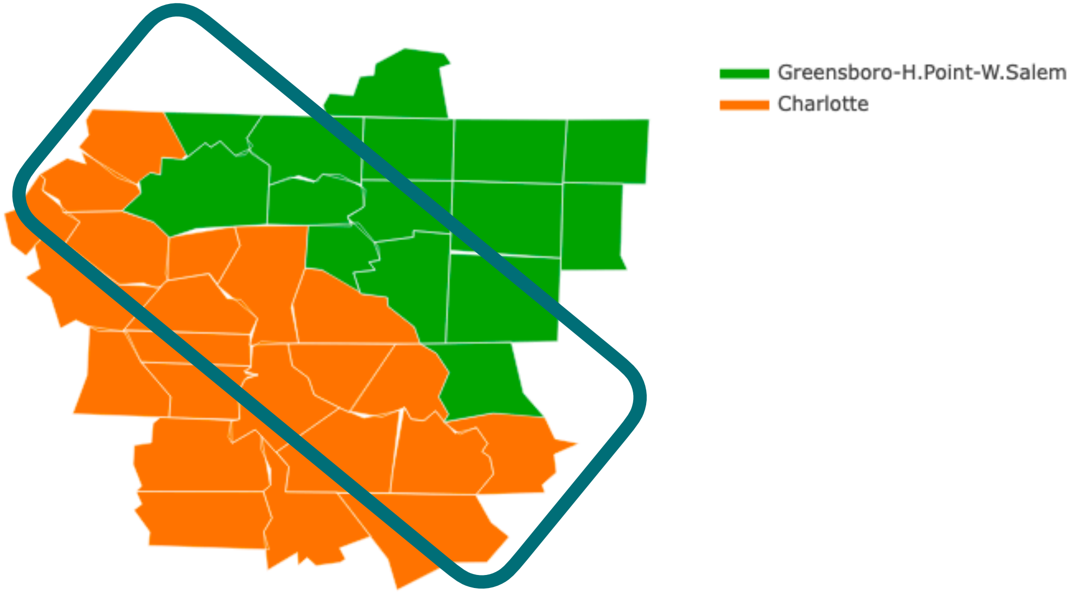
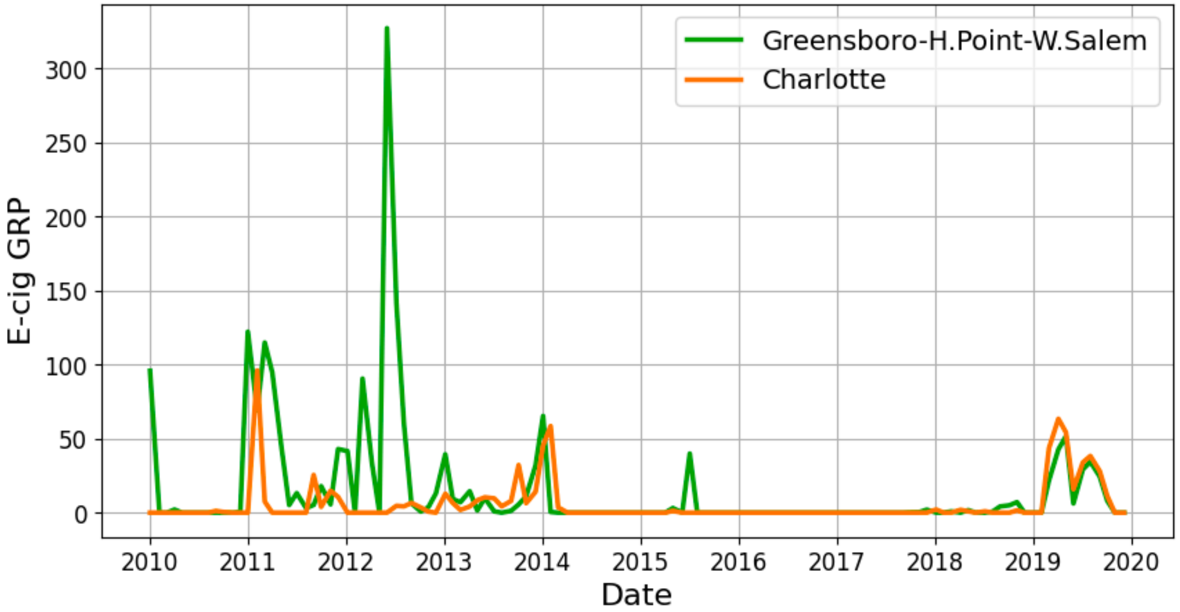
Alternative Specification: Border Strategy



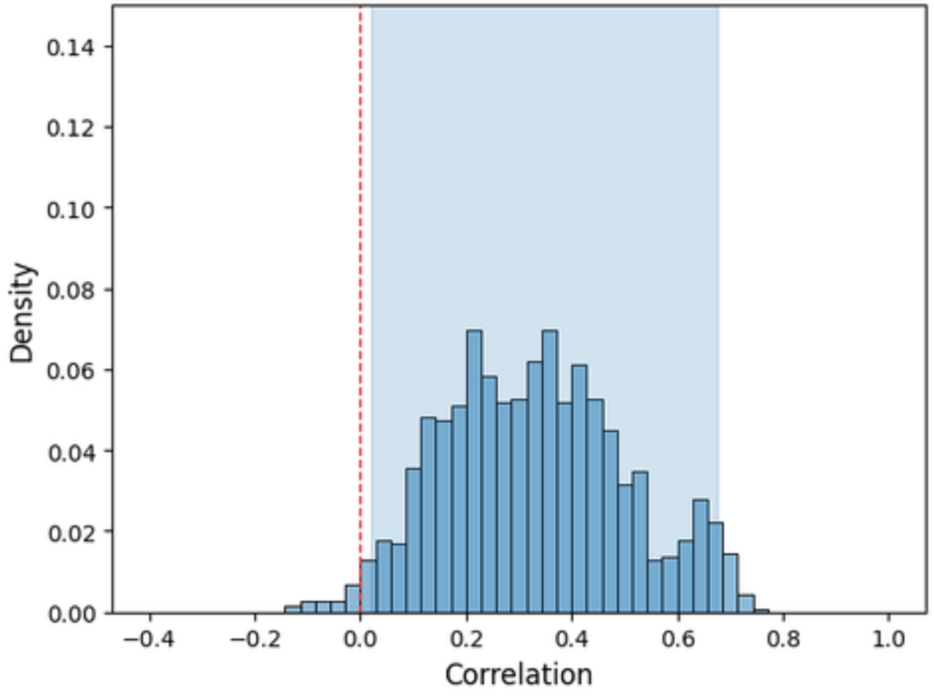


$$\log(Q_{bmt}+1) = \boldsymbol{\beta}^\top \log(\boldsymbol{A}_{\mathsf{D}_{m}t}+1) + \gamma_{mY(t)} + \gamma_{\mathsf{S}(t)} + \gamma_{\mathsf{T}(t)} + \boxed{\gamma_{bq(t)}} + \epsilon_{bmt}$$

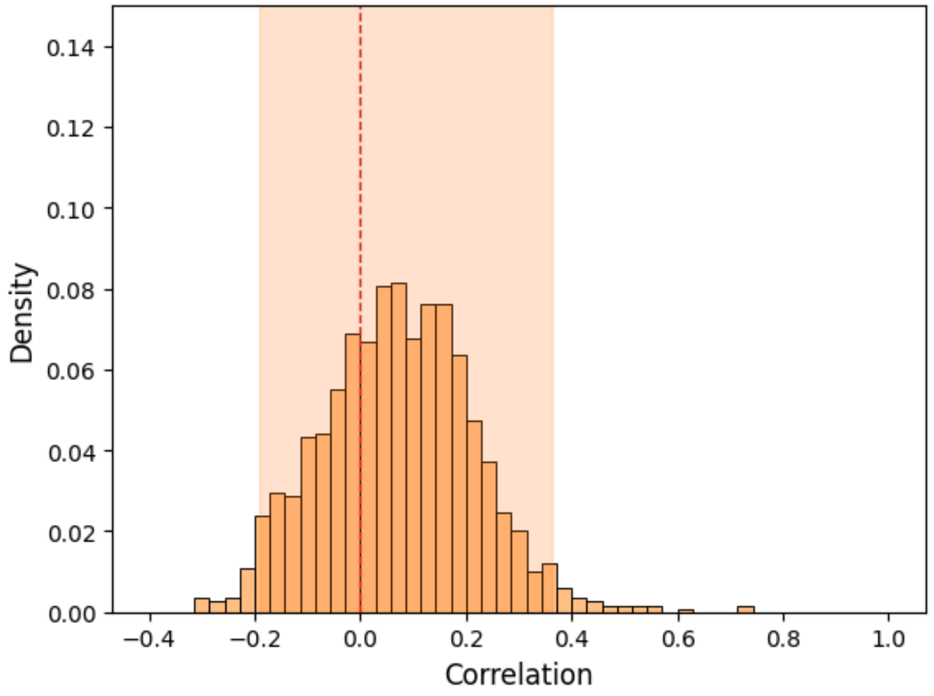
Back

Correlation between NRT and Chantix Advertising

- Each observation is the correlation between NRT and Chantix GRPs within each DMA-year



Raw correlation (without FEs)

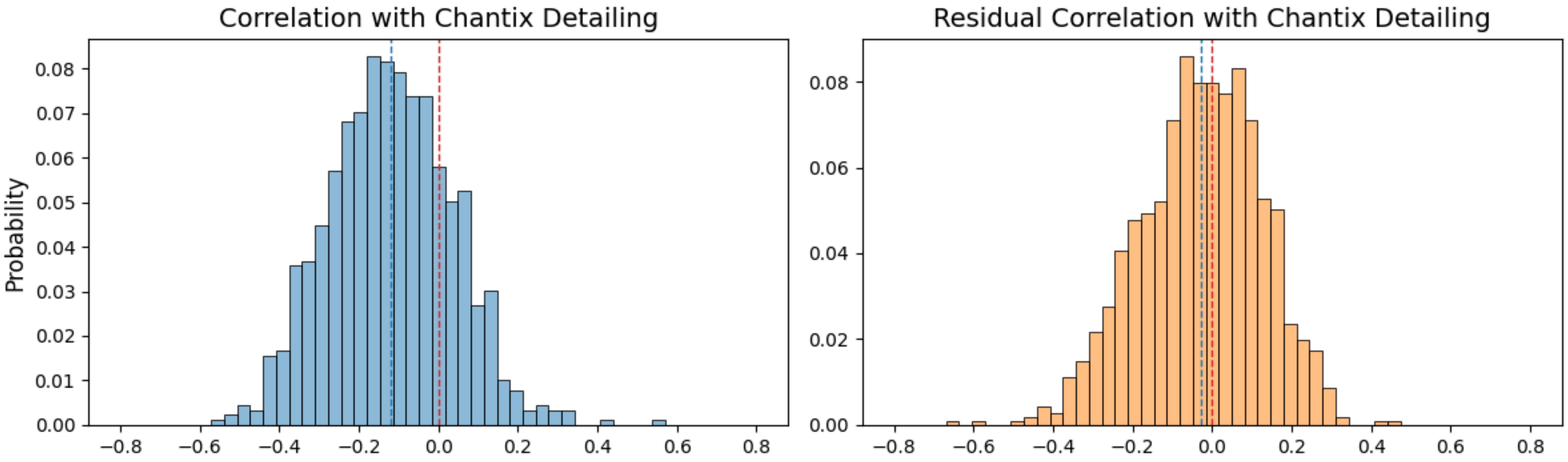


Correlation net of FEs

Back

Correlation between Chantix Advertising and Detailing

- Each observation is the correlation between Chantix advertising and detailing within each DMA-year



Raw correlation (without FEs)

Correlation net of FEs

Back

Endogeneity of DTCA

- Does Chatix DTCA target based on:
  - Age
  - Sex
  - Copayment
  - Insurance Coverage?

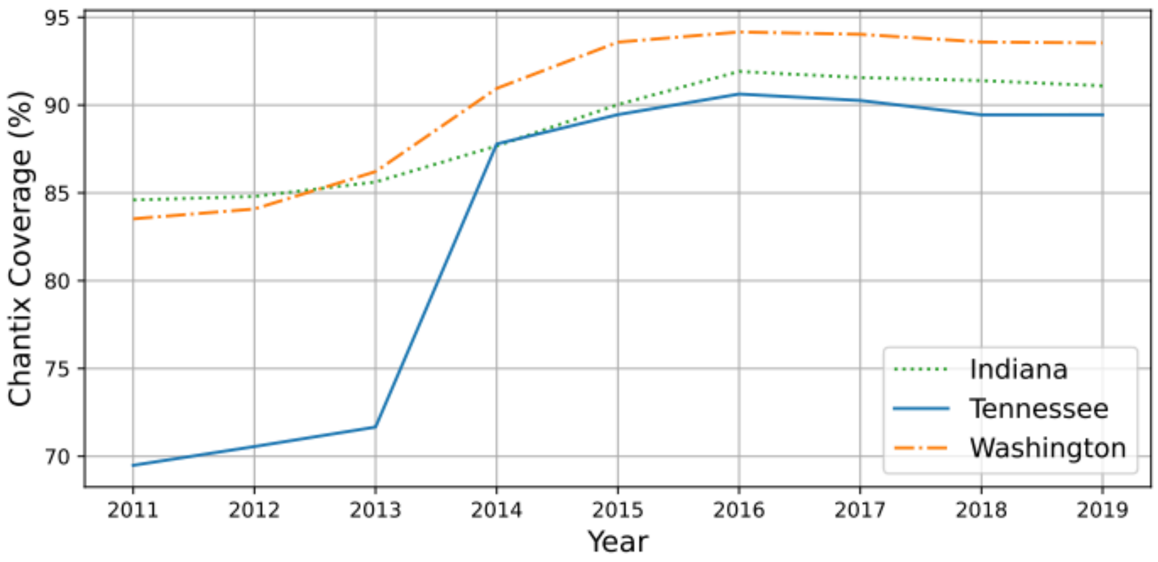
	Prescription level			DMA-year level
	Age	Sex	Copayment	Coverage
$\beta_{\text{Chantix Ads}}$	-0.1290	0.0014	-0.1348	
	(0.1133)	(0.0048)	(0.3102)	
$\beta_{\text{Yearly Chantix Ads}}$				0.0011
				(0.0023)
MSA-year FE	X	X	X	
Monthly FE	X	X	X	
week-of-year FE	X	X	X	
Year FE				X
Observations	1,285,617	1,285,617	1,285,617	1,837
R^2	0.02909	0.01035	0.12762	0.31797
Adjusted R^2	0.02645	0.00767	0.12525	0.31461

Note. – All standard errors are clustered at DMA level.
Advertising carry-over (δ) is set to 0.9.
$^{*}: p < 0.1$, $^{**}: p < 0.05$, $^{***}: p < 0.01$

Back

Sources of Insurance Variation

1. Affordable Care Act (ACA) mandates covering FDA-Approved cessation medication
2. Medicaid expansion timing
3. Portion of individuals using different types of insurance (PUMS)



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Detailing

- Detailing as another form of promotion that drug manufacturers rely on
- We control for detailing activities to ensure our results are robust
- Detailing data on any transfer of value
  - From August 2013
  - Over 751,000 food and beverage detailing records for Chantix (98% of detailing activity)
  - Only three records for Zyban
- Aggregate Chantix Detailing at the DMA-week level.

$$\log(O_{mt}+1) = \boldsymbol{\beta}^\top \log(\boldsymbol{A}_{\mathsf{D}_{m}t}+1) + \gamma_{Chantix\ Detailing} \cdot \log(D_{\mathscr{D}_{m}t}+1) + \gamma_{mY(t)} + \gamma_{\mathsf{S}(t)} + \gamma_{\mathsf{T}(t)} + \epsilon_{mt}$$

Back | Detailing/Ad Corr

Advertising Effect on Prescription Drug

	Full Sample				With Detailing			
	Varenicline		Bupropion		Varenicline		Bupropion	
	Log-Log	Poisson	Log-Log	Poisson	Log-Log	Poisson	Log-Log	Poisson
$\beta_{Chantix\ Ads}$	**0.0564*****	**0.0735*****	**0.0357*****	**0.0360*****	**0.0403****	**0.0480****	0.0006	0.0086
	(0.0123)	(0.0152)	(0.0106)	(0.0097)	(0.0170)	(0.0212)	(0.0161)	(0.0126)
$\beta_{NRT\ Ads}$	-0.0159	**-0.0444*****	**-0.0281****	**-0.0476*****	-0.0189	**-0.0499****	-0.0174	**-0.0501*****
	(0.0116)	(0.0148)	(0.0113)	(0.0100)	(0.0148)	(0.0208)	(0.0142)	(0.0136)
$\beta_{PSA\ Ads}$	0.0037	0.0050	0.0028	0.0021	0.0071*	0.0076	0.0029	0.0020
	(0.0032)	(0.0035)	(0.0030)	(0.0023)	(0.0041)	(0.0064)	(0.0047)	(0.0043)
$\beta_{E-Cig\ Ads}$	0.0030	0.0031	0.0019	0.0029*	-0.0022	-0.0013	0.0024	0.0023
	(0.0022)	(0.0029)	(0.0017)	(0.0016)	(0.0026)	(0.0034)	(0.0020)	(0.0014)
$\gamma_{ChantixDetailing}$					0.0180*	0.0258*	0.0079	0.0146
					(0.0097)	(0.0142)	(0.0086)	(0.0098)
Observations	143,469	143,365	143,705	143,705	88,866	88,762	89,039	89,039
(Pseudo) R^2	0.8260	0.6897	0.9197	0.8728	0.8216	0.6718	0.9173	0.8686
Adjusted (Ps.) R^2	0.8224	0.6862	0.9181	0.8718	0.8174	0.6673	0.9153	0.8674
Residual Std. Dev.	0.4288	1.0546	0.3681	1.1755	0.4237	1.0348	0.3765	1.0898
Residual DF	143,305	143,201	143,541	143,541	88,744	88,640	88,917	88,917

Note. – Each column represents the results of estimating a specific specification for the number of new prescriptions for either Varenicline or Bupropion as outcomes.
Standard errors are two-way clustered at MSA and DMA-year.
All specifications include MSA-Year, Month, and week-of-year fixed effects.
For the Poisson models the reported R^2 and Adjusted R^2 are Pseudo R^2 and Adjusted Pseudo R^2.
Advertising carry-over (δ) is set to 0.9.
$^{*}: p < 0.1$, $^{**}: p < 0.05$, $^{***}: p < 0.01$

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Advertising Effect on Retail Sales

	Full Sample			With Detailing		
	Cigarettes	E-Cigs	OTC NRTs	Cigarettes	E-Cigs	OTC NRTs
$\beta_{Chantix\ Ads}$	**-0.0220***** (0.0054)	**0.0514**** (0.0257)	-0.0046 (0.0077)	**-0.0242***** (0.0086)	**0.1374***** (0.0357)	0.0078 (0.0095)
$\beta_{NRT\ Ads}$	-0.0008 (0.0039)	-0.0173 (0.0195)	**0.0166***** (0.0056)	0.0044 (0.0055)	-0.0348 (0.0246)	**0.0269***** (0.0076)
$\beta_{PSA\ Ads}$	0.0019 (0.0017)	**0.0145**** (0.0060)	**0.0045**** (0.0018)	0.0036 (0.0030)	**0.0167**** (0.0071)	0.0050 (0.0038)
$\beta_{E-Cig\ Ads}$	-0.0005 (0.0012)	0.0084* (0.0051)	-0.0017* (0.0010)	0.0008 (0.0017)	0.0062 (0.0053)	-0.0019 (0.0013)
$\gamma_{ChantixDetailing}$				0.0026 (0.0046)	0.0036 (0.0270)	0.0057 (0.0057)
α_{Price}	**-0.9497***** (0.1310)	**-0.1367**** (0.0617)	**-1.3858***** (0.1302)	**-0.8391***** (0.1047)	-0.0967 (0.0839)	**-1.7368***** (0.2284)
$\eta_{Feature}$	**0.0541***** (0.0092)	0.3744 (0.2870)	**0.9602***** (0.0388)	**0.0461***** (0.0163)	**0.2421***** (0.0799)	**0.8581***** (0.0410)
$\eta_{Display}$	**0.1304***** (0.0270)	0.4196 (0.3556)	**0.6904***** (0.0701)	**0.1286***** (0.0247)	**-5.2673***** (0.1928)	**0.7701***** (0.0920)
Observations	13,992,417	4,235,960	5,625,872	9,043,362	3,163,724	3,421,246
R^2	0.9616	0.7968	0.6705	0.9586	0.8084	0.7073
Adjusted R^2	0.9608	0.7925	0.6640	0.9577	0.8043	0.7008
Residual Std. Dev.	0.2397	0.5662	0.6629	0.2481	0.5456	0.5963
Residual DF	13,992,250	4,235,793	5,625,705	9,043,237	3,163,599	3,421,121

Note. – Each column represents the results of estimating a specific log-log specification (full sample or sample with detailing) for the demand of a particular category of products as the outcome variable.
Standard errors are two-way clustered at the DMA-year and store level.
All specifications include store-year, month, and week-of-year fixed effects.
Advertising and detailing carry-over (δ) is set to 0.9.
$^{*}: p < 0.1$, $^{**}: p < 0.05$, $^{***}: p < 0.01$

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Placebo Results on Emergency Visits

	National		Border Method	
	Log-Log	Poisson	Log-Log	Poisson
$\beta_{Chantix\ Ads}$	-0.0010	0.0038	0.0189	0.0234
	(0.0144)	(0.0136)	(0.0208)	(0.0175)
$\beta_{NRT\ Ads}$	0.0081	0.0199	0.0467*	-0.0019
	(0.0163)	(0.0132)	(0.0246)	(0.0193)
$\beta_{PSA\ Ads}$	-0.0057*	-0.0010	-0.0056	0.0019
	(0.0034)	(0.0040)	(0.0058)	(0.0057)
$\beta_{E-Cig\ Ads}$	-0.0013	0.0017	-0.0055	0.0041
	(0.0022)	(0.0023)	(0.0035)	(0.0041)
Observations	143,151	143,047	114,423	114,423
(Pseudo) R^2	0.8209	0.7908	0.8703	0.8305
Adjusted (Ps.) R^2	0.8172	0.7891	0.8653	0.8282
Residual Std. Dev.	0.5307	1.3879	0.4833	1.3970
Residual DF	142,987	142,883	111,488	111,488