Penalties for Speeding and their Effect on Moving Violations: Evidence from Quebec Drivers

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Abstract.

Résumé.

JEL classification: K42, K49

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	Logistic Regression					Linear Probability Model		
	Marginal Effects		Estimate	Standard	Sig.	Estimate	Standard	Sig.
	AME	MER		Error			Error	
Full sample Drivers (9,675,245,494 observations)								
Model without age-policy interaction:								
Policy	-3.7849	-17.8748	-0.0926	0.0010	**	-3.8656	0.0411	**
Model with age-policy interaction:								
Policy	-0.6709	-2.9587	-0.0435	0.0370		-1.1761	0.5700	
Age 16-19 * policy	-4.9094	-13.7384	-0.0684	0.0373		-6.2697	0.6707	**
Age 20-24 * policy	-5.3116	-14.2921	-0.0822	0.0371		-6.7723	0.6059	**
Age 25-34 * policy	-3.9081	-12.1981	-0.0834	0.0370		-5.1489	0.5805	**
Age 35-44 * policy	-1.7999	-6.0114	-0.0430	0.0371		-2.6807	0.5780	**
Age 45-54 * policy	-1.1679	-4.2241	-0.0337	0.0371		-1.9497	0.5759	*
Age 55-64 * policy	-0.6156	-2.4087	-0.0225	0.0371		-1.2160	0.5762	
Age 65+ * policy	0.7289	3.1682	0.0385	0.0372		0.3767	0.5752	

TABLE 1
Pooled Regressions for all offences, male and female drivers
For each regression, the dependent variable is an indicator that a driver has committed any offence on a particular day. All regressions contain age category and demerit point category controls, as well as monthly and weekday indicator variables. The baseline age category comprises drivers under the age of 16. The heading "Sig." is an abbreviation for statistical significance, with the symbol * denoting statistical significance at the 0.1% level and ** the 0.001% level. In the linear probability model, coefficients and heteroskedasticity-robust standard errors are multiplied by 100,000.

	Logistic Regression					Linear Probability Model		
	Marginal Effects		Estimate	Standard Error	Sig.	Estimate	Standard Error	Sig.
	AME	MER						
Male Drivers (5,335,033,221 observations)								
Model without age-policy interaction:								
Policy	-5.8346	-23.5011	-0.1113	0.0012	**	-5.9663	0.0628	**
Model with age-policy interaction:								
Policy	-0.3718	-1.4247	-0.0195	0.0386		-1.0915	0.7342	
Age 16-19 * policy	-10.6130	-24.0600	-0.1107	0.0389		-11.1587	0.9191	**
Age 20-24 * policy	-10.8708	-23.8645	-0.1300	0.0387	*	-11.9225	0.8017	**
Age 25-34 * policy	-7.6030	-19.9233	-0.1301	0.0387	*	-8.6158	0.7536	**
Age 35-44 * policy	-4.5014	-12.8637	-0.0891	0.0387		-5.0295	0.7484	**
Age 45-54 * policy	-3.1065	-9.5411	-0.0713	0.0387		-3.5740	0.7450	**
Age 55-64 * policy	-2.0814	-6.9077	-0.0594	0.0387		-2.5200	0.7455	*
Age 65+ * policy	0.0269	0.1009	0.0011	0.0389		-0.2808	0.7427	
Female Drivers (4,340,212,273 observations)								
Model without age-policy interaction:								
Policy	-0.7812	-4.2791	-0.0294	0.0019	**	-0.8000	0.0495	**
Model with age-policy interaction:								
Policy	-0.3697	-1.8779	-0.0760	0.1304		-0.7470	0.6348	
Age 16-19 * policy	2.5923	9.5218	0.0625	0.1307		0.7804	0.7413	
Age 20-24 * policy	1.7554	6.0629	0.0415	0.1305		-0.0442	0.6765	
Age 25-34 * policy	0.6728	2.4781	0.0200	0.1304		-0.9585	0.6483	
Age 35-44 * policy	1.6309	6.1424	0.0508	0.1304		0.0531	0.6458	
Age 45-54 * policy	1.0967	4.4729	0.0450	0.1304		-0.1831	0.6424	
Age 55-64 * policy	1.0472	4.6017	0.0587	0.1305		0.1339	0.6424	
Age 65+ * policy	1.6217	7.6916	0.1335	0.1306		0.9727	0.6416	

TABLE 2
Regressions for all offences
For each regression, the dependent variable is an indicator that a driver has committed any offence on a particular day. All regressions contain age category and demerit point category controls, as well as monthly and weekday indicator variables. The baseline age category comprises drivers under the age of 16. The heading "Sig." is an abbreviation for statistical significance, with the symbol * denoting statistical significance at the 0.1% level and ** the 0.001% level. In the linear probability model, coefficients and heteroskedasticity-robust standard errors are multiplied by 100,000.

	Logistic Regression					Linear Probability Model		
	Marginal Effects		Estimate	Standard	Sig.	Estimate	Standard	Sig.
	AME	MER		Error			Error	
Drivers in Age Group 16-19 (252,903,500 observations)								
Policy Indicator	-6.6974	-13.0280	-0.0853	0.0045	**	-6.5742	0.3539	**
Drivers in Age Group 20-24 (679,154,662 observations)								
Policy Indicator	-8.5951	-23.2737	-0.1199	0.0029	**	-8.4513	0.2059	**
Drivers in Age Group 25-34 (1,721,109,220 observations)								
Policy Indicator	-6.6050	-20.6684	-0.1268	0.0021	**	-6.5547	0.1102	**
Drivers in Age Group 35-44 (1,957,261,955 observations)								
Policy Indicator	-3.9187	-12.7882	-0.0877	0.0021	**	-3.9221	0.0956	**
Drivers in Age Group 45-54 (2,171,413,198 observations)								
Policy Indicator	-3.0705	-11.3413	-0.0837	0.0022	**	-3.0670	0.0822	**
Drivers in Age Group 55-64 (1,611,824,607 observations)								
Policy Indicator	-2.2195	-9.7673	-0.0775	0.0030	**	-2.2167	0.0843	**
Drivers in Age Group 65-199 (1,262,602,202 observations)								
Policy Indicator	-0.4329	-2.5930	-0.0232	0.0041	**	-0.4337	0.0768	**

TABLE 3
Regressions for all offences, by age group
For each regression, the dependent variable is an indicator that a driver has committed any offence on a particular day. All regressions contain age category and demerit point category controls, as well as monthly and weekday indicator variables. The baseline age category comprises drivers under the age of 16. The heading "Sig." is an abbreviation for statistical significance, with the symbol * denoting statistical significance at the 0.1% level and ** the 0.001% level. In the linear probability model, coefficients and heteroskedasticity-robust standard errors are multiplied by 100,000.

	Logistic Regression					Linear Probability Model		
	Marginal Effects		Estimate	Standard	Sig.	Estimate	Standard	Sig.
	AME	MER		Error			Error	
Male Drivers (5,335,033,221 observations)								
All point values	-5.8346	-23.5011	-0.1113	0.0012	**	-5.9663	0.0628	**
1 point	0.3993	1.1872	0.0953	0.0043	**	0.3930	0.0177	**
2 points	-0.3960	-1.3014	-0.0191	0.0019	**	-0.4315	0.0394	**
3 points	-4.7086	-21.2669	-0.1872	0.0017	**	-4.7786	0.0436	**
4 points	-0.0725	-0.5024	-0.1252	0.0114	**	-0.0804	0.0066	**
5 points	-0.8123	-6.5090	-0.6470	0.0080	**	-0.8189	0.0100	**
7 points	-0.1607	-1.4815	-0.7392	0.0193	**	-0.1625	0.0042	**
9 or more points	-0.0657	-0.2363	-0.2501	0.0170	**	-0.0675	0.0045	**
Female Drivers (4,340,212,273 observations)								
All point values	-0.7812	-4.2791	-0.0294	0.0019	**	-0.8000	0.0495	**
1 point	0.5197	2.3386	0.2124	0.0062	**	0.5174	0.0150	**
2 points	0.3712	1.7956	0.0303	0.0028	**	0.3613	0.0336	**
3 points	-1.4226	-8.8404	-0.1256	0.0029	**	-1.4289	0.0323	**
4 points	-0.0011	-0.0093	-0.0098	0.0293		-0.0010	0.0032	
5 points	-0.2126	-3.1046	-0.7494	0.0187	**	-0.2105	0.0053	**
7 points	-0.0195	-0.5213	-0.9113	0.0695	**	-0.0191	0.0015	**
9 or more points	-0.0180	-0.0516	-0.1541	0.0282	**	-0.0180	0.0033	**

TABLE 4
Regressions by ticket-point value
In each row, the dependent variable is an indicator that a driver has committed an offence with the stated point value on a particular day. The categories of tickets with 3, 5 and 7 points includes tickets with 6, 10 and 14 points after the policy change, respectively, and the category with 9 or more points includes tickets with all corresponding doubled values after the policy change. All regressions contain age category and demerit point category controls, as well as monthly and weekday indicator variables. The baseline age category comprises drivers under the age of 16. The heading "Sig." is an abbreviation for statistical significance, with the symbol * denoting statistical significance at the 0.1% level and ** the 0.001% level. In the linear probability model, coefficients and heteroskedasticity-robust standard errors are multiplied by 100,000.

	Logistic Regression					Linear Probability Model		
	Marginal Effects		Estimate	Standard	Sig.	Estimate	Standard	Sig.
	AME	MER		Error			Error	
Male Drivers (921,131,812 observations)								
All point values	-38.3085	-57.3556	-0.3732	0.0021	**	-38.0770	0.2114	**
1 point	-0.5567	-0.6172	-0.0735	0.0076	**	-0.5454	0.0572	**
2 points	-7.7110	-9.4813	-0.2111	0.0035	**	-7.7125	0.1261	**
3 points	-24.6472	-39.8692	-0.4677	0.0029	**	-24.5075	0.1520	**
4 points	-0.9036	-2.2192	-0.8975	0.0228	**	-0.8445	0.0205	**
5 points	-3.3687	-8.0148	-1.0016	0.0124	**	-3.3206	0.0393	**
7 points	-0.7491	-1.6777	-1.1495	0.0291	**	-0.7270	0.0173	**
9 or more points	-0.3658	-0.4571	-0.7647	0.0319	**	-0.3543	0.0145	**
Female Drivers (249,294,614 observations)								
All point values	-26.2094	-42.9183	-0.4252	0.0052	**	-26.0411	0.3154	**
1 point	-0.1042	-0.1669	-0.0239	0.0193		-0.0916	0.0830	
2 points	-5.9275	-8.6399	-0.2441	0.0082	**	-5.9044	0.1970	**
3 points	-17.7920	-29.9523	-0.5749	0.0075	**	-17.6976	0.2250	**
4 points	-0.2546	-0.5826	-1.2986	0.1060	**	-0.2424	0.0181	**
5 points	-1.6624	-5.2147	-1.3612	0.0425	**	-1.6387	0.0469	**
7 points	-0.2080	-0.7392	-1.6962	0.1444	**	-0.2020	0.0151	**
9 or more points	-0.2632	-0.2503	-1.1624	0.0942	**	-0.2568	0.0202	**

TABLE 5
Regressions for high-point drivers by ticket-point value
In each row, the dependent variable is an indicator that a driver has committed an offence with the stated point value on a particular day. The categories of tickets with 3, 5 and 7 points includes tickets with 6, 10 and 14 points after the policy change, respectively, and the category with 9 or more points includes tickets with all corresponding doubled values after the policy change. All regressions contain age category and demerit point category controls, as well as monthly and weekday indicator variables. The baseline age category comprises drivers under the age of 16. The heading "Sig." is an abbreviation for statistical significance, with the symbol * denoting statistical significance at the 0.1% level and ** the 0.001% level. In the linear probability model, coefficients and heteroskedasticity-robust standard errors are multiplied by 100,000.

	Logistic Regression					Linear Probability Model		
	Marginal Effects		Estimate	Standard Error	Sig.	Estimate	Standard Error	Sig.
	AME	MER						
Male Drivers (2,618,869,394 observations)								
Model without age-policy interaction:								
Policy	-0.1306	-0.5478	-0.0024	0.0017		-0.2109	0.0905	
Model with age-policy interaction:								
Policy	-1.0812	-4.1848	-0.0572	0.0540		-1.8092	1.0215	
Age 16-19 * policy	-1.1446	-2.6473	-0.0106	0.0545		-2.9360	1.3097	
Age 20-24 * policy	2.0266	4.5628	0.0204	0.0542		-0.1000	1.1226	
Age 25-34 * policy	3.2514	8.7684	0.0457	0.0542		1.3441	1.0507	
Age 35-44 * policy	2.8733	8.4706	0.0496	0.0542		1.2368	1.0420	
Age 45-54 * policy	3.4577	10.9720	0.0698	0.0542		1.9795	1.0375	
Age 55-64 * policy	3.5248	12.0052	0.0879	0.0543		2.3344	1.0386	
Age 65+ * policy	3.3942	12.9623	0.1316	0.0545		2.7337	1.0342	
Female Drivers (2,109,880,942 observations)								
Model without age-policy interaction:								
Policy	-0.1543	-0.8795	-0.0059	0.0027		-0.1803	0.0706	
Model with age-policy interaction:								
Policy	0.8415	4.3695	0.1696	0.1874		0.6983	0.9249	
Age 16-19 * policy	-6.8789	-26.4519	-0.1940	0.1879		-1.1349	1.0789	
Age 20-24 * policy	-6.4219	-23.3417	-0.1686	0.1875		-0.0914	0.9821	
Age 25-34 * policy	-5.7121	-22.0027	-0.1848	0.1875		-1.0372	0.9438	
Age 35-44 * policy	-5.4912	-21.6223	-0.1970	0.1875		-1.4878	0.9396	
Age 45-54 * policy	-3.7063	-15.7414	-0.1681	0.1875		-0.8437	0.9355	
Age 55-64 * policy	-2.4244	-11.0054	-0.1496	0.1876		-0.6454	0.9358	
Age 65+ * policy	-1.0624	-5.1866	-0.1028	0.1878		-0.3173	0.9345	

TABLE 6
Placebo regressions for all offences
For each regression, the dependent variable is an indicator that a driver has committed any offence on a particular day. All regressions contain age category and demerit point category controls, as well as monthly and weekday indicator variables. The baseline age category comprises drivers under the age of 16. The heading "Sig." is an abbreviation for statistical significance, with the symbol * denoting statistical significance at the 0.1% level and ** the 0.001% level. In the linear probability model, coefficients and heteroskedasticity-robust standard errors are multiplied by 100,000.

	Logistic Regression					Linear Probability Model		
	Marginal Effects		Estimate	Standard	Sig.	Estimate	Standard	Sig.
	AME	MER		Error			Error	
Male Drivers (5,335,033,221 observations)								
Policy Indicator	-4.0366	-16.4792	-0.0762	0.0015	**	-4.1859	0.0763	**
Month 1	9.9449	38.5317	0.1483	0.0047	**	8.6823	0.2761	**
Month 2	7.2862	27.2675	0.1110	0.0046	**	6.6386	0.2726	**
Month 3	2.2160	8.3591	0.0380	0.0048	**	2.2264	0.2683	**
Month 4	-4.7201	-17.3888	-0.0965	0.0049	**	-5.0416	0.2534	**
Month 5	-4.1329	-17.4499	-0.0969	0.0052	**	-4.5641	0.2379	**
Month 6	-6.4410	-20.9716	-0.1206	0.0047	**	-6.9509	0.2708	**
Month 7	-4.2653	-14.4849	-0.0782	0.0046	**	-4.4353	0.2648	**
Month 8	-6.3291	-22.5706	-0.1320	0.0049	**	-7.3088	0.2584	**
Month 9	-4.9332	-35.9259	-0.2503	0.0071	**	-6.6876	0.1737	**
Month 10	-10.5940	-44.5275	-0.3699	0.0057	**	-15.3145	0.2167	**
Month 11	-6.2712	-23.1921	-0.1366	0.0051	**	-7.2667	0.2609	**
Month 12	-2.8571	-10.5662	-0.0551	0.0047	**	-3.1070	0.2560	**
Female Drivers (4,340,212,273 observations)								
Policy Indicator	0.8179	4.6888	0.0310	0.0022	**	0.8391	0.0611	**
Month 1	3.7539	19.1217	0.1063	0.0070	**	3.5263	0.2238	**
Month 2	2.1374	10.6644	0.0632	0.0069	**	2.2000	0.2191	**
Month 3	-0.4495	-2.3531	-0.0157	0.0074		-0.3857	0.2112	
Month 4	-3.4773	-18.6622	-0.1527	0.0078	**	-4.0417	0.1945	**
Month 5	-3.2337	-19.8371	-0.1654	0.0083	**	-3.9171	0.1824	**
Month 6	-4.5281	-19.8371	-0.1654	0.0071	**	-4.8207	0.2167	**
Month 7	-3.8277	-17.3447	-0.1390	0.0071	**	-3.9811	0.2116	**
Month 8	-4.5030	-21.4857	-0.1842	0.0074	**	-5.3036	0.2072	**
Month 9	-2.9968	-32.3390	-0.3584	0.0117	**	-5.3165	0.1302	**
Month 10	-6.0362	-37.1693	-0.5268	0.0095	**	-10.3117	0.1611	**
Month 11	-4.3594	-22.6167	-0.1978	0.0080	**	-5.2484	0.2036	**
Month 12	-2.1026	-10.5533	-0.0772	0.0072	**	-2.1935	0.2059	**

TABLE 7
Regressions with indicators for month since policy change
For each regression, the dependent variable is an indicator that a driver has committed any offence on a particular day. All regressions contain age category and demerit point category controls, as well as monthly and weekday indicator variables. The baseline age category comprises drivers under the age of 16. The heading "Sig." is an abbreviation for statistical significance, with the symbol * denoting statistical significance at the 0.1% level and ** the 0.001% level. In the linear probability model, coefficients and heteroskedasticity-robust standard errors are multiplied by 100,000.