

Cigarette Graphic Warning Labels and Smoking Prevalence in Canada: A Critical Examination and Reformulation of the FDA Regulatory Impact Analysis

Online-only Supplements:

Appendix 1. Data

Country	Smoking Survey Cycle	Year	Smoking Rate	Canada Dummy	Post GWL Dummy	Country PostGWL Interaction	Tax Rate Inflation Adjusted to July 2011	Price With ITC	Price W/O ITC	Normalized Tax Rate (Model 1 - 6)	Normalized Price With ITC (Model 1-6)	Normalized Price W/O ITC (Model 1-6)	Yearly Trend	Monthly Trend
US	Jan to Dec	1995	24.6	0	0	0	0.87	0.57	0.57	0.33	0.43	0.43	10	54.5
US	Jan to Dec	1997	24.6	0	0	0	0.85	0.59	0.59	0.33	0.45	0.45	12	78.5
US	Jan to Dec	1998	23.9	0	0	0	0.87	0.65	0.65	0.36	0.53	0.53	13	90.5
US	Jan to Dec	1999	23.3	0	0	0	0.94	0.82	0.82	0.39	0.68	0.68	14	102.5
US	Jan to Dec	2000	23.1	0	0	0	1.08	0.88	0.88	0.45	0.73	0.73	15	114.5
US	Jan to Dec	2001	22.6	0	1	0	1.06	0.93	0.93	0.46	0.79	0.79	16	126.5
US	Jan to Dec	2002	22.3	0	1	0	1.25	0.99	0.99	0.55	0.86	0.86	17	138.5
US	Jan to Dec	2003	21.3	0	1	0	1.38	0.94	0.98	0.54	0.73	0.76	18	150.5
US	Jan to Dec	2005	20.7	0	1	0	1.46	0.90	0.99	0.49	0.60	0.66	20	174.5
US	Jan to Dec	2006	20.6	0	1	0	1.46	0.93	1.00	0.46	0.58	0.62	21	186.5
US	Jan to Dec	2007	19.4	0	1	0	1.55	0.94	1.03	0.47	0.56	0.61	22	198.5
US	Jan to Dec	2008	20.4	0	1	0	1.61	0.99	1.06	0.48	0.58	0.62	23	210.5
US	Jan to Dec	2009	20.5	0	1	0	2.22	1.08	1.31	0.71	0.68	0.82	24	222.5
Canada	Jan to Dec	1991	31.1	1	0	0	5.85	0.90	0.90	1.31	0.90	0.90	6	6.5
Canada	May 1994	1994	31.0	1	0	0	2.81	0.57	0.57	0.63	0.57	0.57	9	41
Canada	June 1994 to May 1995	1994-1995	30.5	1	0	0	2.85	0.57	0.57	0.64	0.57	0.57	9.5	47.5
Canada	June 1996 to May 1997	1996-1997	28.6	1	0	0	2.91	0.58	0.58	0.65	0.58	0.58	11.5	71.5
Canada	June 1998 to May 1999	1998-1999	27.7	1	0	0	3.08	0.63	0.63	0.69	0.63	0.63	13.5	95.5
Canada	Feb to Dec	1999	25.2	1	0	0	3.10	0.63	0.63	0.69	0.63	0.63	14	103
Canada	Feb to Dec	2000	24.4	1	0	0	3.15	0.64	0.64	0.71	0.64	0.64	15	115
Canada	Feb to Dec	2001	21.7	1	1	1	3.49	0.71	0.71	0.78	0.71	0.71	16	127

Country	Smoking Survey Cycle	Year	Smoking Rate	Canada Dummy	Post GWL Dummy	Country PostGWL Interaction	Tax Rate Inflation Adjusted to July 2011	Price With ITC	Price W/O ITC	Normalized Tax Rate (Model 1 - 6)	Normalized Price With ITC (Model 1-6)	Normalized Price W/O ITC (Model 1-6)	Yearly Trend	Monthly Trend
Canada	Feb to Dec	2002	21.4	1	1	1	4.46	0.92	0.92	1	0.92	0.92	17	139
Canada	Feb to Dec	2003	20.9	1	1	1	6.15	1.03	1.04	1.38	1.03	1.04	18	151
Canada	Feb to Dec	2004	19.6	1	1	1	6.63	1.00	1.09	1.49	1.00	1.09	19	163
Canada	Feb to Dec	2005	18.7	1	1	1	6.55	0.98	1.10	1.47	0.98	1.10	20	175
Canada	Feb to Dec	2006	18.6	1	1	1	6.50	0.95	1.11	1.46	0.95	1.11	21	187
Canada	Feb to Dec	2007	19.2	1	1	1	6.53	0.92	1.13	1.46	0.92	1.13	22	199
Canada	Feb to Dec	2008	17.9	1	1	1	6.53	0.92	1.13	1.47	0.92	1.13	23	211
Canada	Feb to Dec	2009	17.3	1	1	1	6.59	0.93	1.16	1.48	0.93	1.16	24	223

Appendix 2 Estimated Models Using Only the Pre-2001 Observations

	FDA's Estimates		Model A(Replication)		Model B and C ⁱ	
	1	2	3	4	5	6
ln(Smoking Rate)	Canada	US	Canada	US	Canada	US
ln(Trend-1985)	-0.377 (0.063)	-0.115 (0.074)	-0.388*** (0.0588)	-0.113 (0.0631)	-0.353*** (0.0525)	-0.0229 (0.0494)
ln(ExciseTax)	-0.215 (0.08)	-0.101 (0.106)	-0.225** (0.0733)	-0.122 (0.0989)		
ln(PriceIndex) ⁱ					-0.322** (0.107)	-0.129* (0.0388)
Constant	4.455 -0.215	3.451 (0.202)	4.531*** (0.210)	3.450*** (0.167)	4.036*** (0.106)	3.184*** (0.138)
Observations	7	5	7	5	7	5
R-squared	N/A	N/A	0.922	0.896	0.920	0.972

i. estimated model parameters are the same for the selected periods with and without including the ITC prices since ITC prices only apply to post 2002 observations.

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix 3 Estimated Models Using All Available Observations

ln(Smoking Rate)	Model D		Model E		Model F	
	Canada	US	Canada	US	Canada	US
ln(MonthlyTrend)	-0.127*** (0.0198)	-0.134** (0.0468)	-0.118*** (0.0180)	-0.213*** (0.0551)	-0.128*** (0.0255)	-0.216*** (0.0421)
Post GWL Dummy	-0.0834 (0.0519)		-0.0569 (0.0532)		-0.0755 (0.0747)	
ln(ExciseTax)	-0.242*** (0.0545)	-0.0647 (0.0674)				
ln(PriceIndex w/o ITC)			-0.367*** (0.0766)	0.0688 (0.0951)		
ln(PriceIndex w/ITC)					-0.393** (0.131)	0.0919 (0.0860)
Constant	4.132*** (0.123)	3.759*** (0.216)	3.641*** (0.0691)	4.139*** (0.280)	3.672*** (0.0883)	4.161*** (0.218)
Observations	16	13	16	13	16	13
R-squared	0.965	0.903	0.968	0.899	0.947	0.905

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix 4 Estimated/Predicted Smoking Rates in Canada

Year		Actual Smoking Rates	Estimated/Predicted Smoking Rates							Unexplained Smoking Rates						
			<i>FDA Model</i>	<i>Model A</i>	<i>Model B</i>	<i>Model C</i>	<i>Model D</i>	<i>Model E</i>	<i>Model F</i>	<i>FDA Model</i>	<i>Model A</i>	<i>Model B</i>	<i>Model C</i>	<i>Model D</i>	<i>Model E</i>	<i>Model F</i>
N/U ¹	1991	31.1	N/A	31.097	31.115	31.115	31.990	31.831	32.264	N/A	0.003	-0.015	-0.015	-0.890	-0.731	-1.164
	1994	31	N/A	31.344	31.176	31.176	30.216	30.242	30.408	N/A	-0.344	-0.176	-0.176	0.784	0.758	0.592
Pre	1994-1995	30.5	30.391	30.601	30.693	30.693	29.559	29.841	29.965	0.109	-0.101	-0.193	-0.193	0.941	0.659	0.535
	1996-1997	28.6	28.172	28.277	28.389	28.389	27.914	28.103	28.072	0.428	0.323	0.211	0.211	0.686	0.497	0.528
	1998-1999	27.7	26.237	26.232	26.172	26.172	26.536	26.412	26.248	1.463	1.468	1.528	1.528	1.164	1.288	1.452
	1999	25.2	25.855	25.834	25.842	25.842	26.249	26.183	25.999	-0.655	-0.634	-0.642	-0.642	-1.049	-0.983	-0.799
	2000	24.4	25.099	25.061	25.057	25.057	25.783	25.657	25.433	-0.699	-0.661	-0.657	-0.657	-1.383	-1.257	-1.033
Post	2001	21.7	24.088	23.874	23.686	23.686	24.825	24.413	24.108	-2.388	-2.174	-1.986	-1.986	-3.125	-2.713	-2.408
	2002	21.4	22.247	22.070	21.331	21.331	23.133	21.971	21.530	-0.847	-0.670	0.069	0.069	-1.733	-0.571	-0.130
	2003	20.9	20.274	20.071	20.141	20.182	21.170	20.857	20.408	0.626	0.829	0.759	0.718	-0.270	0.043	0.492
N/U ¹	2004	19.6	19.596	19.328	19.439	20.020	20.591	20.289	20.483	0.004	0.272	0.161	-0.420	-0.991	-0.689	-0.883
Post	2005	18.7	19.242	18.997	19.031	19.786	20.464	20.049	20.455	-0.542	-0.297	-0.331	-1.086	-1.764	-1.349	-1.755
	2006	18.6	18.950	18.670	18.653	19.651	20.326	19.830	20.541	-0.350	-0.070	-0.053	-1.051	-1.726	-1.230	-1.941
	2007	19.2	18.607	18.321	18.228	19.489	20.148	19.538	20.581	0.593	0.879	0.972	-0.289	-0.948	-0.338	-1.381
	2008	17.9	18.291	18.004	17.966	19.178	19.994	19.431	20.417	-0.391	-0.104	-0.066	-1.278	-2.094	-1.531	-2.517
	2009	17.25	17.957	17.671	17.540	18.839	19.808	19.110	20.203	-0.707	-0.421	-0.290	-1.589	-2.558	-1.860	-2.953

¹N/U stands for Not Used. None of the models used the select years for mean difference in difference calculation because FDA model did not have those observations available for US.

Appendix 5 Estimated/Predicted Smoking Rates in the U.S.

Year		Actual Smoking Rates	Estimated/Predicted Smoking Rates							Unexplained Smoking Rate						
			<i>FDA Model</i>	<i>Model A</i>	<i>Model B</i>	<i>Model C</i>	<i>Model D</i>	<i>Model E</i>	<i>Model F</i>	<i>FDA Model</i>	<i>Model A</i>	<i>Model B</i>	<i>Model C</i>	<i>Model D</i>	<i>Model E</i>	<i>Model F</i>
Pre	1995	24.6	24.742	24.704	24.623	24.623	25.360	25.805	25.715	-0.142	-0.104	-0.023	-0.023	-0.760	-1.205	-1.115
	1997	24.6	24.213	24.276	24.444	24.444	24.191	23.918	23.822	0.344	0.324	0.156	0.156	0.409	0.682	0.778
	1998	23.9	23.971	23.979	24.071	24.071	23.694	23.373	23.325	-0.053	-0.079	-0.171	-0.171	0.206	0.527	0.575
	1999	23.3	23.564	23.562	23.305	23.305	23.190	23.136	23.206	-0.261	-0.262	-0.005	-0.005	0.110	0.164	0.094
	2000	23.1	23.005	22.974	23.055	23.055	22.638	22.708	22.807	0.060	0.126	0.045	0.045	0.462	0.392	0.293
Post	2001	22.6	22.869	22.857	22.884	22.884	22.364	22.302	22.417	-0.226	-0.257	-0.284	-0.284	0.236	0.298	0.183
	2002	22.3	22.141	22.259	22.658	22.659	21.865	21.976	22.116	0.121	0.041	-0.358	-0.359	0.435	0.324	0.184
	2003	21.3	21.945	21.854	22.647	22.765	21.487	21.582	21.631	-0.635	-0.554	-1.347	-1.465	-0.187	-0.282	-0.331
	2005	20.7	21.538	21.446	22.563	22.859	20.988	20.927	20.855	-0.814	-0.746	-1.863	-2.159	-0.288	-0.227	-0.155
	2006	20.6	21.447	21.319	22.533	22.727	20.798	20.636	20.626	-0.882	-0.719	-1.933	-2.127	-0.198	-0.036	-0.026
	2007	19.4	21.211	21.053	22.406	22.665	20.545	20.414	20.374	-1.762	-1.653	-3.006	-3.265	-1.145	-1.014	-0.974
	2008	20.4	20.948	20.853	22.316	22.494	20.336	20.193	20.212	-0.539	-0.453	-1.916	-2.094	0.064	0.207	0.188
	2009	20.5	21.190	19.961	21.674	22.233	19.773	20.258	20.124	0.323	0.539	-1.174	-1.733	0.727	0.242	0.376