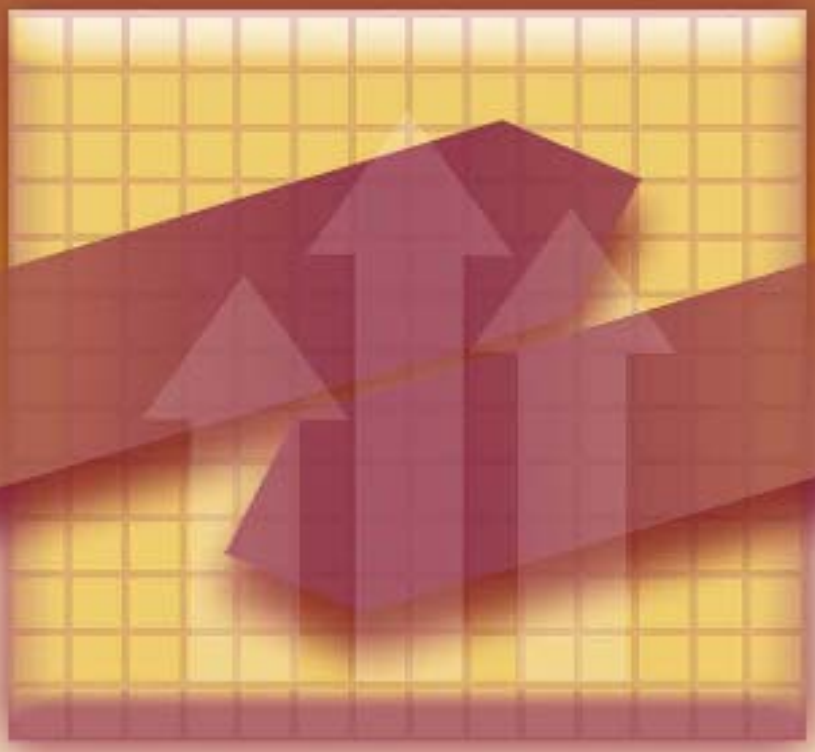
RESEARCH REPORT

ANALYSIS OF THE ACCIDENT RISK FOR RIGHT-HAND DRIVE VEHICLES IN QUÉBEC



Société de l'assurance automobile Québec

ANALYSIS OF THE ACCIDENT RISK FOR RIGHT-HAND DRIVE VEHICLES IN QUÉBEC

François Tardif, B. Sc., actuarial science
Direction des études et des stratégies en sécurité routière

Mark Baril, Eng.
Service de l'ingénierie des véhicules

Vice-présidence à la sécurité routière
Société de l'assurance automobile du Québec
November 2009

ISBN: 978-2-550-57646-4 (print version)
ISBN: 978-2-550-57645-7 (PDF version)

Legal deposit Bibliothèque et Archives nationales du Québec, 2009

Highlights

- The aim of this study was to assess the accident risk for right-hand drive vehicles and compare it with the accident risk for comparable left-hand drive vehicles, in Québec.

- Right-hand drive vehicles were identified on the basis of the vehicle identification number (VIN) and the model year of vehicles destined for the Japanese domestic market. An analysis with respect to these vehicles quickly revealed that the vast majority of them were sports cars. The right-hand drive vehicles retained for the study were grouped into the category “Sports – Right-Hand Drive”.

- The choice of comparable left-hand drive vehicles was strongly influenced by a list of models suggested by the Association des propriétaires de véhicules importés du Québec (APVIQ). The left-hand drive vehicles retained for the study were grouped into the category “Comparable – Left-Hand Drive”.

- For men aged 16 to 34, the “Sports – Right-Hand Drive” category presented, with respect to the “Comparable – Left-Hand Drive” category, increased risks of 22% and 41% for the years 2007 and 2008, respectively. Thus, the average increased risk for those two years was 32%.

- In addition, for 2007 and 2008, the increased risk for the “Sports – Right-Hand Drive” category compared with the “Comparable – Left-Hand Drive” category was present for the three age groups analysed, namely, 16-19, 20-24 and 25-34.

- A number of confounding effects, including sex and age, were taken into account in order to compare the accident risk for the two categories of vehicles as objectively as possible. Leaving aside distinctions of sex and age, the increased risks for “Sports – Right-Hand Drive” vehicles compared with “Comparable – Left-Hand Drive” vehicles were 101% and 137% for the years 2007 and 2008, respectively. Thus, for those two years, the average increased risk was 119%.

- Several complementary analyses were performed in order to strengthen the results obtained. One of the analyses showed that, despite a major change in the composition of the “Comparable – Left-Hand Drive” category, the increased risk for the “Sports – Right-Hand Drive” category remained essentially the same.

Table of Contents

Table of Contents

(cont.)

Page

List of Appendices

1. Introduction

This report arises from the mandate entrusted to us to assess the accident risk for right-hand drive vehicles and compare it with the accident risk for comparable left-hand drive vehicles, in Québec.

A ministerial order, dated April 29, 2009, prohibited new right-hand drive vehicles from being operated on Québec roads for a period of 180 days. Vehicles registered before that date were exempt from the measure, however, as were vehicles registered outside Québec and vehicles manufactured before January 1, 1971. The ministerial order is reproduced in Appendix 1.

2. Period covered by the study

In order to assess the accident risks for right-hand drive vehicles and comparable left-hand drive vehicles, we used the data on accidents and on vehicles allowed to be operated on Québec roads for the years 2007 to 2009.

It is important to note that 2009 is set apart from 2007 and 2008 by the fact that, for the 180-day period commencing on April 29, 2009, right-hand drive vehicles not registered by then were prohibited from being used on the road network.

3. Accidents

The accident data bank contains information on the drivers and vehicles involved in each accident reported to the Société de l'assurance automobile du Québec. The following excerpt from the document entitled *Dossier statistique – Bilan 2008 : Accidents, parc automobile, permis de conduire* provides a clear idea of the characteristics of the accidents that must be reported:

[TRANSLATION]

Further to sections 173 and 176 of the *Highway Safety Code*, the *Regulation respecting accident reports*, made by Order in Council 708-99 of June 16, 1999, stipulates that, effective July 15, 1999, a peace officer called to the scene of an accident in which a person has sustained bodily injury must report the accident to the Société. Where an accident has caused property damage only, a peace officer called to the scene must report the accident to the Société in the following cases:

1. The accident gave rise to failure to stop at the scene (hit and run).
2. The accident caused only property damage in excess of $1000 and occurred in one of the following situations:
- it involved a heavy vehicle other than a bus used for urban transport; or
- it occurred on an autoroute or a provincial, regional or feeder road under the responsibility of the Minister of Transport; or
- it occurred on a road under municipal management on a 100-metre stretch providing access to an autoroute or a road under the responsibility of the Minister of Transport.

In summary, the data bank on accidents contains information on accidents with bodily injury and certain accidents with property damage only. In the latter case, the accident has to meet very specific and restrictive criteria. An accident for which only a joint accident report has been completed, for instance, will not be included in the data bank. Similarly, an accident for which there is no accident report, even if a private insurance claim for vehicle repairs has been filed, will not be included in the data bank.

4. **Right-hand drive vehicles**

Since the early 1980s, all new vehicles destined for the North American market, regardless of country of origin, have had to be identified by a unique number, which we call the vehicle identification number (VIN), consisting of 17 alphanumeric characters. Vehicles destined for the Japanese domestic market, however, have not been required to be identified in the same way. Research by make, model and model year showed that the vehicles from the Japanese domestic market that are entered in the data bank for vehicles whose operation on Québec roads is allowed have identification numbers consisting of 9 to 13 characters.

Table 1 shows the number of passenger vehicles[1] allowed to be operated on Québec roads at June 30, 2009, according to the age of the vehicle and the number of characters in the VIN. The shaded area corresponds to the 2,385 passenger vehicles that are potentially from the Japanese domestic market and have the steering wheel on the right.

Table 1

Number of passenger vehicles allowed to be operated on Québec roads at June 30, 2009 by age of vehicle and number of characters in VIN

Age of vehicle	Number of characters in VIN							Total
	9	10	11	12	13	17	Other	
-1	0	0	0	0	0	15,267	0	15,267
0	0	0	0	0	0	209,874	0	209,874
1	0	0	0	0	0	334,451	0	334,451
2	0	0	0	0	0	356,189	0	356,189
3	0	0	0	0	0	288,345	0	288,345
4	0	1	0	0	0	314,774	0	314,775
5	0	0	0	0	0	282,023	0	282,023
6	0	0	0	0	0	328,790	0	328,790
7	0	0	0	0	0	311,165	1	311,166
8	0	0	1	0	0	258,570	0	258,571
9	0	1	0	0	0	267,082	0	267,083
10	0	0	0	0	0	207,845	0	207,845
11	0	0	0	0	0	201,580	0	201,580
12	0	0	0	0	0	169,007	0	169,007
13	0	0	0	0	0	116,440	0	116,440
14	0	0	0	0	0	114,037	1	114,038
15	12	6	11	13	1	90,812	1	90,856
16	62	74	171	94	10	72,135	1	72,547
17	13	264	361	60	22	64,675	3	65,398
18	6	151	331	86	7	42,171	2	42,754
19	14	66	311	36	1	31,382	3	31,813
20	14	26	109	5	0	23,090	2	23,246
21	5	7	6	1	0	19,826	5	19,850
22	1	2	4	0	0	12,758	6	12,771
23	2	2	2	0	1	9,392	13	9,412
24	1	2	3	0	0	6,806	23	6,835
25	1	3	1	2	2	5,207	17	5,233
Total	131	605	1,311	297	44	4,153,693	78	4,156,159

Note : Vehicle age was calculated on the basis of model year [2009 - (model year)].

1 Vehicles whose category of use is specified as AU-SQ-SP-PROME on the registration certificate.

In addition, the fact that Canadian regulations allow vehicles over 15 years old (according to their date of manufacture) to be imported without requiring that they meet Transport Canada safety standards facilitated the identification of right-hand drive vehicles from the Japanese domestic market because, as Table 1 shows, the vehicles in the data bank that have 9-to-13-character VINs are 15 years old or older (with 3 exceptions).

After this first stage of identification, each VIN was verified to make sure it corresponded exactly to a right-hand drive vehicle from the Japanese domestic market. We will see later that 39 vehicles were not included in the study because they did not correspond to right-hand drive vehicles from the Japanese domestic market. This validation process reduced to 2,346 the number of right-hand drive passenger vehicles from the Japanese domestic market whose operation on Québec roads was allowed at June 30, 2009. Next, copious research enabled us to precisely determine the make and model of each vehicle retained for the study. Because erroneous entries are inevitable when more than 4 million vehicles are registered, a few right-hand drive vehicles from the Japanese domestic market may have been missed in our study. On the other hand, the careful validation of each VIN left very little room for the possibility that any vehicles included were not right-hand drive vehicles from the Japanese domestic market.

4.1 Confounding effects

In order to be able to compare the accident risk for right-hand drive vehicles from the Japanese domestic market with that for comparable left-hand drive vehicles, a number of confounding effects had to be eliminated. To illustrate the phenomenon of confounding effect, let us assume there is a Category A of vehicles that young drivers are strongly drawn to. If we compare the accident risk for our Category A with that for a Category B of vehicles that are unattractive to young drivers, the comparison is shaky. What we are actually doing, in large part, is comparing the accident risk for young drivers with that for older drivers. Special care was taken to eliminate this kind of confounding effect.

4.2 Vehicle type, use and storage

When a vehicle is registered, its category of use is determined on the basis of what type of vehicle it is, how it is used, what type of user is concerned and where the vehicle is used. For the purposes of our analysis, we included right-hand drive automobiles from the Japanese domestic market that were used as passenger vehicles[2] and belonged to a natural person. A cursory analysis of the vehicles corresponding to these criteria quickly made it apparent that the vast majority of them were sports cars. Naturally, this fact strongly influenced the choice of vehicles for the comparison group.

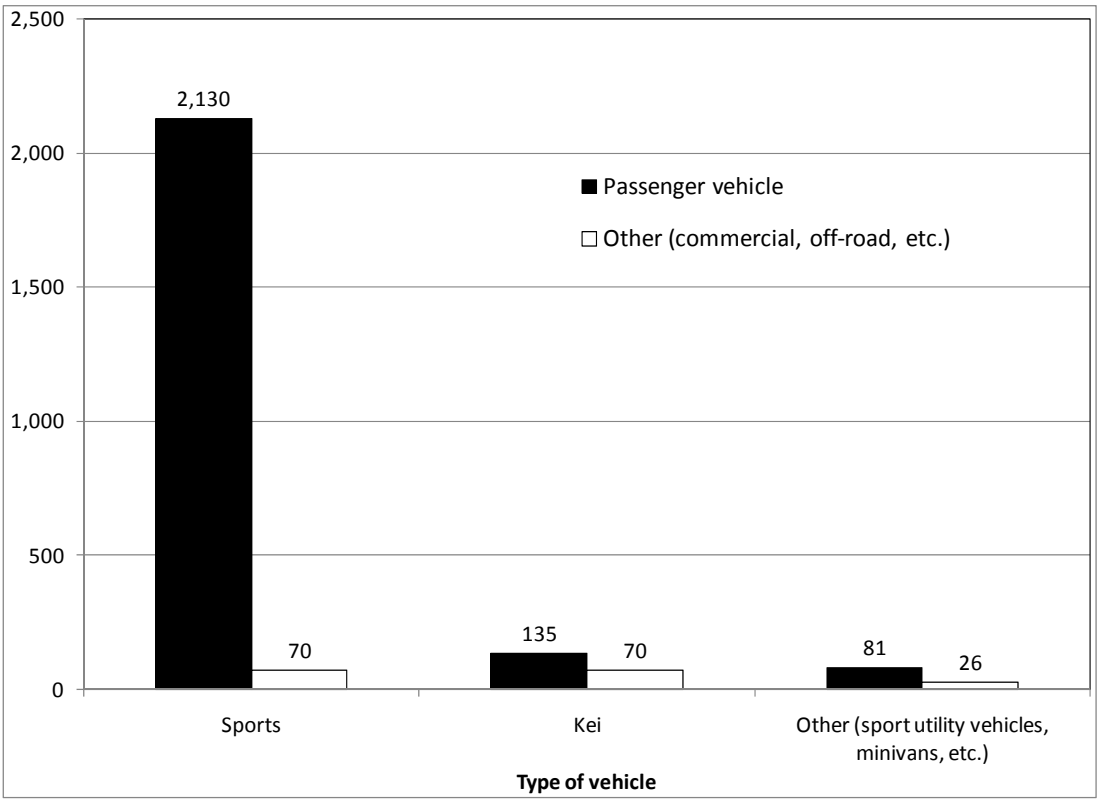
An additional factor that had to be taken into account was vehicle storage. An analysis of the data on the number of vehicles allowed to be operated on Québec roads showed that more than half of the right-hand drive vehicles from the Japanese domestic market whose operation was allowed at June 30 no longer had the same status at December 31 of the same year, as a result of requests for storage submitted to the Société. That made it inappropriate to use the most recent official figures for the number of vehicles allowed to be operated on Québec roads, which correspond to the number of vehicles allowed at December 31 of each year. The official figures, which are presented in the statistical compendium entitled *Dossier statistique – Bilan 2008 : Accidents, parc automobile, permis de conduire*, would have led us to overestimate the accident risk for right-hand drive vehicles from the Japanese domestic market, because the number of such vehicles used on Québec roads in a given year is actually higher. To ensure that the results reflected reality, it was more appropriate to use the number of vehicles allowed at June 30 of each year.

2 "Kei" class vehicles were excluded from the study because they have more in common with low-speed vehicles (LSV) from the standpoint of the protection they provide to their occupants in the event of a collision. Furthermore, there are no comparable left-hand drive vehicles that are registered in Québec and allowed to be operated without restriction.

Graph 1 shows the number of right-hand vehicles from the Japanese domestic market allowed to be operated on Québec roads at June 30, 2009, according to vehicle type and use. The data for 2009 are presented because they provide the most recent picture.

Graph 1

Number of right-hand drive vehicles from the Japanese domestic market allowed to be operated on Québec roads at June 30, 2009 by vehicle type and use



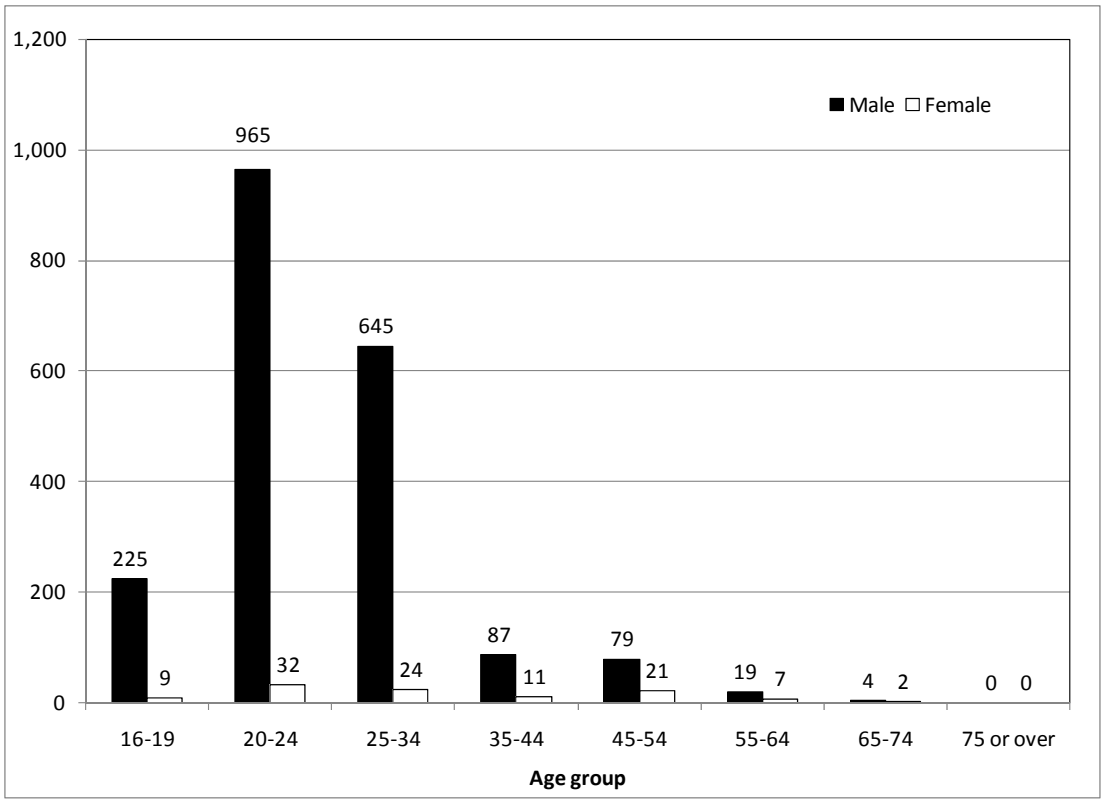
A total of 2,512 right-hand drive vehicles from the Japanese domestic market were allowed to be operated on Québec roads at June 30, 2009. Of their number, 2,346 (2,130 + 135 + 81), or 93%, were used as passenger vehicles. These included 135 “Kei” class vehicles and 81 vehicles that are not strictly automobiles, such as sport utility vehicles and minivans. As a result, for 2009, 2,130 vehicles were retained for the purposes of our study. For convenience, we have named this category “Sports – Right-Hand Drive”. Appendix 2 shows the number of vehicles in this category allowed to be operated on Québec roads at June 30 of each year, according to vehicle make, model and model year.

4.3 *Sex and age*

In view of our goal to compare the accident risk for vehicles in the "Sports – Right-Hand Drive" category with that for comparable left-hand drive vehicles as objectively as possible, it was essential to eliminate the effect that sex and age have on accident risk. Graph 2 shows the distribution of the 2,130 "Sports – Right-Hand Drive" vehicles allowed to be operated on Québec roads at June 30, 2009 by vehicle owner's sex and age.

Graph 2

Distribution of the 2,130 "Sports – Right-Hand Drive" vehicles allowed to be operated on Québec roads at June 30, 2009 by vehicle owner's sex and age



Graph 2 shows that 95% (2,024/2,130) of the vehicles in the "Sports – Right-Hand Drive" category belong to men. Of those 2,024 vehicles, 91% (1,835/2,024) belong to men aged 16 to 34.

The volume of data for women and that for men aged 35 and over was insufficient for consideration in our analysis. However, the situation was very different for men under 35. Here, the volume of data allowed for segmentation into three age groups: 16-19, 20-24 and 25-34. We were thus able to compare the accident risk for "Sports – Right-Hand Drive" vehicles with that for comparable left-hand drive vehicles for each age group separately. This brought a non-negligible advantage, because it was possible to determine not only whether there was an overall difference in accident risk for "Sports – Right-Hand Drive" vehicles among men under 35, but also whether the difference was present for each separate age group.

5. Comparable left-hand drive vehicles

As with right-hand drive vehicles, great care was taken in identifying comparable left-hand drive vehicles. A first list of makes and models was drawn up, representing close to 100,000 vehicles at June 30 of each year.

Considering the importance of the choice of comparable left-hand drive vehicles, we asked the Association des propriétaires de véhicules importés du Québec (APVIQ), which represents the owners of the vehicles concerned by this study, to collaborate. [TRANSLATION] "The APVIQ committee submitted a list of comparable models developed as a result of consultations with JDM[3] vehicle owners and other stakeholders".[4]

The APVIQ's list made it possible to further restrict our comparison group to less than 30,000 vehicles allowed to be operated on Québec roads at June 30 of each year. It is important to mention that the vehicles suggested by the APVIQ were all on our initial list. Considering that the passenger vehicle fleet counts more than 4,000,000 vehicles, we feel that the APVIQ's

3 JDM = Japanese domestic market.

4 Formulation proposed by the APVIQ representative.

suggestions, which enabled us to use a group representing less than 0.75% of the motor vehicle fleet (30,000/4,000,000), will limit possible criticism of the vehicles selected as a basis of comparison.

Appendix 3 shows the number of “Comparable – Left-Hand Drive” vehicles allowed to be operated on Québec roads at June 30 of each year, broken down by make, model and model year.

6. Accident rates

A rate is a ratio between two quantities. We compared the number of accidents with the number of vehicles allowed to be operated on Québec roads in this way. The following formula shows the calculation of the accident rate per 10,000 vehicles:

Accident rate per 10,000 vehicles = (accidents/vehicles) x 10,000

The only reason for using a rate per 10,000 vehicles was to simplify the interpretation of the results. To illustrate, if 10 out of a group of 2,000 vehicles were involved in accidents, we would say that the frequency of accidents in the group was 0.005 (10/2,000). The rate per 10,000 vehicles would be 50 (0.005 x 10,000). The result is interpreted by saying that 50 out of 10,000 vehicles will be involved in accidents. Comparing the accident ratio for vehicles in the "Sports – Right-Hand Drive" category with that for vehicles in the "Comparable – Left-Hand Drive" category allows us to determine whether there is a difference in accident risk between the two categories of vehicles.

As mentioned previously, we used the number of vehicles allowed to be operated on Québec roads at June 30 of each year, rather than at December 31, in order to take into account the fact that right-hand drive vehicles are often placed in storage. For the same reason, we restricted our analysis to accidents that occurred from April 1 to September 30 of each year.

We also had to consider the process for transferring accident report data into the Société's data bank. Normal routing and entry take a certain amount of time before the data are complete and ready to be analysed. For the purposes of this study, the data bank was used as it stood at October 5, 2009. This explains why, for the year 2009, accidents that occurred in September could not be taken into consideration.

Appendix 4 presents the data, for men, on vehicles allowed to be operated on Québec roads and on accidents for each of the "Sports – Right-Hand Drive" and "Comparable – Left-Hand Drive" categories separately. The results are segmented according to the age groups 16-19, 20-24, 25-

34, 35-44, 45-54, 55-64, 65-74 and 75 or over. Also, the results for each of the years 2007, 2008 and 2009 are given separately. The same data, for women, are presented in Appendix 5.

As mentioned previously, the lack of data for women in general and for men aged 35 and over led us to limit our analysis to men under 35. Table 2 presents the data necessary to calculate the accident rate per 10,000 vehicles, by vehicle category and the age groups 16-19, 20-24 and 25-34. We were able to calculate the rate for the years 2007, 2008 and 2009.

Table 2

Calculation of the accident rate per 10,000 vehicles by vehicle category

		Men – aged 16 to 19			Men – aged 20 to 24			Men – aged 25 to 34		
		(1)	(2)	(2)/(1) x 10 000	(3)	(4)	(4)/(3) x 10 000	(5)	(6)	(6)/(5) x 10 000
Year	Vehicle category	Vehicles	Accidents	Rate	Vehicles	Accidents	Rate	Vehicles	Accidents	Rate
2007	Sports – Right-Hand Drive	86	14	1,628	317	20	631	220	7	318
	Comparable – Left-Hand Drive	1,109	141	1,271	5,036	268	532	8,433	219	260
2008	Sports – Right-Hand Drive	185	25	1,351	696	47	675	433	11	254
	Comparable – Left-Hand Drive	1,228	121	985	4,790	213	445	7,913	155	196
2009	Sports – Right-Hand Drive	225	18	800	965	32	332	645	12	186
	Comparable – Left-Hand Drive	1,318	116	880	4,552	153	336	7,300	130	178

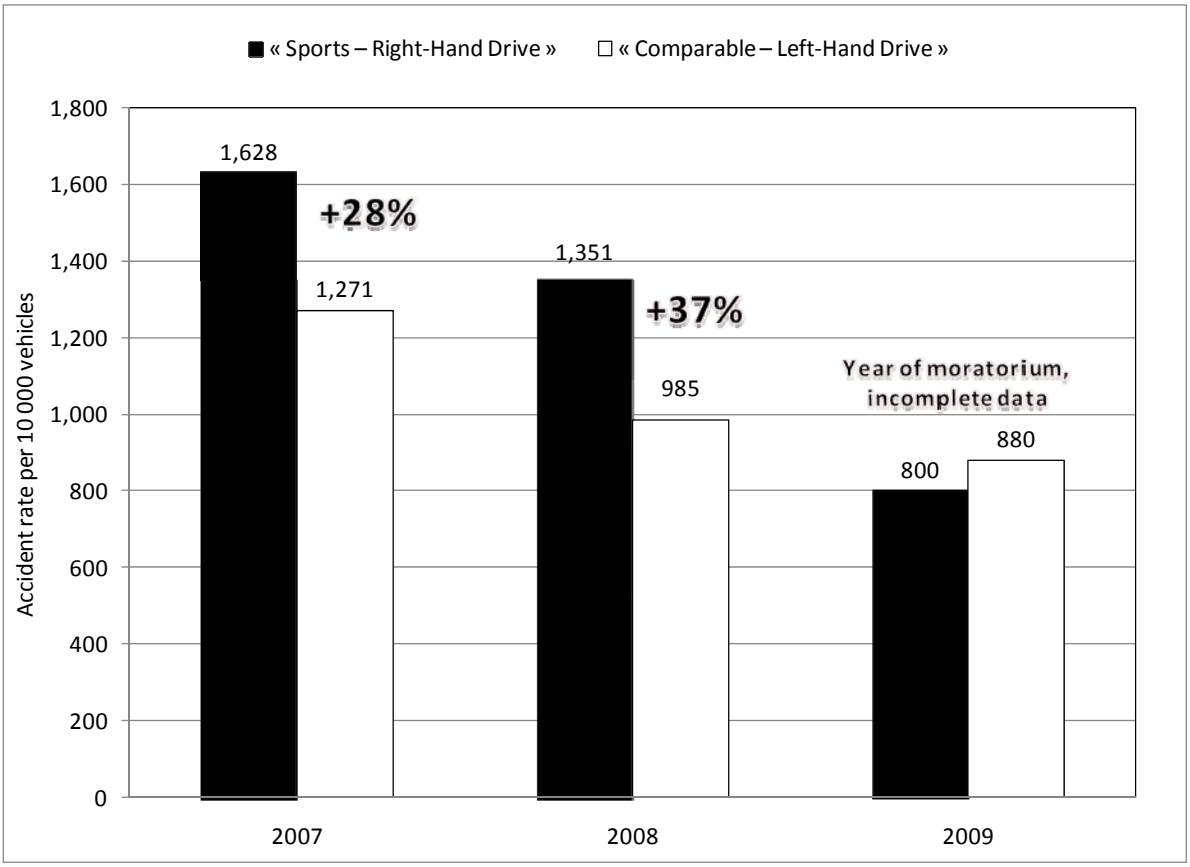
For 2007, the accident rate per 10,000 vehicles in the "Sports – Right-Hand Drive" category was 1,628 (14/86 x 10,000) for men aged 16 to 19, while that for the "Comparable – Left-Hand Drive" category was 1,271 (141/1,109 x 10,000). Thus, the accident rate per 10,000 vehicles in the "Sports – Right-Hand Drive" category was 28% [(1,628/1,271 - 1) x 100][5] higher than that for the "Comparable – Left-Hand Drive" category for men aged 16 to 19.

5 The comparison between the accident rates uses non-rounded rates. For 2007, the calculation took the form [((14/86)/(141/1,109) - 1)) x 100] for men aged 16 to 19.

Graph 3 shows the accident rate per 10,000 vehicles for men aged **16 to 19**. We see that the accident rate per 10,000 vehicles was also higher in 2008 for the "Sports – Right-Hand Drive" category—37% higher than that for the "Comparable – Left-Hand Drive" category.

Graph 3

Accident rate per 10,000 vehicles for men aged 16 to 19

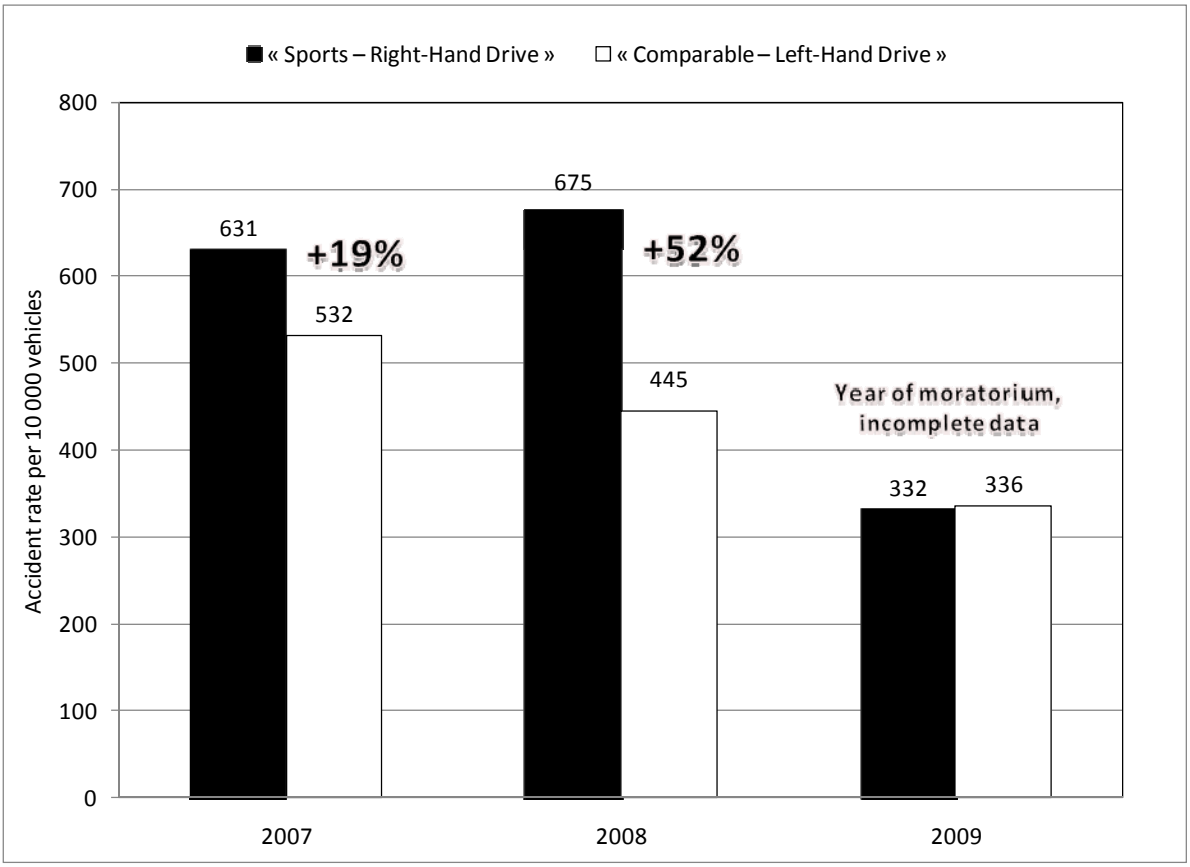


For 2009, the year of the moratorium on the registration of right-hand drive vehicles, the incomplete data show that the accident rate per 10,000 vehicles was lower for the "Sports – Right-Hand Drive" category for men aged 16 to 19.

Graph 4 shows the accident rate per 10,000 vehicles for men aged **20 to 24**. We see that the accident rate per 10,000 vehicles was higher for the "Sports – Right-Hand Drive" category than for the "Comparable – Left-Hand Drive" category, by 19% and 52% in 2007 and 2008, respectively. The incomplete results for 2009 do not show a significant difference between the two categories.

Graph 4

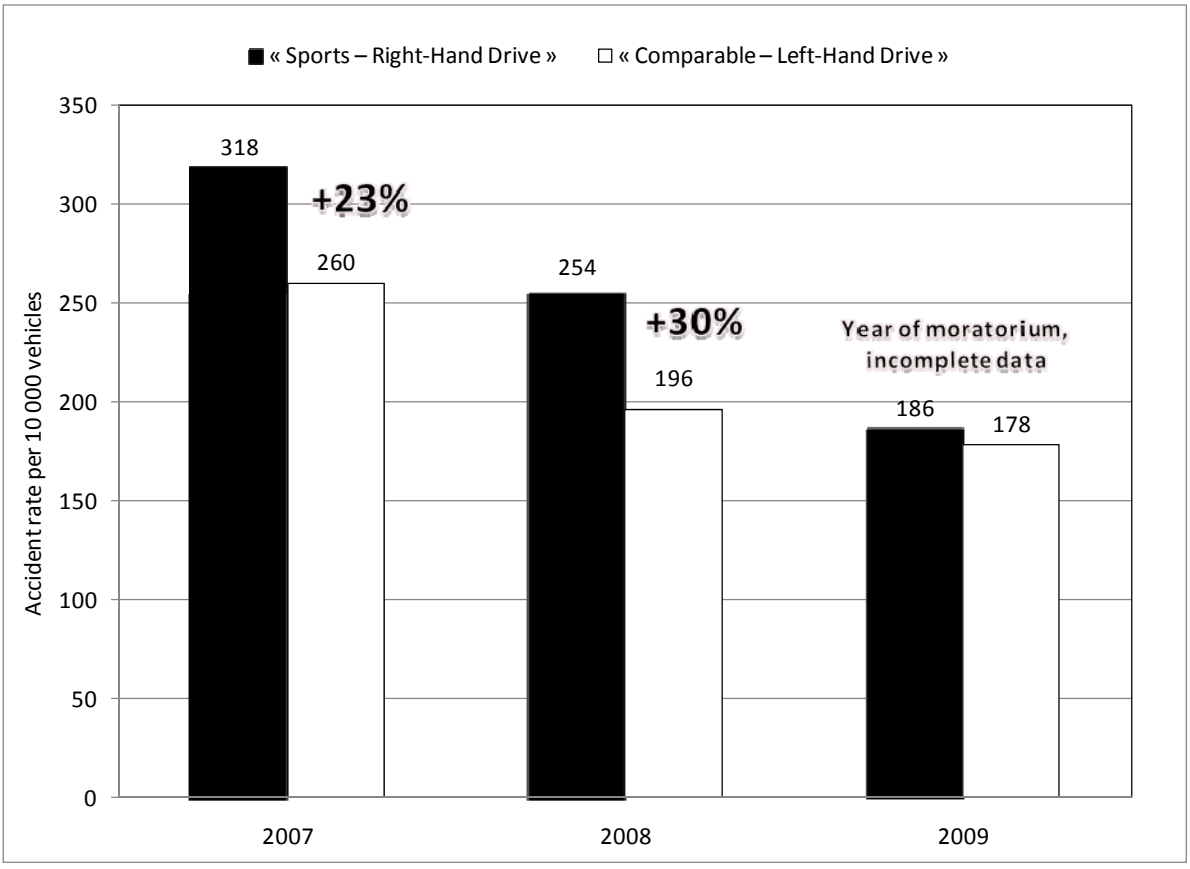
Accident rate per 10,000 vehicles for men aged 20 to 24



Finally, Graph 5 shows the accident rate per 10,000 vehicles for men aged **25 to 34**. We see that the accident rate per 10,000 vehicles was higher for the "Sports – Right-Hand Drive" category than for the "Comparable – Left-Hand Drive" category, by 23% and 30% for the years 2007 and 2008, respectively. For 2009, the year of the moratorium on the registration of right-hand drive vehicles, the incomplete data show that the accident rate per 10,000 vehicles was higher for the "Sports – Right-Hand Drive" category.

Graph 5

Accident rate per 10,000 vehicles
for men aged 25 to 34



7. Complementary analyses

Several complementary analyses were performed to reinforce the validity of the results. In particular, tests were done on the seriousness of the accidents in the "Sports – Right-Hand Drive" category compared with those in the "Comparable – Left-Hand Drive" category. Also, the distribution of the owners of the vehicles in both categories was analysed by region of residence. In addition, we assessed the impact of further restricting the number of vehicles in the "Comparable – Left-Hand Drive" category, redoing all our calculations after changing the composition of the category. The reason for this test is explained a little further on. A last test was conducted to measure the impact on the results of integrating the preliminary data for September 2009.

7.1 Break-down of accidents by seriousness

We have seen, in section 3, that the data bank on accidents contains information on the drivers and vehicles involved in each accident reported to the Société. It thus contains information on accidents with **bodily injury** and certain accidents with **property damage** only.

It was possible to compare the percentage of accidents with bodily injury separately for the "Sports – Right-Hand Drive" and "Comparable – Left-Hand Drive" categories. This revealed that 28.5% of the 186 accidents involving "Sports – Right-Hand Drive" vehicles in Table 2 caused bodily injury. The percentage for "Comparable – Left-Hand Drive" vehicles was nearly identical, with 30.4% of 1,516 accidents resulting in bodily injury. Thus, there was no significant difference in accident seriousness when we compared the "Sports – Right-Hand Drive" and "Comparable – Left-Hand Drive" categories.

7.2 Distribution of vehicle owners by region of residence

In Section 4, we spoke of the confounding effects that were taken into account so that we could calculate the difference in accident risk between the "Sports – Right-Hand Drive" and "Comparable – Left-Hand Drive" categories as objectively as possible. We took into consideration the sex and age of vehicle owners, as well as the type, use and storage of vehicles.

Since different Québec regions have different accident rates, we felt it was important to measure the impact that the vehicle owner's region of residence had on the accident risk for each vehicle category. Accordingly, we analysed the regional distribution of the owners of the vehicles in the "Sports – Right-Hand Drive" and "Comparable – Left-Hand Drive" categories.

The aim of this test was to determine whether, for instance, most owners of vehicles in the "Sports – Right-Hand Drive" category lived in regions where accident rates were highest. The result of the test, presented in Appendix 6, shows this was not the case. In point of fact, in order to eliminate the effect of the regional distribution of owners, the frequency of accidents for the "Comparable – Left-Hand Drive" category would have to be reduced by 1.7%. The impact of doing so would be to increase the increased risk for the "Sports – Right-Hand Drive" category by the same percentage. We felt the adjustment was negligible and, therefore, did not take it into account.

7.3 Change in the composition of the "Comparable – Left-Hand Drive" category

Appendix 3 shows the number of "Comparable – Left-Hand Drive" vehicles allowed to be operated on Québec roads at June 30 of each year, broken down by make, model and model year. We see that, from 2007 to 2009, the Honda Civic Si/SiR represented a high percentage (45.7%) of the vehicles in this category. In such a context, it is important to do a sensitivity analysis in order to determine whether the results for the model concerned have inordinately influenced the overall results. Therefore, we redid all our calculations, excluding the Civic Si/SiR from the "Comparable – Left-Hand Drive" category. The change in the composition of the category was radical, but the increased risk for the "Sports – Right-Hand Drive" category

remained essentially the same, the average for the years 2007 and 2008 being decreased by less than 1 percent (0.7%).

This significant sensitivity analysis shows that the Honda Civic Si/SiR vehicles included in the study had accident rates similar to those of all the other vehicles, taken as a group, in the "Comparable – Left-Hand Drive" category.

7.4 Integration of the preliminary data for September 2009

Because normal routing and entry take a certain amount of time before the data are complete and ready to be analysed, accidents that occurred in September 2009 were excluded from the study.

When we include the preliminary data for September 2009 that were available on October 5, 2009, there is an increased risk for the 16-19 and 25-34 age groups. Matters are made worse especially for men aged 16 to 19. A total of 18 accidents were reported for that group from April to August. If we add September 2009, the total is increased to 26. Table 3 details the impact of integrating the preliminary data for September 2009.

Table 3

Accident risk for 2009 for the "Sports – Right-Hand Drive" category compared with the "Comparable – Left-Hand Drive" category

	Men 16 to 19	**Men 20 to 24**	**Men 25 to 34**
Without September 2009 preliminary data	-9%	-1%	4%
With September 2009 preliminary data	17%	-5%	11%

8. Conclusions

The aim of this study was to assess the accident risk for right-hand drive vehicles and compare it with the accident risk for comparable left-hand drive vehicles, in Québec. The analysis of the data on vehicles allowed to be operated on Québec roads and on accidents, the elimination or control of the main confounding effects and the performance of complementary analyses showed that vehicles in the "Sports – Right-Hand Drive" category presented an increased risk compared with vehicles in the "Comparable – Left-Hand Drive" category.

For 2007, the increased risks were 28%, 19% and 23% for men in the 16-19, 20-24 and 25-34 age groups, respectively. For 2008, the increased risks were 37%, 52% and 30%. Taking into account the age distribution, the standardized increased risks were 22% and 41% for the years 2007 and 2008, respectively. Thus, for those two years, the average standardized increased risk was 32%. Table 4 presents the results, and Appendix 7 details the calculation.

Table 4

Increased accident risk for the "Sports – Right-Hand Drive" category compared with the "Comparable – Left-Hand Drive" category

Year	Men 16 to 19	Men 20 to 24	Men 25 to 34	Standardized increased risk
2007	28%	19%	23%	22%
2008	37%	52%	30%	41%
	2007-2008 average			32%

Leaving aside distinctions of sex and age, the increased risks for the "Sports – Right-Hand Drive" category compared with the "Comparable – Left-Hand Drive" category were 101% and 137% for the years 2007 and 2008, respectively. Thus, for those two years, the average increased risk was 119%. Appendix 8 details the calculation.

9. Comments on the conclusions

The results for 2007 and 2008, in contrast to those for 2009, are based on complete data. In addition, the 2007 and 2008 results are not biased by the potential influence of the moratorium and the announcement of a study of the accident risk for right-hand drive vehicles. Thus, **from a statistical standpoint**, the objective assessment of the accident risk for right-hand drive vehicles must not include the results for 2009. Knowing in advance that a risk study was going to be conducted may have influenced the behaviour of drivers of right-hand drive vehicles, tending to make them drive more carefully. While that is desirable, **from the standpoint of road safety**, given that the Société has the mission of reducing the number of accidents on Québec's roads, the fact remains that, statistically, the 2009 results do not represent the actual accident risk for right-hand drive vehicles.

It is also important to mention that, in data analysis, the size of the population observed can influence the stability of the results. In our analysis, we worked with rather restricted volumes of data, for both the "Sports – Right-Hand Drive" category and the "Comparable – Left-Hand Drive" category. Despite that, the six results obtained for 2007 and 2008 show increased risks for the "Sports – Right-Hand Drive" category. This reality brings an additional perspective, because it shows that an increased risk existed not only for young drivers (aged 16 to 19) but also for older drivers (aged 25 to 34) in 2007 and 2008.

10. References

Société de l'assurance automobile du Québec. *Bilan 2008, Accidents, parc automobile, permis de conduire*. Québec, 2009. 213 p.
http://www.saaq.gouv.qc.ca/publications/dossiers_etudes/bilan2008_accidents.pdf

Polk. *Vehicle Identification Number Analysis (VINA)*.
http://www.polk.com/

Sanford Evans. *Gold Book* (2003 and 2009 editions).
http://www.sanfordevans.com/

Guide de l'auto (1989 to 1995 editions).

CARFAX Vehicle History Reports.
http://www.carfax.com/

AutoCheck Vehicle History Reports.
http://www.autocheck.com

Cars-directory.net Website.
http://www.cars-directory.net/

SAS Institute Inc. *SAS User's Guide: Basics, Version 5*.

SAS Institute Inc. *Base SAS 9.1.3 Procedures Guide*.

SAS Institute Inc. *SAS 9.1.3 Output Delivery System: User's Guide*.

Appendix 1

Order number AM 2009-05 of the Minister of Transport dated 14 April 2009

Highway Safety Code
(R.S.Q., c. C-24.2)

CONCERNING access to public highways by right-hand drive vehicles

THE MINISTER OF TRANSPORT,

CONSIDERING the first paragraph of section 633.1 of the Highway Safety Code (R.S.Q., c. C-24.2), under which after consultation with the Société de l'assurance automobile du Québec, the Minister of Transport may, by order, restrict or prohibit, for up to 180 days, the use on public highways of any model or class of vehicle that endangers the safety of persons and property;

CONSIDERING the first paragraph of this section which provides that any interested party may submit comments to the person designated in the order within 90 days after its publication in the *Gazette officielle du Québec*;

CONSIDERING the first paragraph of this section which provides that at the expiry of 180 days, the Minister may, by order, make the restriction or prohibition permanent;

CONSIDERING the first paragraph of this section, according to which a restriction or prohibition under this paragraph comes into force on the date the order is published;

CONSIDERING the fourth paragraph of this section, which provides that the publication requirement set out in section 8 of the Regulations Act (R.S.Q., c. R-18.1) does not apply to an order made under this section;

CONSIDERING THAT a consultation with the Société shows that it is in favour of prohibiting for a period of 180 days, access to public highways to right-hand vehicles because they constitute a danger to the safety of persons or property;

CONSIDERING THAT for the reasons invoked by the Société, it is appropriate to prohibit access to public highways to right-hand drive vehicles for a period of 180 days;

ORDERS AS FOLLOWS:

1. Access to public highways is prohibited to righthand drive vehicles, except for:

1) Vehicles registered in Québec before April 29, 2009;

2) Vehicles registered outside of Québec;

3) Vehicles manufactured before January 1, 1971;

4) Trucks, snow blowers, and equipment transport vehicles within the meaning of the Regulation respecting road vehicle registration, made by Order in Council 1420-91 of October 16, 1991;

5) Vehicles required to stop frequently along a road in performing work for a public service;

6) Special mobile equipment;

7) Road vehicles belonging to a driving school or to an establishment that holds a permit for teaching the operation of heavy trucks issued under section 10 of An Act respecting private education (R.S.Q., c. E-9.1).

2. Road vehicles registered before April 29, 2009, by means of a temporary registration certificate or a removable registration plate, may not claim the exception specified in paragraph 1 of section 1.

3. Any interested person may forward observations about this Order before July 28, 2009 to Mark Baril, Société de l'assurance automobile du Québec, 333 Jean-Lesage, C-4-21, P.O. Box 19600, Québec City, Québec G1K 8J6, email Mark.Baril@saaq.gouv.qc.ca

4. This Order comes into force on April 29, 2009. It is repealed on October 26, 2009.

JULIE BOULET,
The Minister of Transport

Appendix 2

Number of vehicles allowed to be operated on Québec roads at June 30 of each year by make, model and model year

Sports – Right-Hand Drive

Make	Model	Model year	2007	2008	2009
Honda	Civic	1988-1994	25	73	91
	CRX	1987-1992	41	53	51
	Delsol	1992-1993	3	20	30
	Integra	1989-1994	1	4	13
	Prelude	1991-1994	3	7	15
Mazda	Cosmo	1990-1990	1	1	1
	Familia	1989-1993	4	9	15
	Roadster	1989-1993	7	18	25
	RX-7	1988-1994	25	93	133
Mitsubishi	Eclipse	1991-1991	1	1	1
	Galant	1991-1991	1	2	2
	GTO	1990-1993	18	27	39
	Lancer	1992-1994	0	9	46
Nissan	180SX	1989-1993	31	107	139
	Bluebird	1992-1992	1	1	1
	Cedric	1991-1991	0	2	2
	Fairlady	1989-1993	98	184	221
	Leopard	1992-1992	0	1	0
	Pulsar	1990-1994	34	72	97
	Silvia	1988-1994	60	125	185
	Skyline	1988-1994	249	456	564
Subaru	Legacy	1994-1994	0	0	1
	WRX	1990-1994	0	7	57
Toyota	Aristo	1991-1993	8	22	34
	Celica	1989-1994	16	40	66
	Celsior	1990-1991	1	1	2
	Corolla	1983-1992	5	11	12
	Mark2	1992-1993	0	0	5
	MR2	1987-1994	40	84	120
	Sera	1990-1991	2	1	2
	Soarer	1991-1993	18	35	55
	Supra	1989-1994	13	34	105
Total			**706**	**1,500**	**2,130**

Appendix 3

Number of vehicles allowed to be operated on Québec roads at June 30 of each year by make, model and model year

Comparable – Left-Hand Drive

Make	Model	Model year	2007	2008	2009
Acura	Integra GSR	1992-2001	443	411	368
	Integra RS	1994-2001	3,348	3,066	2,838
	Integra Type R	1997-2001	87	82	80
	RSX Type S	2002-2003	733	735	724
Dodge	Stealth R/T	1991-1995	315	303	298
Eagle	Talon TSI	1995-1998	267	243	214
Ford	Focus SVT	2002-2004	98	95	94
Honda	CRX Si	1988-1991	448	397	357
	Civic Si/SiR	1989-2004	13,761	12,805	11,756
	Del Sol	1993-1997	984	936	911
	Prelude SH	1997-2001	172	171	164
	Prelude SR-V	1993-1996	140	131	121
Hyundai	Tiburon (6 cylinders)	2003-2004	826	780	757
Mazda	RX-7 Turbo II	1986-1991	277	253	234
	Protege Speed	2003-2003	465	461	438
Mitsubishi	3000	1991-1998	18	17	18
	Eclipse	1990-1999	194	202	201
Nissan	240SX	1989-1998	1,106	976	838
	300ZX	1990-1995	398	392	386
	Sentra SE-R/Spec-V	2002-2004	2,497	2,423	2,368
Plymouth	Laser Turbo	1990-1994	83	76	54
Subaru	Impreza RS	1998-2000	414	404	402
	Impreza WRX	2002-2003	983	983	987
Toyota	Celica *(see note 1)*	1988-1991	18	12	12
	Corolla *(see note 2)*	1984-1987	55	44	36
	MR2 Super Charger	1988-1989	48	43	39
	MR2 Turbo	1991-1995	101	93	98
	Supra Turbo	1986-1991	469	442	417
Volkswagen	Corrado and Golf GTI	1988-2001	1,007	984	934
Total			**29,755**	**27,960**	**26,144**

Note 1: Models whose VIN begins with JTDDY32T, JT2ST68M or JT2ST88P.
Note 2: Models whose VIN begins with JT2AE86.

Appendix 4

Number of vehicles allowed to be operated on Québec roads and number of accidents by age group and vehicle category

Men

Year	Vehicle category	age 16 to 19		age 20 to 24		age 25 to 34	
		Vehicles	Accidents	Vehicles	Accidents	Vehicles	Accidents
2007	Sports – Right-Hand Drive	86	14	317	20	220	7
	Comparable – Left-Hand Drive	1,109	141	5,036	268	8,433	219
2008	Sports – Right-Hand Drive	185	25	696	47	433	11
	Comparable – Left-Hand Drive	1,228	121	4,790	213	7,913	155
2009	Sports – Right-Hand Drive	225	18	965	32	645	12
	Comparable – Left-Hand Drive	1,318	116	4,552	153	7,300	130

Year	Vehicle category	age 35 to 44		age 45 to 54		age 55 to 64	
		Vehicles	Accidents	Vehicles	Accidents	Vehicles	Accidents
2007	Sports – Right-Hand Drive	22	0	24	0	7	0
	Comparable – Left-Hand Drive	2,882	39	2,228	24	1,240	11
2008	Sports – Right-Hand Drive	60	2	52	1	7	0
	Comparable – Left-Hand Drive	2,739	32	2,087	18	1,182	7
2009	Sports – Right-Hand Drive	87	0	79	0	19	0
	Comparable – Left-Hand Drive	2,505	19	1,988	15	1,145	6

Year	Vehicle category	age 65 to 74		age 75 or over		Total - Men	
		Vehicles	Accidents	Vehicles	Accidents	Vehicles	Accidents
2007	Sports – Right-Hand Drive	2	0	0	0	678	41
	Comparable – Left-Hand Drive	296	5	89	3	21,313	710
2008	Sports – Right-Hand Drive	7	0	0	0	1,440	86
	Comparable – Left-Hand Drive	310	3	89	1	20,338	550
2009	Sports – Right-Hand Drive	4	0	0	0	2,024	62
	Comparable – Left-Hand Drive	311	2	91	1	19,210	442

Notes: - Vehicles allowed to be operated on Québec roads at June 30.
- Accidents from April to September.
- The 2009 results exclude accidents that occurred in September 2009.

Appendix 5

Number of vehicles allowed to be operated on Québec roads and number of accidents by age group and vehicle category

Women

Year	Vehicle category	age 16 to 19		age 20 to 24		age 25 to 34	
		Vehicles	Accidents	Vehicles	Accidents	Vehicles	Accidents
2007	Sports – Right-Hand Drive	2	0	5	0	6	1
	Comparable – Left-Hand Drive	208	23	1,283	56	2,446	46
2008	Sports – Right-Hand Drive	1	0	18	0	13	0
	Comparable – Left-Hand Drive	282	28	1,147	36	2,141	28
2009	Sports – Right-Hand Drive	9	1	32	1	24	0
	Comparable – Left-Hand Drive	297	15	1,073	27	1,902	25

Year	Vehicle category	age 35 to 44		age 45 to 54		age 55 to 64	
		Vehicles	Accidents	Vehicles	Accidents	Vehicles	Accidents
2007	Sports – Right-Hand Drive	4	0	9	0	1	0
	Comparable – Left-Hand Drive	1,511	20	1,806	18	911	6
2008	Sports – Right-Hand Drive	10	0	14	0	3	0
	Comparable – Left-Hand Drive	1,273	9	1,631	15	847	4
2009	Sports – Right-Hand Drive	11	0	21	0	7	0
	Comparable – Left-Hand Drive	1,116	8	1,460	12	790	5

Year	Vehicle category	age 65 to 74		age 75 or over		Total - Women	
		Vehicles	Accidents	Vehicles	Accidents	Vehicles	Accidents
2007	Sports – Right-Hand Drive	1	0	0	0	28	1
	Comparable – Left-Hand Drive	230	2	47	0	8,442	171
2008	Sports – Right-Hand Drive	1	0	0	0	60	0
	Comparable – Left-Hand Drive	248	5	53	0	7,622	125
2009	Sports – Right-Hand Drive	2	0	0	0	106	2
	Comparable – Left-Hand Drive	245	2	51	0	6,934	94

Notes: - Vehicles allowed to be operated on Québec roads at June 30.
- Accidents from April to September.
- The 2009 results exclude accidents that occurred in September 2009.

Appendix 6

Calculation of the impact of the regional distribution of vehicle owners

Region	Regional distribution of owners at June 30, 2008 (1) « Comparable - Left-Hand Drive »	(2) « Sports - Right-Hand Drive »	(3) Regional accident rate
01. Bas-Saint-Laurent	2.56%	2.05%	121.60
02. Saguenay–Lac-Saint-Jean	3.17%	1.77%	150.17
03. Capitale-Nationale	8.61%	8.05%	146.94
04. Mauricie	3.98%	3.89%	139.81
05. Estrie	4.06%	2.80%	132.31
06. Montréal	15.32%	15.83%	146.00
07. Outaouais	4.91%	5.25%	118.55
08. Abitibi-Témiscamingue	1.32%	0.61%	130.98
09. Côte-Nord	1.16%	0.68%	133.61
10. Nord-du-Québec	0.17%	0.00%	128.55
11. Gaspésie–Îles-de-la-Madeleine	1.18%	0.75%	122.79
12. Chaudière-Appalaches	7.33%	2.73%	110.38
13. Laval	5.15%	6.68%	95.97
14. Lanaudière	7.67%	11.26%	102.42
15. Laurentides	7.81%	8.80%	112.04
16. Montérégie	21.85%	24.90%	99.94
17. Centre-du-Québec	3.75%	3.96%	140.69

$$\left[\frac{\Sigma\,(1) \times (3)}{\Sigma\,(2) \times (3)} \right] - 1 = 1.7\%$$

Note: Accident rates from April to September 2008 per 10,000 vehicles, calculated for all passenger vehicles allowed to be operated on Québec roads at June 30, 2008.

Appendix 7

Calculation of the standardized increased risk for the "Sports – Right-Hand Drive" category compared with the "Comparable – Left-Hand Drive" category

Year	Vehicle category	Men – aged 16 to 19			Men – aged 20 to 24			Men – aged 25 to 34		
		(1) Vehicles	(2) Accidents	(2)/(1) x 10 000 Rate	(3) Vehicles	(4) Accidents	(4)/(3) x 10 000 Rate	(5) Vehicles	(6) Accidents	(6)/(5) x 10 000 Rate
2007	Sports – Right-Hand Drive	86	14	1,628	317	20	631	220	7	318
	Comparable – Left-Hand Drive	1,109	141	1,271	5,036	268	532	8,433	219	260
2008	Sports – Right-Hand Drive	185	25	1,351	696	47	675	433	11	254
	Comparable – Left-Hand Drive	1,228	121	985	4,790	213	445	7,913	155	196

Standardized increased risk for 2007

$$\left[\frac{((86+1{,}109)x1{,}628 + (317+5{,}036)x631 + (220+8{,}433)x318) \,/\, (86+1{,}109+317+5{,}036+220+8{,}433)}{((86+1{,}109)x1{,}271 + (317+5{,}036)x532 + (220+8{,}433)x260) \,/\, (86+1{,}109+317+5{,}036+220+8{,}433)}\right] - 1$$

$$= 22\%^{6}$$

Standardized increased risk for 2008

$$\left[\frac{((185+1{,}228)x1{,}351 + (696+4{,}790)x675 + (433+7{,}913)x254) \,/\, (185+1{,}228+696+4{,}790+433+7{,}913)}{((185+1{,}228)x985 + (696+4{,}790)x445 + (433+7{,}913)x196) \,/\, (185+1{,}228+696+4{,}790+433+7{,}913)}\right] - 1$$

$$= 41\%^{7}$$

Average standardized increased accident risk for 2007 and 2008[8]

(22.08% + 41.48%)/2 = 31.78%

6 When calculated with non-rounded accident rates, the increased risk for 2007 is 22.08%.

7 When calculated with non-rounded accident rates, the increased risk for 2008 is 41.48%.

8 The average was calculated using the increased risks calculated with non-rounded accident rates.

Appendix 8

Calculation of the non-standardized increased risk for the "Sports – Right-Hand Drive" category compared with the "Comparable – Left-Hand Drive" category

Year	Vehicle category	(1) Vehicles	(2) Accidents	(2)/(1) x 10 000 Rate
2007	Sports – Right-Hand Drive	706	42	595
	Comparable – Left-Hand Drive	29,755	881	296
2008	Sports – Right-Hand Drive	1,500	86	573
	Comparable – Left-Hand Drive	27,960	675	241

Non-standardized increased risk for 2007

(595/296) - 1

= 101%[9]

Non-standardized increased risk for 2008

(573/241) - 1

= 138%[10]

Average non-standardized increased accident risk for 2007 and 2008[11]

(100.92% + 137.49%)/2 = 119.20%

9 When calculated with non-rounded accident rates, the increased risk for 2007 is 100.92%.

10 When calculated with non-rounded accident rates, the increased risk for 2008 is 137.49%.

11 The average was calculated using the increased risks calculated with non-rounded accident rates.