
Automobile Insurance: Evolution and Trends

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Summary

- Prehistory: before 1930
- 1930: major innovation
- More recent past
- Auto insurance in Canada per region/province
- Two main pieces: Ontario and Quebec
- Discussion about actuarial techniques
- Expected future trends

Prehistory: before 1930

- First motor vehicles
- Horses and cars living together
- First traffic lights : UK 1868 ? USA 1912 ?
- First turnpikes and multi-level highways
- Dangerous sites

Prehistory: before 1930

□ Accident example in Manhattan (1901)

Coefficient Actuarial Consulting, Montreal

FOUR HURT IN CAR CRASH

Wagon Hit at Full Speed and Smashed on Sixth Avenue.

Many Terror-stricken Women Passengers Jump from the Car—Motorman and Driver Had Quarreled.

Running at full speed, a north-bound Sixth Avenue car, crowded with shoppers and working girls, crashed into a delivery wagon belonging to Macy & Co., at the corner of Nineteenth Street and Sixth Avenue, last evening. Four persons were so severely injured that they were taken to the New York Hospital.

The injured are:
BORAK, MARIE, twenty-two years old, the driver of the wagon, at 2314 Sixth Avenue, fractured skull, contusions, and internal injuries.
BRITTON, CHARLES, twenty-nine years old, conductor of 322 East Fifty-second Street; contusions at both feet and internal injuries.
MACKER, SIMON, thirteen years old of 361 East Third Street; severe scalp wound, cut over forehead, and internal injuries.
BRINWELL, MARIANNE, thirteen years old, at 230 East Third Street; laceration of delivery wagon; scalp wound, contusions, and abrasions about the body.

When the car and wagon crashed together every woman on the car became hysterical, and many fainted. There was a scramble to get off, and the terror-stricken women jumped over the guard rail to the street.

Police-men Barnes and Hynes of the West Thirtieth Street Station, standing at Broadway Street and Sixth Avenue, heard cries and screams and ran to the wrecked car. The wagon, which had been struck broadside, was thrown over on its side and lay in a mass of wreckage on the curb. Traffic was delayed for three-quarters of an hour and the blockade of cars extended down as far as Eighth Street.

According to the story told by the police by Michael Ferguson, thirty-seven old, the motorman of the car, who lives at 421 West Forty-eighth Street, a wordy war ensued between him and Dolan, the wagon driver, just previous to the collision. He said that Dolan drove his wagon on the tracks, jolting at a slow pace, and paid no heed to the motorman's bell. Throongs of shoppers were coming from the department stores, and Ferguson had to stop at nearly every crossing to take on passengers. When he would start the car again the wagon would be jolting along at the same slow speed. The motorman said that he called out to Dolan several times, but the driver gave no response to the demands until near Eighteenth Street. Then he answered that he would keep on the tracks as long as he wished, instead of doing as he should do, to get to the right and let the car pass him.

At the south crossing at Nineteenth Street Ferguson brought his car to a stop to take on a load of passengers, mostly women. As the car started Dolan turned the lever and the car shot forward. He had put on all possible speed, as he is a slow road for about two blocks, and did not see the delivery wagon until too late as it turned on the tracks directly in front of the car, which knocked the wagon about fifteen feet to the curb.

Ferguson jumped and escaped unhurt. Dolan, who was on the seat, and Simons, his helper, was thrown across the down-town tracks, where he landed on his back. He was picked up unconscious. Simons was thrown over the lower bridge, and narrowly escaped being trampled to death as they attempted to run away. Police-man Hynes grabbed the bridle and cut them loose from the traces.

Simon Haaker was crossing the street. He was struck by the wagon as it toppled over, and was buried beneath the wreckage, from which he was extricated after considerable trouble. His condition is serious.

Charles Kelchlin, the conductor, was standing on the running board collecting fares. He was hurled into the air about twelve feet, falling on the sidewalk, and was unconscious when he was picked up. Forty calls were sent in to the West Park Hospital. Ambulance Squadron Headquarters responded and removed the injured. Ferguson was picked up in the West Thirtieth Street Station. Two physicians who happened to be on the scene attended the women who had fainted.

PHYSICIAN INJURED IN RUNAWAY.

Horse Dishes into a Car and Is Shot by a Policeman.

A runaway horse, owned by Dr. David Randall of 143 East Fifty-sixth Street, collided with a north-bound Lexington Avenue electric car at Fifty-sixth Street, last night, breaking its neck and causing several woman passengers to faint.

The animal was attached to a light runabout, the front wheel of which became detached from the axle, while the doctor was driving from Fifth Avenue into Fifty-sixth Street. The horse, upon feeling the jolt, started to run. Dr. Randall was thrown to the curb, receiving severe injuries to both ankles and contusions about the body. Henry Czer, the motorman, of 113 East One Hundred and second Street, saw the runaway, and turning the current on full, he drove the car ahead. But the animal crashed into the rear platform of the car. Policeman Stoffe of the East Fifty-sixth Street Station killed the horse. The horse, which was known as Venette, had the record of 2:20 1/4 on the Broadway. Dr. Randall visited it at 5:30.

KILLED IN COLLAPSE OF HOUSE.

Hoboken Man Pauses to Warn Intruder and Loses His Life—Woman Badly Hurt.

Bernitt's, 2341, a three-story brick building, at First and Second Streets, Hoboken, collapsed yesterday morning, killing one man and seriously injuring a woman. The dead man was George Koerner, fifty years old, employed in the place as a bartender. The woman is Mrs. Helen Bernitt, the owner, who was badly cut and bruised about the body. Her face and neck were also severely lacerated. She was taken to St. Mary's Hospital.

Mrs. Bernitt kept a saloon on the first floor and lived on the third floor. The second floor was used for lodge rooms by several societies.

Mrs. Bernitt, Koerner, Annie Gervel, and Emma Raaboh, two servants, were the only persons in the building at the time of the accident. Mrs. Raaboh received only a slight bruise on her arm, and Mrs. Gervel escaped unhurt. The cause of the accident is not known, but the building was one of those severely shaken by Saturday's storm.

The collapse came almost without warning. Koerner had opened the saloon at a quick pace, and was clearing the place, assisted by the servants. When Koerner heard the first crash he shouted to the two women to make their escape, and they did so.

Koerner ran to a speaking tube leading to the top floor, and shouted to Mrs. Bernitt to hurry down, as the building was falling. As he turned to the door the front wall gave way and fell into the street. The two upper floors sagged, holding fast by the rear ends. Koerner was crushed by a falling beam, and was probably killed instantly.

Mrs. Bernitt, who had reached the lower hall, was hurled in the debris. An alarm of fire was turned on and the firemen and police were soon on the scene. Mrs. Bernitt was taken out of the ruins unconscious, but severely injured, and Koerner's body was recovered shortly after.

Mrs. Bernitt resides in the home on the building at 2340. The house was built fifty-one years ago and was regarded as one of the fine homes of the city.

While the firemen and police were removing the debris a notice, apparently that of a child, was heard from under a pile of bricks and timber, crying "Mamma, Mamma!" The debris was shifted several feet, and under it was found a half-grown bird cage in which Mrs. Bernitt's pet parrot.

The bodies of passengers had a narrow escape. One of the trolley cars of the Jersey City, Hoboken and Paterson Railroad Company was passing through the street. Just as it was nearing Bernitt's Hall a car was low riding at its crashing walls and ran on the tracks, compelling the motorman to stop the car. A mass of the debris fell within ten feet of the car.

Major innovation

- **1930 : mandatory auto insurance in UK !!**
- Reasons
- Implications
- Reflections on the 1974 "Rapport Gauvin" in the province of Quebec
- US states vs mandatory and No-Fault
- Outside Canada and US

More recent past

- ❑ Automobiles insurance development in Canada
- ❑ First C.A.S. Fellow from Quebec province: around 1975
- ❑ 303 FCAS working in Canada, 2009: from C.A.S. listings
- ❑ 102 FCAS working in Quebec
- ❑ 335 AAIARD members, summer 2009 (not all in auto insurance ...)
- ❑ Actuaries "needed" : estimated per capita, per 100 000 vehicles, per \$ millions of Direct Written Premiums ?
- ❑ Regular evolution of provincial auto insurance regimes and regulation in Ontario, Alberta, Atlantic provinces since 1990
- ❑ Government auto insurers : BC 1973, Quebec 1978 ...

Canada per region/province

British Columbia - Population (July 2008): 4 380 000

- ❑ Government Insurer : Corporation of British Columbia (ICBC) since 1973
- ❑ Offer all coverages, the only one to sell "TPL base"
- ❑ Responsibilities spread to vehicle registration, driving licenses, safety and others
- ❑ Electoral promise early 2000's: increase competition
- ❑ ICBC : Net premiums written 2008 : 3,6G\$*
- ❑ Private insurers part in 2007** : $\approx 4,9\%$ of DWP

* *source: ICBC annual report*

** *source: Brown Chart 2007*

Canada per region/province

Alberta

- ❑ Population (July 2008): 3 585 000
- ❑ Private insurers, regime with fault
- ❑ No Fault BI – rather limited «Accident Benefits» coverage
- ❑ Collision, Comprehensive: as in Quebec, Ontario (optional)
- ❑ Rate regulation differs per coverage in PPA
- ❑ Direct written premiums 2008, PPA: \$2,3G
- ❑ Avg written premium per vehicle PPA 2008 = \$1051
- ❑ Avg written premium per vehicle PPA - TPL 2008 = \$543
- ❑ Loss ratios 5 years: quite stable !

Alberta (continued)

	Population July ('000)	% Var.	Written vehicles PPA	% Var.	Written vehicles per capita	% Var.	Loss ratios GISA
2008	3,585	2.1%	2,190,766	3.7%	0.611	1.6%	59%
2007	3,511	2.6%	2,112,463	5.3%	0.602	2.6%	60%
2006	3,421	3.0%	2,006,527	6.4%	0.587	3.3%	65%
2005	3,322	2.5%	1,886,073	6.1%	0.568	3.5%	72%
2004	3,240		1,777,804		0.549		69%
5 years			9,973,633				65%

Canada per region/province

Saskatchewan – popu. (July 2008): 1 016 000

- Saskatchewan Government Insurance – (SGI) government insurer since 1945
- Saskatchewan Auto Fund : Direct Written Premiums 2008 : \$613 000 000
- Market share for private insurers in Saskatchewan auto: very low ...

Canada per region/province

Manitoba - population July 2008 : 1 208 000

- ❑ Manitoba Public Insurance – (MPI) government insurer since 1971
- ❑ Direct Written Premiums 2008 : \$842 000 000
- ❑ Market share for private insurers in Manitoba auto: very low ...

Canada per region/province

Atlantic Provinces – popu. (July 2008 : 2 333 000)

- ❑ Nova Scotia: 939 000
- ❑ New Brunswick: 747 000
- ❑ Newfoundland and Labrador: 508 000
- ❑ Prince Edward Island: 140 000
- ❑ 4 rate regulation systems in auto insurance
- ❑ Direct Written Premiums 2008, PPA: \$1,06G
- ❑ Avg written premium per vehicle PPA 2008 = \$828
(In comparison, the Montreal metropolitan region :
population near 3 000 000)

Atlantic provinces (continued)

	Population		Written vehicles		Written vehicles		Loss ratios
	July	%	vehicles	%	per	%	ratios
	('000)	Var.	PPA	Var.	capita	Var.	GISA
2008	2,333	0.3%	1,280,349	2.7%	0.549	2.4%	59%
2007	2,326	-0.3%	1,246,924	2.3%	0.536	2.5%	60%
2006	2,332	-0.3%	1,219,314	2.9%	0.523	3.2%	56%
2005	2,338	-0.2%	1,184,927	1.8%	0.507	2.1%	54%
2004	2,344		1,163,513		0.496		50%
5 years			6,095,027				56%

The case of Ontario

- ❑ Population (July 2008): 12 929 000
- ❑ Private insurers
- ❑ Injuries occurring in Ontario : No-Fault but can sue at fault driver if over a given threshold
- ❑ Physical Damage Not-at-Fault: (DCPD) Direct Compensation Property Damage since 1994
- ❑ Optional coverages : Collision, Comprehensive similar as in Quebec (UM and UDM exist too)

The case of Ontario

Many law changes :

- ❑ OMPP – June 22 1990
- ❑ Bill 164 – Jan. 1st, 1994
- ❑ Bill 59 – Nov. 1st, 1996
- ❑ Bill 198 – Oct. 1st, 2003
- ❑ Harsh regulation of rates in PPA
- ❑ Direct Written Premiums 2008 PPA: \$8,5G
- ❑ Avg. Written premium per vehicle PPA 2008: \$1 313
- ❑ Current discussions: rates are increasing, Avg. P high, loss ratios high, consumers and insurers all unhappy ...

Ontario (continued)

	Population July ('000)	% Var.	Written vehicles PPA	% Var.	Written vehicles per capita	% Var.	Loss ratios GISA
2008	12,929	1.1%	6,484,302	1.5%	0.502	0.4%	80%
2007	12,794	1.0%	6,389,890	1.9%	0.499	0.9%	80%
2006	12,665	1.1%	6,271,367	2.3%	0.495	1.2%	72%
2005	12,529	1.1%	6,131,844	2.6%	0.489	1.5%	67%
2004	12,391		5,973,604		0.482		62%
5 years			31,251,007				72%

Ontario (continued)

- ❑ Coverage of No-Fault Injuries "Accident Benefits" generous
- ❑ Coverage of No-Fault Injuries "Accident Benefits" costly (Avg Earned Premium AB per vehicle 2008 = 382\$ in PPA, 460\$ in AB motorcycles, AB clearly underrated)
- ❑ Over the threshold BI is risky (\$167 000 avg severity PPA, over \$500 000 in ATV, 2008 GISA)
- ❑ Injuries rates hard to determine for actuaries

Ontario (continued)

An exemple of sharp regulation : FSCO rates per territory – 2005

- 55 territories max, 10 max within Toronto
- "Common definition per coverage"
- "Minimum exposure number"
- "Contiguous rule"
- "Min and max variations when change"

The case of Quebec

- ❑ Population (July 2008): 7 751 000
- ❑ "Gauvin Report" 1974: high premiums, accessibility problems, uninsured motorists, slow payments ...
- ❑ 1978 Creation of Société de l'Assurance Automobile du Québec (SAAQ) : Injuries covered by No-Fault government scheme
- ❑ Private Insurers: No-Fault PD to vehicles if not-at-fault - Direct Compensation Property damage - DCPD (new) ; very few lawsuits remain ...
- ❑ Private Insurers : Optionnal coverages "own damage" Collision (B2) and Comprehensive (theft, ...) (B3)
- ❑ Very "différent" regime, stable since 1978

Quebec (continued)

SAAQ – Death rates

Year	Registered vehicles	Deaths	Death rate per 100 000 vehi.	Ratio 1973 vs year
2008	5,665,272	557	9.80	9.9
2007	5,539,013	608	10.98	8.9
2006	5,402,353	721	13.35	7.3
2005	5,306,534	707	13.32	7.3
2004	5,203,491	644	12.38	7.9
2003	5,063,449	623	12.30	7.9
2002	4,881,265	704	14.42	6.8
1973 Max	2,265,471	2 209	97.50	1.0

Quebec (continued)

SAAQ data – 25 years death rate decrease ... main reasons :

- ❑ Stricter laws against drinking and driving
- ❑ 3 points seatbelts mandatory (and enforced)
- ❑ Improved vehicle design, better protection of occupants, air bags on the rise
- ❑ Table de la Sécurité Routière
- ❑ Other safety measures ...

Quebec (continued)

Private insurers (since 1978) : physical damage to vehicles (+ BI/PD to TP if accident not in Quebec)

- ❑ \$ paid for "not-in-Quebec" : $\leq 5\%$
- ❑ Direct Compensation PD : good, stable system
- ❑ Free rate competition (Use and File, easy)
- ❑ DWP 2008 Private Passenger (PPA): \$2,5G
- ❑ Avg. Written Premium per vehi. PPA 2008: \$562 (not including \$ SAAQ car register and driving license)
- ❑ Very stable loss ratios ? (not always)

Quebec (continued)

	Population July 2008 ('000)	% Var.	Written Vehicles PPA	% Var.	Written Vehicles per capita	% Var.	Loss ratios GAA
2008	7,751	0.8%	4,433,343	1.9%	0.572	1.0%	64.2%
2007	7,686	0.7%	4,352,494	2.3%	0.566	1.5%	63.2%
2006	7,632	0.7%	4,256,709	2.5%	0.558	1.8%	61.5%
2005	7,582	0.6%	4,153,803	1.8%	0.548	1.2%	60.5%
2004	7,536		4,080,848		0.542		59.2%
5 years			21,277,197				61.7%

Quebec (continued)

	Population July ('000)	% var. 5 years	Written Vehicles PPA	% var. 5 years	Written Vehicles per capita	% var. 5 years	Loss ratios GAA
2007	7,686	0.7%	4,352,494	2.4%	0.566	1.7%	63.2%
2002	7,441	0.5%	3,863,928	2.4%	0.519	2.0%	61.6%
1997	7,275	0.5%	3,429,730	1.6%	0.471	1.1%	81.0%
1992	7,110	1.0%	3,174,970	2.9%	0.447	2.0%	69.0%
1987	6,781	0.6%	2,749,281	5.0%	0.405	4.4%	83.5%
1982	6,581		2,152,711		0.327		56.0%

Evolution: actuarial techniques

- Hugo Fortin (AAIARD 2004) writes: do reforms in auto insurance in Canada threaten the solvency of several insurers ?

Evolution: actuarial techniques

- If high direct loss ratios, who is "faulty" ?
 - A) Regulators ?
 - B) Consumers ... shopping "too much" ?
 - C) Marketing guys, IT, claims department?
 - D) Insurance companies top management ?
 - E) P&C actuaries ?
 - F) None of the above answers ?
 - G) A mix of A to E answers ?

Evolution: actuarial techniques

Refinement of "Vehicles classification and Rate Groups"

- Since around 1993, classification tables for vehicles PPA in Canada exists under "CLEAR rate groups"
- CLEAR (Canadian Loss Experience Automobile Rating) rates all vehicles "PPA" according to their expected insurance cost per coverage (normalized for other factors effects), based on detailed data from industry and Government insurers – Combined and Un-Combined Tables per coverage exist
- MSRP table (based on Manufacturer Suggested Retail Price): remnant of the past or still useful for vehicles not PPA ?
- "Can beat" CLEAR ? First, know it well ?

Future evolution

Who in this room normally forecasts ...

- Expected market share of his employer (if private insurer) in the annual budget ? Raise your hand !
- Number of written vehicles for your employer (raise your hand ...) ?
- Number of written vehicles in the market ?
- Number of written vehicles per capita ?
- Quebec population (or other province population) ?
- Global frequencies and severities, or even global per coverage and not by KOL ? (Don't raise your hand ...) !

Future evolution

- Who was using, 15 or 20 years ago, for setting automobile insurance rates and rate differentials :
 - Pure premium methods (one-way)
 - Loss ratio methods (one-way)
 - Decision trees (one-way)
 - Minimum bias (2 or 3 ways maximum)
 - GLM's, Neural Networks, Text Mining
 - Usage Based Insurance / Pay As You Drive
- 15 or 20 years ago ... on line quotes on the Web ?
- Same questions 10, 5, 2 years ago ... ?

Future evolution

- Who, in 2, 5, 10 years ... will use for setting automobile insurance rates and rate differentials :
 - Pure premium methods (one-way)
 - Loss ratio methods (one-way)
 - Decision trees (one-way)
 - Minimum bias (2 or 3 ways maximum)
 - GLM's, Neural Networks, Text Mining
 - Usage Based Insurance / Pay As You Drive
 - Other methods to come ?

Future evolution

- ❑ A rise in number of risk factors/rating criteria
- ❑ Precision of "categories/levels" per risk factor
- ❑ Fraud detection with actuarial involvement
- ❑ Sensivity/elasticity studies
- ❑ Optimization techniques
- ❑ ↑ or ↓ of automobile rate regulation ?
- ❑ Continuing trend vs ↑ of direct writer mkt share ?
- ❑ Threatening "Usage Based Insurance" ?

Future evolution

Several companies with UBI experience

- Progressive - USA
- GMAC mileage discount - USA
- Holland Insurance in South Africa
- Norwich Union - UK
- Aviva Canada
- ...

Future evolution – a simple example - we need or we fear UBI ?

Estimated risk per month of year, numbers (SAAQ data)*

Season	Death	Serious injury	Minor injury	All 3 categories
Spring	0.78	0.78	0.84	0.83
Summer	1.46	1.30	1.18	1.20
Fall	1.00	1.00	1.00	1.00
Winter	0.89	0.96	0.97	0.97

* For one given past year, whole province, not controlled for factor effects other than season itself

Illustrating past and future evolution ... who said ?

- A plan without action, it's a dream ...
- ... but action without a plan, it's a nightmare !
- Answer : it's a Japanese proverb !

Illustrating past and future evolution ...

- ❑ So, do you have a (good) plan for ratemaking in automobile insurance for the future ... and will you put it into action (soon) ?
- ❑ If you have a plan, are you an actuary sentenced to excellence ? *
- ❑ If yes, conscious of this fact, will you deliver ? *

* parody of a Quebec humorist show

Thanks for your attention !

