# Age and Gender Price Discrimination for Auto Insurance in Alberta, Canada: Evidence of Anti-Competitive Behaviour

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## Abstract

We analyze the auto insurance premiums that insurance brands charge for ten hypothetical consumer profiles at two different coverage levels across eight regions in Alberta, Canada. The differences in premiums cannot be entirely explained by profile, coverage level, location, and brand level dummies. We demonstrate that insurance brands vary in which profile or type of consumer they willingly compete for. The behaviour of insurance brands is homogeneous for brands owned by the same firm. Focusing on the seven largest insurance firms in Alberta, for a given profile up to 46% of these firms by market share opt out of competing. The lowest competition found is for women, while the highest level of competition is for young men, which suggests price discrimination by age and gender may play a role in segmenting the market. We claim that this discrimination results in an illusion of competition as most consumers only have a portion of the market competing for their business.

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# 1 Introduction

A 2023 report from the Competition Bureau of Canada indicated that across many Canadian industries, there has been a rise in market concentration and markups over the last two decades (Competition Bureau of Canada, 2023). The auto insurance industry in Canada is no exception to this trend. The auto insurance firms that operate in Canada have been slowly acquiring competitors and in the province of Alberta this concentration has resulted in the market share of the four largest firms (C4) reaching 62% and the market shares of the ten largest firms (C10) reaching 94%. With higher concentration comes an increased concern of firms using market power to achieve higher markups and profits. Paulley (2024) found that in Ontario markups have increased even well beyond what can be explained by the increase in market concentration. This increase resulted in consumers paying tens of billions of dollars in additional markups between 2001 and 2021. Alberta's auto insurance industry is more concentrated than Ontario's and dominated by the same firms. Therefore, there is a possibility that the firms that have achieved higher markups in Ontario have been able to do so in Alberta. There is still ambiguity as to how firms were able to increase their markups and this paper seeks to explain in part how these higher markups were achieved. Using unique data published in Alberta, we will provide evidence of anti-competitive behaviour of auto insurance companies via age and gender price discrimination which results in firms achieving higher markups.

Auto insurance uses individual and regional characteristics to determine the premiums they will offer consumers. Insurance brands owned by the same firm may even price the consumer's characteristics differently. Chief among a consumers' characteristics are age and gender. The use of these variables has been contentious in the public domain for decades. Ontario passed a law in 1988 which banned the use of these characteristics

as rating factors for auto insurance; however, the law was repealed and never came into force. In 1992, the use of age and gender for determining premiums was taken to and eventually held up by the Supreme Court of Canada.

As auto insurance is legally mandated for driving a vehicle on a public road, all private insurance companies are required to insure anyone who wishes to obtain auto insurance. Therefore, to not compete in a section of a market, instead of denying insurance to a group of people, an insurer can instead simply raise premiums for those individuals to an unaffordable amount to discourage those people from purchasing insurance with that firm. For example consider a mother (aged 52) and a son (aged 21) who drive a 2019 Honda CR-V in Edmonton, Alberta. Their cheapest option is from Zenith Insurance Company which would provide the mandatory level of insurance for an annual premium of $836. That same mother and son duo would be charged a premium of $4,193 by The Co-Operators General Insurance Company for the same level of insurance. Now consider a man (aged 19) driving a 2013 Hyundai Elantra in Canmore, Alberta. Zenith would charge this individual $2,131 as an annual premium for the mandatory level of insurance, whereas The Co-Operators would charge a similar premium of $2,628 for that same level of coverage. From these examples, we would conclude that Zenith and The Co-Operators are not directly competing for the mother and son, and in fact, The Co-Operators are not competing in the market for the group of people similar to the individuals described at all. In contrast, we would conclude that Zenith and The Co-Operators are competing for the 19-year-old male driver. We therefore will consider how each brand prices auto insurance and try to determine if brands are only competing for segments of the population. If brands are only targeting segments of the population, then there is higher industry concentration within population segments than what is observed at the provincial level. A higher level of actual concentration would, in part, explain how markups are higher than what is explained

by the level of concentration at the provincial level. The effects of the markup, and the welfare of consumers, is left for further work.

In terms of the use of age and gender in pricing insurance, the economic literature has been straightforward. The use of information to price accurately and avoid adverse selection goes back to Akerlof (1970) and the sale of 'Lemons'. Crocker and Snow (1986) demonstrated that banning categorizations with costless information always lowers efficiencies in the insurance market, and later Rothschild (2011) showed that banning discrimination is inefficient even when categorization is costly. As the auto insurance industry grew its technology and pricing models, it may now be the case that age and gender have proxies that were previously not tracked by the industry. These proxies would mean that even if there was a ban on the use of age and gender as rating factors the premiums would not change. A paper by Fusco and Porrini (2020) tracked the banning of age as a rating characteristic for auto insurance in Italy and found that not only did the premiums between men and women of similar characteristics not fall, but the gap doubled. The economic theory of price discrimination in insurance, however, assumes competitive markets and the use of rating factors to give consumers a more accurate premium that reflects their individual risk level. If firms were to focus on segments of the population or collude, they could use rating factors to carve up the larger market and achieve lower levels of competition for every firm.

Carving up the provincial insurance market by demographics would create a multimarket contact environment that is more specific than just across provinces. As described in Bernheim and Whinston (1990), multimarket contact creates easier conditions to sustain implicit collusive agreements. In the sub-perfect equilibria described by Bernheim and Whinston firms are less likely to deviate from the collusive equilibrium because punishment can now occur in all markets of interaction, rather than the

individual market the firm deviates in. Therefore, if a firm intends to deviate and face punishment in one market then it will choose to deviate in every market. When applied to auto insurance in Alberta the theory supports that if collusive behaviour is found in Alberta along age and gender lines then it should be found in all other provinces with private auto insurance markets.

Since Bernheim and Whinston developed the theory around multimarket contact, evidence of this reduction of competition and collusive behaviour has been studied in multiple industries including cement, telecommunications, hotels, radio, and airlines. We would be the first to our knowledge to have the markets be individual characteristics instead of geography. In analysing the airline industry, Ciliberto and Williams (2014) found that carriers serving many markets simultaneously sustain nearly perfect price coordination, whereas smaller carriers with minimal markets do not. In line with the results of Ciliberto and Williams, we will pay special attention to firms in Alberta which compete nationally rather than those that only compete in Alberta or in a subset of Canadian provinces.

It is of course possible that that firms' competition for segments of a population is not a collusive equilibrium but rather a competitive one. Firms may find efficiencies in targeting one segment of the population. For example, firms may find efficiencies in advertising to specific segments of the population, or efficiencies in estimating the expected costs of insuring certain groups. It may also be the case that firms that own multiple providers of auto insurance use different providers to target different population segments. In both the collusive and competitive case the result is higher market concentration and therefore higher markups.

# 2 Data Description

Data is collected from the Alberta Auto Insurance Rate Board (AIRB). The regulator requires all insurance brands in the province to submit the premiums they would charge for ten hypothetical consumer profiles in eight different locations for both the minimum level of insurance and full coverage. Insurance brands owned by the same firm submit premiums independently. Data is available for premiums charged in January 2024; regrettably, we have no access to historical data. In aggregate, each of the 37 insurance brands submit 160 different premiums across the 10 profiles for a total of 5,920 observations.

Insurance brands must submit premiums for the following locations: Canmore, Grande Prairie, Lethbridge, North Edmonton, South Edmonton, North-East Calgary, South-West Calgary, and Vegreville. These regions have large differences in incomes, population sizes, and population densities so we would expect the location of an individual to have an effect on their premiums. Specifically, the highest premiums are expected to be in Calgary and Edmonton. These are major cities that both with a population of over one million people. Here we make a claim, however, that brands within the auto insurance industry are not targeting segments of the population based on geography. A comb through the data reveals that the order of insurance brands by premium for a particular profile changes very little with location. For example, consider our previous 19-year-old male driving a 2013 Hyundai Elantra. For the basic level of coverage, Allstate Insurance Company of Canada is the lowest premium for all eight locations, while The Personal Insurance Company, TD Insurance, and the Sovereign General Insurance Company all stay in the bottom five. Furthermore, the order of brands for a particular location varies greatly across the rating profiles.

Detailed descriptions of the hypothetical consumer profiles are outlined in Table

Table 2.1: Rating Profile Descriptions

| Rating Profile | Short Description | Primary Operator | Secondary Operator |
|---|---|---|---|
| 1 | Female age 52; Male age 21; 2019 Honda CR-V | Female, age 52; Single; No driver training; Licensed 30 years; Class 5 license; Annual mileage 25,000km; Commute one way – 25 km; 2019 Honda CR-V EX 4DR AWD (VICC Code 027101) | (Occasional); Male, age 21; Single; Driver training; Licensed 3 years; Class 5 license |
| 2 | Male age 28; Female age 27; 2016 Mazda CX-5 | Male, age 28; Married; Driver training; Licensed 10 years; Class 5 license; Annual mileage 15,000km; Commute one way – 10 km; 2016 Mazda CX-5 GX 4DR AWD (VICC Code 7841) | (Occasional); Female, age 27; Married; Driver training; Licensed 10 years; Class 5 license |
| 3 | Male age 33; 2017 Dodge Ram, Female age 31; 2014 Chevy Cruze | Male, age 33; Married; No driver training; Licensed 14 years; Class 5 license; Annual mileage 20,000km; Pleasure Use; 2017 Dodge Ram 1500 SLT Crew Cab 4WD (VICC Code 2842) | (Principal); Female, age 31; Married; Driver training; Licensed 15 years; Class 5 license; Annual mileage 10,000km; Commute one way – 10 km; 2014 Chevrolet Cruze LT Turbo 4DR (VICC Code 5099) |
| 4 | Male age 40; Female age 39; 2016 Dodge Grand Caravan | Male, age 40; Married; No driver training; Licensed 24 years; Class 5 license; Annual mileage 15,000km; Commute one way – 10 km; 2016 Dodge Grand Caravan SE (VICC Code 2662) | (Occasional); Female, age 39; Married; No driver training; Licensed 20 years; Class 5 license |
| 5 | Male age 19; 2013 Hyundai Elantra | Male, age 19; Single; Driver Training; Licensed 2 years; Class 5 license; Annual mileage 18,000 km; Pleasure use; 2013 Hyundai Elantra GL, 4DR (VICC Code 0528) | NA |
| 6 | Male age 48; 2018 Ford F150; Female age 48; 2016 Honda Civic | Male, age 48; Married; No driver training; Licensed 30 years; Class 5 license; Annual mileage 20,000 km; Commute one way – 15 km; 2018 Ford F150 XLT Supercrew 4WD (VICC Code 3558 01) | (Principal); Female, age 48; Married; Driver training; Licensed 30 years; Class 5 license; Annual mileage 15,000 km; Commute one way – 20 km; 2016 Honda Civic LX 4DR (VICC Code 025100) |
| 7 | Male age 66, Female age 65; 2016 Nissan Rogue | Male, age 66; Married; Driver training; Licensed 48 years; Class 5 license; Annual mileage 12,000km; Pleasure Use; 2016 Nissan Rogue S 4DR 2WD (VICC Code 1477) | (Occasional); Female, age 65; Married; Driver training; Licensed 45 years; Class 5 license |
| 8 | Female age 50; 2017 Ford Escape | Female, age 50; Single; No driver training; Licensed 25 years; Class 5 license; Annual mileage 15,000 km; Commute one way – 15 km; 2017 Ford Escape SE 4DR AWD (VICC Code 3737) | NA |
| 9 | Male age 70; 2017 Toyota Corolla | Male, age 70-Retired; Single; No driver training; Licensed 45 years; Class 5 license; Annual mileage 11,000 km; Pleasure Use; 2017 Toyota Corolla 4DR (VICC Code 0445 00) | NA |
| 10 | Female age 35; 2017 Honda Civic | Female, age 35; Single; No driver training; Licensed 15 years; Class 5 license; Annual mileage 25,000 km; Commute one way – 25 km; 2017 Honda Civic LX, 4DR (VICC Code 0251) | NA |

2.1. The ten rating profiles include the age, gender, marital status, and class of driver's licence of the driver as well as any designated secondary driver. Rating profiles also include the commute distance, expected annual mileage, and the year, make, model, and trim of the vehicle. Usually, the econometrician has limited information about a driver, and therefore the variance of premiums offered to a driver can be chalked up to information unobserved by the econometrician but observed by the insurance brands. In our case, our level of profile detail means that the differences in premiums, accounting for location and coverage level, is indeed how a brand prices that individual.

The limitation of our dataset is that we only have ten profiles and since each profile has many unique elements we cannot separate the effect of specific characteristics such as age on the premium from the other elements. Therefore, we focus on the profile

as a whole, simply estimating how brands price profiles relative to themselves with other profiles and relative to other brands. If an insurance brand charges more for a profile than it does on average for all other profiles relative to other brands, then this is evidence that the brand is not competing for these individuals or not competing for similar individuals. We note this is also a limitation of the regulator, as without many different profiles it is not possible to gain valuable information on the pricing of brands for characteristics of interest such as age, gender, etc. Even though the profile has many elements, we consider that if a brand is not competing for a profile it is not competing specifically for those of the profile's age and gender.

Table 2.2: Rating Profile Premium Statistics

| Rating Profile | Basic Coverage | | | | Full Coverage | | | |
|---|---|---|---|---|---|---|---|---|
| | Max | Min | Mean | SD | Max | Min | Mean | SD |
| 1 | 5,026 | 490 | 2,033.1 | 837.6 | 9,720 | 2,013 | 4,331.8 | 1,267.1 |
| 2 | 4,754 | 457 | 1,231.0 | 750.7 | 6,954 | 949 | 2,563.3 | 985.5 |
| 3 | 5,848 | 759 | 1,858.2 | 823.6 | 8,800 | 2,230 | 4,567.9 | 1,247.3 |
| 4 | 4,070 | 347 | 1,101.0 | 640.1 | 5,741 | 947 | 2,266.9 | 789.0 |
| 5 | 8,799 | 1,350 | 3,714.8 | 1,506.7 | 11,700 | 2,082 | 6,262.6 | 2,323.0 |
| 6 | 6,546 | 804 | 1,820.3 | 791.7 | 10,391 | 2,492 | 4,737.8 | 1,377.8 |
| 7 | 3,899 | 355 | 1,007.4 | 624.0 | 5,555 | 928 | 1,950.8 | 789.8 |
| 8 | 3,134 | 367 | 1,088.0 | 534.1 | 4,823 | 1,152 | 2,377.5 | 649.9 |
| 9 | 4,216 | 365 | 1,154.3 | 699.9 | 5,899 | 1,257 | 2,535.9 | 849.2 |
| 10 | 3,609 | 490 | 1,369.4 | 616.1 | 5,800 | 1,182 | 3,015.3 | 1,002.3 |

Table 2.2 outlines descriptive statistics for each rating profile across all brands and locations, separated by level of coverage. A clear outlier is Rating Profile 5, which represents a 19-year-old male. It is well-known that young men, usually under 25, have higher auto insurance rates than all other age and gender tuples. The lowest premiums are paid by those over 50. Premiums are understood to fall with age for both men and women as they take less risk or are retired and stop daily commutes. Across all profiles

the standard deviation is high and the spread between the highest and lowest premiums is consistently above \$3000. We expect part of the high standard deviation is due to location effects. For the effect of location on premiums, we are unable to estimate the effects of the characteristics of location like population size and density. Therefore we also focus on the location effect as a whole. The remaining deviation of premiums for a given profile will be estimated by different specifications of brand or firm level effects.

The AIRB also supplies market shares for 2022 and the current and historic ownership of auto insurance brands. For our firm and brand level effects, this allows us to group insurance brands by firm and see how they coordinate premiums within their own brands. For example, if brands within a firm target the same segments of the population this could indicate firm level efficiencies or a multimarket contact equilibrium.

## 3   Empirical Results

### 3.1   Industry Level Estimation

Our preliminary model will assess the Alberta auto insurance industry as a whole and estimate the effects of individual profiles, location, coverage level, and insurance brands. We opt to estimate the log of premiums as it is more realistic that brands and firms adjust premiums by percentages rather than dollars. Therefore, the log of a premium $p_{bicr}$ charged by brand $b$ for a rating profile $i$, with coverage level $c$, in region $r$, is a set of dummy variables

$$log(p_{bicr}) = \alpha + \delta Coverage_c + \beta_i Profile_i + \gamma_r Region_r + \phi_b Brand_b + \epsilon_{ficr}. \quad (1)$$

Using the specification above, we start with the case that brands charge more or less than their competitors on average, rather than above market average for one profile

and below average for another. If there remains a substantial portion of premiums unexplained by this specification then we can move to estimating brand and profile interaction terms to further estimate premiums. We also note that we use an intercept. The intercept is used to capture that there are parts of a premium not related to the expected claim costs of the policy holder, such as a firm's fixed costs, taxes, and profit margin. Including a constant, however, means that a single profile, region, and brand are each dropped and included into the intercept to avoid issues of multicollinearity.

The results of estimating equation (1) are seen in Table 3.1. Rating Profile 7, a male aged 66 with a secondary driver female aged 65, driving a 2016 Nissan Rogue is our base profile and included in the intercept. Rating Profile 7 has the lowest average premium as seen in Table 2.2; therefore, we should expect all rating profile dummies to be positive and statistically significant. Column (i) estimates equation (1) without location and brand dummies. All rating profile dummies are positive and statistically significant. The highest coefficient, and therefore the highest average premium, is for Rating Profile 5, our 19-year-old male, as expected. Just accounting for profiles and coverage level produces an R-Squared of 0.674, suggesting that the majority of differences in premiums can be explained by differences in how profiles are priced. Column (ii) includes location dummies but not brand dummies. The location dummy for Canmore is excluded and therefore a part of the intercept. The addition of location dummies only adds an additional 5% of the explanatory power of the model, increasing the R-Squared to 0.725. For each of the rating profiles, the coefficients do not change from (i) to (ii) but all standard deviations of the coefficients fall. This could be a case of removing the city versus rural effect. For each rating profile, the premiums charged should be higher in Calgary and Edmonton than in the rest of the province. Simply by adding location dummies we remove that part of the variance in premiums within a profile.

Table 3.1: Industry Level Estimation Results

| | i | ii | iii |
|---|---|---|---|
| Intercept | 6.737*** (0.019) | 6.574*** (0.021) | 6.854*** (0.025) |
| Full Coverage | 0.817*** (0.010) | 0.817*** (0.009) | 0.817*** (0.007) |
| Rating Profile 1 | 0.785*** (0.023) | 0.785*** (0.021) | 0.785*** (0.015) |
| Rating Profile 2 | 0.233*** (0.025) | 0.233*** (0.023) | 0.233*** (0.015) |
| Rating Profile 3 | 0.773*** (0.022) | 0.773*** (0.021) | 0.773*** (0.014) |
| Rating Profile 4 | 0.129*** (0.024) | 0.129*** (0.022) | 0.129*** (0.014) |
| Rating Profile 5 | 1.267*** (0.024) | 1.267*** (0.022) | 1.267*** (0.019) |
| Rating Profile 6 | 0.784*** (0.022) | 0.784*** (0.021) | 0.784*** (0.014) |
| Rating Profile 8 | 0.166*** (0.023) | 0.166*** (0.021) | 0.166*** (0.013) |
| Rating Profile 9 | 0.204*** (0.025) | 0.204*** (0.023) | 0.204*** (0.015) |
| Rating Profile 10 | 0.399*** (0.023) | 0.399*** (0.022) | 0.399*** (0.014) |
| R2 | 0.674 | 0.725 | 0.851 |
| Location Dummies | No | Yes | Yes |
| Brand Dummies | No | No | Yes |
| Num.Obs. | 5920 | 5920 | 5920 |

Estimation is with OLS. The dependent variable is log of premiums. Observations are at the profile-city-brand level.
Standard errors in parentheses below each result. Robust White Standard Errors clustered on coverage type in all columns.
Stars: * 0.1 > p, ** 0.05 > p, *** 0.01 > p

Column (iii) estimates the full specification of the model. The intercept now includes the brand dummy for Alberta Motor Association Insurance Company. With the addition of brand dummies our explanatory power increases by 12.6%, more than twice the impact of adding location dummies. It is clear from the additional R-Squared for (iii) that there are firms that charge a higher (or lower) premium on average across our rating profiles. Similar to the inclusion of the location dummies, the addition of brand dummies does not change the coefficients on the rating profiles but does lower the standard deviation of the coefficients. However, there remains 15% of the differences in premiums unaccounted for in our estimation. For an average premium of $1500, this means we still need to account for over $200. The largest standard deviation of the coefficients of the rating profiles is for Rating Profile 5. For estimating brand rating profile interaction terms we will focus on Rating Profile 5. At the moment we forgo having brand interaction terms for each rating profile as that would add over 300 more

coefficients to estimate. Therefore adding interaction terms for brands and Rating Profile 5 creates the following specification:

$$log(p_{bicr}) = \alpha + \delta Coverage_c + \beta_i Profile_i$$
$$+ \gamma_r Region_r + \phi_b Brand_b + \theta_b Brand_b \times Profile_5 + \epsilon_{ficr}. \quad (2)$$

Figures 4.2.1 and 4.2.2 show all the estimates of the interaction terms between brands and Rating Profile 5. The coefficient for the interaction of Rating Profile 5 and Zurich Insurance Company Ltd is dropped to avoid multicollinearity. Adding our interaction terms explains an additional 2.5% of the premiums of the remaining 15%. This is significant, considering that Rating Profile 5 makes up 10% of our data. Immediately it is clear that for Rating Profile 5 brands price the profile differently than just the brand dummy would suggest. Of the 37 auto insurance brands, 31 have coefficients that suggest the premiums by those brands deviate in a statistically significant percentage away from the average premium for Rating Profile 5. These deviations occur after accounting for location and brand-level dummies. Consider the Alberta Motor Association Insurance Company interaction term with Rating Profile 5. For Rating Profile 5 they reduce the premiums they charge relative to the market by 26.1%. In this, we account for Alberta Motor Association Insurance Company's average deviation from the average premium across the profiles. In other terms, if Alberta Motor Association Insurance Company charged the market average for all other profiles then a coefficient value of -0.261 suggests that for only Rating Profile 5 they charge 26.1% below the market average.

While there is a large spread of brand and Rating Profile 5 coefficients, one pattern emerges. It is clear that brands owned by the same firm adjust their premiums for

Figure 4.2.1: Rating Profile 5 and Brand Dummy Estimation Results (1)

| | i | | i |
|---|---|---|---|
| Intercept | 6.883*** (0.024) | Co-operators General Insurance Company | −0.376*** (0.079) |
| Full Coverage | 0.817*** (0.006) | Cumis General Insurance Company | 0.181*** (0.063) |
| Alberta Motor Association Insurance Company | −0.261*** (0.090) | Definity Insurance Company | 0.434*** (0.089) |
| Allstate Insurance Company of Canada | −1.358*** (0.088) | Facility Association | −0.383*** (0.085) |
| Aviva General Insurance Company | −0.127** (0.064) | Federated Insurance Company of Canada | 0.279*** (0.063) |
| Aviva Insurance Company of Canada | 0.025 (0.065) | Intact Insurance Company | 0.116 (0.083) |
| Belair Insurance Company Inc. | −0.008 (0.080) | Millennium Insurance Corporation | 0.440*** (0.071) |
| Certas Direct Insurance Company | −0.325*** (0.075) | Northbridge General Insurance Corporation | 0.283*** (0.079) |
| Certas Home and Auto Insurance Company | −0.340*** (0.075) | Optimum West Insurance Company Inc. | 0.534*** (0.064) |
| Chubb Insurance Company of Canada | 0.143** (0.063) | Peace Hills General Insurance Company | −0.302*** (0.076) |
| R2 | 0.878 | R2 | 0.878 |
| Profile Dummies | Yes | Profile Dummies | Yes |
| Location Dummies | Yes | Location Dummies | Yes |
| Brand Dummies | Yes | Brand Dummies | Yes |
| Num.Obs. | 5920 | Num.Obs. | 5920 |

Estimation is with OLS. The dependent variable is log of premiums. The brand coefficients presented are the interaction of the profile 5 dummy with each insurnace brand dummy. Observations are at the profile-city-brand level. Standard errors in parentheses below each result. Robust White Standard Errors in all columns.

Stars: * 0.1 > p, ** 0.05 > p, *** 0.01 > p

Rating Profile 5 similarly. Certas Direct Insurance Company, Certas Home and Auto Insurance Company, and The Personal Insurance Company are all owned by Desjardins. All three of these brands reduce premiums by more than 20% for Rating Profile 5. TD Home and Auto, Security National Insurance Company, and Primmum Insurance Company, all owned by TD Bank Group, reduce premiums between 32% and 34%. On the other hand, Definity Insurance Company, and their subsidiary Sonnet Insurance Company, both price Rating Profile 5 with 43% and 39% higher premiums respectively. The firms listed above represent a large combined market share of the Alberta auto insurance industry. If the largest firms in the province are targeting specific demographics, then the amount of industry concentration that can be achieved for a demographic is much higher than the provincial-level market concentration would suggest. Firms using

all of their brands to price profiles similarly would suggest they are not using specific brands to target specific demographic sections of the population. Rather, the firms are targeting specific demographics across all of their brands. This firm-level behaviour would be consistent with a multimarket contact equilibrium where each firm targets a specific group of the population.

Figure 4.2.2: Rating Profile 5 and Brand Dummy Estimation Results (2)

| | i | | i |
|---|---|---|---|
| Pembridge Insurance Company | −0.354*** (0.096) | The Personal Insurance Company | −0.237*** (0.062) |
| Primmum Insurance Company | −0.323*** (0.078) | The Portage La Prairie Mutual Insurance Company | 0.335*** (0.067) |
| S&Y Insurance Company | 0.306*** (0.080) | The Sovereign General Insurance Company | 0.179*** (0.060) |
| Security National Insurance Company | −0.332*** (0.073) | The Wawanesa Mutual Insurance Company | 0.344*** (0.103) |
| SGI CANADA Insurance Services Ltd. | 0.273*** (0.087) | Tokio Marine & Nichido Fire Insurance Co., Ltd. | 0.283*** (0.079) |
| Sompo Japan Insurance Inc. | −0.113 (0.079) | Traders General Insurance Company | 0.032 (0.066) |
| Sonnet Insurance Company | 0.389*** (0.081) | Unifund Assurance Company | 0.256*** (0.081) |
| TD Home and Auto Insurance Company | −0.346*** (0.069) | Verassure Insurance Company | 0.283*** (0.079) |
| The Dominion of Canada General Insurance Company | 0.328*** (0.074) | Zenith Insurance Company | 0.615*** (0.070) |
| R2 | 0.878 | R2 | 0.878 |
| Profile Dummies | Yes | Profile Dummies | Yes |
| Location Dummies | Yes | Location Dummies | Yes |
| Brand Dummies | Yes | Brand Dummies | Yes |
| Num.Obs. | 5920 | Num.Obs. | 5920 |

Estimation is with OLS. The dependent variable is log of premiums. The brand coefficients presented are the interaction of the profile 5 dummy with each insurnace brand dummy. Observations are at the profile-city-brand level. Standard errors in parentheses below each result. Robust White Standard Errors in all columns.
Stars: * 0.1 > p, ** 0.05 > p, *** 0.01 > p

Estimation is with OLS. The dependent variable is log of premiums. The brand coefficients presented are the interaction of the profile 5 dummy with each insurnace brand dummy. Observations are at the profile-city-brand level. Standard errors in parentheses below each result. Robust White Standard Errors in all columns.
Stars: * 0.1 > p, ** 0.05 > p, *** 0.01 > p

## 3.2   Estimation of Top Brands and Firms

In the previous subsection, we found evidence via Rating Profile 5 that insurance brands target specific rating profiles and that brands owned by the same firm seem to target the same profiles. In this subsection, we will focus on the largest firms operating in Alberta over several rating profiles. There are seven firms that each have a market share of over 6.5%. Of these, Intact is the top with 22% of the market share. The other

six are grouped into pairs. Wawanesa and TD both have around 15%, Desjardins and The Co-Operators both have just below 9%, and Aviva and Allstate have around 6.5%. These firms therefore make up 85% of Alberta's auto insurance market, and include 15 of the 37 insurance brands.

To estimate how the demographics of Alberta are split over these firms we will use five of the ten profiles. Many of the profiles are similar. for example, Rating Profiles 2, 3, and 4 are all married men between the ages of 28 to 40, and in order to limit the number of coefficients to estimate we forgo estimating firm-level dummies interacting with each rating profile. We consider Rating Profile 1, Rating Profile 3, Rating Profile 5, Rating Profile 7, and Rating Profile 10. With our seven firms and five profiles of interest, we can estimate the following specification,

$$
\begin{aligned}
log(p_{bicr}) = {} & \alpha + \delta Coverage_c + \beta_i Profile_i + \gamma_r Region_r + \phi_f Firm_f \mathbb{1}\{b \in f\} \\
& + \theta_{1,f} Firm_f \mathbb{1}\{b \in f\} \times Profile_1 + \theta_{3,f} Firm_f \mathbb{1}\{b \in f\} \times Profile_3 \\
& + \theta_{5,f} Firm_f \mathbb{1}\{b \in f\} \times Profile_5 + \theta_{7,f} Firm_f \mathbb{1}\{b \in f\} \times Profile_7 \\
& + \theta_{10,f} Firm_f \mathbb{1}\{b \in f\} \times Profile_{10} + \epsilon_{ficr} \quad (3)
\end{aligned}
$$

where $f$ is indexed from 1 to 7, representing our seven firms of interest, and therefore $\mathbb{1}\{b \in f\}$ is an indicator function that brand $b$ is owned by firm $f$.

Firm-level estimation results are presented in Table 3.3. The first row is the estimated industry average for each rating profile with basic coverage and without including location dummies, which would default the location to Canmore. To obtain the industry average we add the intercept and the profile dummies, and the sum becomes the exponent of the exponential function as we have been estimating the log of premiums. The average premium for Rating Profile 1 is then $\exp\{\alpha + \beta_1\}$. The values calculated for

Table 3.3: Firm Level Estimation Results

| Firm | Rating Profile 1 | Rating Profile 3 | Rating Profile 5 | Rating Profile 7 | Rating Profile 10 |
|---|---|---|---|---|---|
| Industry Average | 1,597.9 | 1,689.6 | 3,199.4 | 733.7 | 1,149.1 |
| Intact | −20.4% | −20.4% | −29.7% | −20.4% | −20.4% |
| Wawanesa | 53.0% | 0.0% | 0.0% | −17.1% | 0.0% |
| TD | 12.3% | −4.0% | −31.6% | 31.7% | 21.5% |
| Co-Operators | −19.2% | −19.2% | −35.1% | −19.2% | −19.2% |
| Desjardin | −6.8% | 14.1% | −32.2% | 14.1% | 29.9% |
| Aviva | 19.3% | −20.8% | −29.7% | −26.2% | −20.8% |
| Allstate | 7.3% | 10.3% | −45.3% | 161.5% | 6.2% |
| Firms not Competing | | | | | |
| Number | 4 | 3 | 1 | 3 | 4 |
| Market Share | 43.2% | 29.6% | 14.0% | 32.3% | 46.4% |

Industry average the the estimated premium for each rating profile for basic level of coverage and in Canmore. Each firm row is the estimated percentage deviation from the average of the respecitve rating profile. Firm level dummies and firm Rating Profile interaction dummies are only inluded if they are statistically significant at the 5% level with White robust standard errors. A firm is deemed to be competing if they charge below the industry average as the industry average is skewed upwards by other firms opting out of the profile as well.

each firm are the percent deviation from the industry average using the firm dummies and the firm rating profile interaction dummies. Dummy variables are only included if the values estimated in equation (3) are statistically different from zero at the 5% level using White robust standard errors. Given the specification of the model, the percent deviation is the same for every location and at both coverage levels. Using the estimates of the firm level deviations of premiums we induce an ad hoc definition of a firm competing at the rating profile level. The industry average in Table 3.3 is skewed upwards by firms not competing for a profile; therefore, we suggest that if a firm is competing for a profile it is charging below the industry average. The number of firms not competing and their total province-level market shares are shown at the bottom of the table.

Of the largest seven firms in Alberta, our results suggest upwards of 46% of the industry by market share is not competing at the profile level across all locations. The lowest levels of competition, i.e. where the most firms opt out of a profile are for Rating

Profile 1 and Rating Profile 10. This is cause for concern as these are our two female profiles. This would suggest female drivers across Alberta have less competition from the major auto insurance firms than male drivers. The exception to this would be young female drivers if they are being marketed to at a similar level as young male drivers. Our results indicate that young male drivers have the highest level of competition. People tend to stick with an insurance firm for a long period of time. This means recruiting younger clients creates long-term business, so we would expect competition to be high for both young men and women.

# 4    Conclusion

The auto insurance industry in Alberta is a fairly concentrated industry at the provincial level. However, our results indicate that concentration is higher when looking at the age and gender demographic level. It is clear that many auto insurance brands focus on particular rating profiles and do not simply charge the same percentage above or below the industry average across profiles. Firms that own multiple insurance brands do not have different brands focus on different profiles and instead actually price profiles similarly. This means if a firm like TD Bank Group chooses not to compete for a profile, then all three of TD's brands are not competing for it. We found that at the firm level up to 46% of firms by market share are not competing for particular profiles and the competition is lowest for female drivers. The result is lower competition relative to what the provincial market shares would suggest and less choice for consumers.

The policy implications of our findings are as follows. With only ten profiles to observe, the AIRB is unable to fully understand the pricing strategies of firms and which portions of the population they are not competing for. Of the ten profiles, there are only three that feature women as the principal driver and they are all between the

ages of 35-52; thus we are unable to report on the level of competition for younger and senior female drivers. As the lowest level of competition found was for female drivers, it is therefore even more important to include more female profiles to further gauge the extent of the issue. Another policy implication is that the AIRB should look to approve rate adjustments closer to the individual level. The AIRB currently approves aggregate rate changes that correspond to a percentage increase in a brand's total premiums. More granular rate change approvals could shrink the range of premiums offered by insurance brands and increase the efficiency of search for the consumer. Failure to induce competition across demographics in Alberta opens the door for even more market power of the largest firms in Alberta resulting in higher premiums and markups. As these profiles and the rate adjustment framework are used by auto insurance regulators across Canada, this is a possible national issue.

# 5    References

Akerlof, George A., "The Market for "Lemons": Quality Uncertainty and the Market
    Mechanism", *The Quarterly Journal of Economics*, 1970, 84 (3), 488-500.

Bernheim, B. Douglas, and Michael D. Whinston, "Multimarket Contact and Collusive
    Behavior", *The RAND Journal of Economics*, 1990, 21 (1), 1-26.

Boeker, Warren, Jerry Goodstein, John Stephan, and Johann Peter Murmann, "Competition
    in Multimarket Environment: The Case of Market Exit", *Organization Science*,
1997,
    8 (2), 126-142.

Ciliberto, Federico, and Jonathan W. Williams, "Does multimarket contact facilitate
tacit
    collusion? Inference on conduct parameters in the airline industry", *The RAND
Journal*
    *of Economics*, 2014, 45 (4), 764-791.

Competition Bureau of Canada, "Competition in Canada from 2000 to 2020: An Economy
    At A Crossroads", October, 2023.

Crocker, Keith J., and Arthur Snow, "The Efficiency Effects of Categorical Discrimination in
    the Insurance Industry", *Journal of Political Economy*, 1986, 95 (21), 321 – 344.

Dahlby, B.G., "Adverse Selection and Statistical Discrimination: An analysis of Canadian
    automobile insurance", *Journal of Public Economics*, 1983, 20, 121-130.

Fusco, Giulio and Donatella Porrini, "Less Discrimination, More Gender Inequality:
The Case
    of the Italian Motor-Vehicle Insurance", *The Journal of Risk Management and
Insurance*,
    2020, 24 (1), 1-11.

Medders, A. Lorilee, Jamie A. Parson, and Matthew Thomas-Reid, "Gender X and
    Auto Insurance: is Gender Rating Unfairly Discriminatory", *Journal of Insurance
    Regulation*, 2021, 40 (7), 1-31.

Rothschild, Casey, "The Efficiency of Categorical Discrimination in Insurance Markets",
    *The Journal of Risk and Insurance*, 2011, 78 (2), 267-285.

Paulley, Andrew, "The Evolution of Markups in the Auto Insurance Industry of Ontario, Canada", *unpublished working paper*, June 2024.