ALBERTA AUTO INSURANCE RATE BOARD

Presentation by

Norma L. Nielson, Ph.D.

Chairholder in Insurance and Risk Management

And Interim Director, Risk Studies Centre

Haskayne School of Business

University of Calgary

Calgary, Alberta T2N 1N4

Developed in conjunction with

Mary Kelly, Ph.D.

Associate Professor, Finance and Insurance

School of Business & Economics

Wilfrid Laurier University

75 University Avenue West

Waterloo, Ontario, Canada N2L 3C5

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I.   Introduction and Statement of Objectives

My name is Dr. Norma Nielson. I am a full professor in the Haskayne School of Business at the University of Calgary, where I also hold the Chair in Insurance and Risk Management and serve as Interim Director of the Risk Studies Centre. My purpose in this submission is to provide an overview of the automobile insurance market in Alberta and then to summarize research being conducted at the Risk Studies Centre on what the market considers an appropriate rate of return on equity for companies selling automobile insurance in Alberta. That research project is being conducted jointly with Dr. Mary Kelly of Wilfrid Laurier University in Ontario and today's testimony also was developed in conjunction with her.

II.   The Alberta Marketplace for Auto Insurance

Canadian Underwriter's statistical issue for 2005 indicates total direct written premiums for all lines of automobile insurance in Alberta of $2,578,436,000 by 47 insurance groups, or roughly seventy individual companies. Our data, collected from MSA Research, shows total direct premiums of $2,580,015,000 for 2005.[1]

Of the 66 firms we track with positive automobile insurance direct premiums in Alberta, the ten individual firms that held the highest market share of automobile insurance in Alberta in that year were:

Wawanesa Mutual Insurance Company
ING Insurance Company of Canada
Security National Insurance Company
Co-operators General Insurance Company
Aviva Insurance Company of Canada
Alberta Motor Association Insurance Company
Dominion of Canada General Insurance Company

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[1] MSA Research collects data from insurers that file company level annual statements with the Office of the Superintendent of Insurance. Results differ slightly from *Canadian Underwriter* totals because we removed from our sample insurance companies that had negative direct premiums. *Canadian Underwriter*, in looking at group rather than company totals, would have included some companies where a pooling agreement between and among insurers in the same group netted out those results.

State Farm Mutual Automobile Insurance Company

Economical Mutual Insurance Company

Unifund Assurance Company

Collectively, these 'top ten' firms accounted for 65 percent of the total auto insurance market in Alberta, as measured by direct written premiums.

Insurance companies operating in Alberta (and the rest of Canada) exhibit several different forms of legal structure and ownership. In the Alberta top ten, for example, five have publicly traded common shares. One (Co-operators) has publicly traded preferred shares only. Three of the top four insurers – Economical Mutual, State Farm, and Wawanesa – are mutual companies that do not issue shares of any sort. These firms are owned by their policyholders and the accumulated wealth in the company "belongs" to the policyholders, not to third party shareholders. Finally, Alberta Motor Association Insurance Company is an insurer owned privately by the Alberta Motor Association. These latter four firms account for 25 percent of the auto insurance market in Alberta. For the full auto insurance market in Alberta, ownership, at the end of 2005, breaks down as follows:

- 49 insurers are publicly traded or part of publicly traded group, e.g., Aviva or Lombard General.

- 10 insurers are mutuals, e.g., Economical Mutual Insurance Company, or State Farm Mutual Automobile Insurance Company.

- 7 insurers are privately held in a form that is not a mutual, e.g., Alberta Motor Insurance Corporation or Lloyd's.

Academic research suggests that firm characteristics such as organizational form, size, investment yield, claims service and product diversity, among many others, will affect both the expected and actual profitability of insurers operating in Alberta.[2] The impact of these factors on

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[2] See, for example, J. M. Carson and R.E. Dumm (2000). The Relationship of Insurer Characteristics and Life Insurance Surrender Values, *Journal of Financial Services Professionals* **54** (5), 86-90. These authors argue that characteristics such as organizational form, investment yield, changes in product mix, total annual premium, financial stability, expense levels as well as such life insurance characteristics as lapse rates should have a direct impact on surrender values (which in turn impact the premiums charged by the insurer).

expected profitability gives rise to different premiums charged by insurers. Expected profitability is the focus of both this research and this rate hearing.[3]

The importance of the Alberta auto insurance market to each company's overall premiums also varies. On average, the insurers that write automobile insurance in Alberta generate 17.8 percent of their Canada-wide net premiums written (NPW) via Alberta auto insurance. The minimum contribution to NPW is 0.4 percent, and the maximum is 96.53 percent. Only six companies, out of 66, derive more than a third of their net premiums written from Alberta auto insurance.

Companies writing auto insurance in Alberta exhibit a great deal of diversity, both geographically and by line of business. This diversity provides financial diversification and should be recognized as a positive factor for company solvency and consumer safety. From the perspective of operating efficiencies, this diversity may increase the cost of delivering insurance.

Geographic diversification is evidenced by the spread of written premium across provinces. In our sample 44 firms wrote in all ten provinces; four firms wrote in two or fewer provinces or territories. Another measure of diversification is a Herfindahl index[4] that produces an index of 100 for any firm that writes in only one province or territory. Conversely, a firm that writes an equal amount of business in all provinces and territories in Canada would have a Herfindahl index of 7.69. In our data set, the lowest Herfindahl index is 18.2; the highest is 98.6. Breaking this down a bit further, the 25th percentile is 27.6; the 50th percentile (median) is 39.8; and the 75th percentile is 56.7.

Similarly, we measure diversification by line of business using a Herfindahl index computed using seven groupings for lines of business – auto, personal property, commercial property, liability, surety, boiler, and other. As above, a smaller Herfindahl index signifies greater diversification and an index of 100 implies that a company only writes one line of

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[3] The relationship among these factors, along with a myriad of other factors including economic prosperity, weather, market conditions, and medical and technological changes, will result in a firm's actual experience being different from its predicted experience. This in turn gives rise to a difference in expected and actual profitability, loss ratios, and earnings.

[4] Mathematically, the index for each firm is computed as the sum of the squares of direct written premiums for each province (or line of business) divided by the square of total direct written premiums for the firm multiplied by 100.

business, Canada-wide. The Herfindahl index in our sample ranges from 21.9 to 100. The 25th percentile is 33.5; the 50th percentile (median) is 48.5; and the 75th percentile is 66.7.

Several other characteristics of the companies writing auto insurance in Alberta serve to further underscore the differences that exist in our marketplace. For example, the size of the companies varies substantially. The smallest firm in our sample (with positive direct premiums) wrote $75,000 Canada-wide in 2005. The largest firm wrote $3,131,751,000 in direct premiums across Canada. A chart showing the distribution of firms by size of direct premiums is given in

Figure in Section 0. Firm size affects several aspects of the insurance business. First, economies of scale tend to result in smaller expense ratios for larger companies. In addition, the relative amount of capital held by insurers (for example, when compared to net premiums written) is proportionately lower for larger insurers.

Companies also differ in the underwriting classifications and standards they use; this in turn produces disparate price mixes across the insured population. Even in a "take all comers" model, insurers are expected to use marketing and placement strategies that affect the mix of potential insureds. Differences in the mix of insureds will lead to differences in loss experience for insurers. One result of this is that companies' actual performance in 2005 varies considerably with respect to both claims and investment performance. After removing outliers, the loss ratio[5] in Alberta auto in 2005 averaged 64 percent. However, one firm experienced a loss ratio of 10.5 percent while another was 131 percent. For the entire sample, the 25th percentile was 52.46 percent; the 50th percentile (median) was 62.39 percent; and the 75th percentile was 78.85 percent. Investment yield in 2005 ranged from a low of 2 percent to a high of 16.7 percent. The 25th percentile is 4.1 percent; the 50th percentile (median) is 5.1 percent; and the 75th percentile is 6.3 percent. If an insurer believes that its past performance is an indication of future performance, then a firm with lower-than-average loss ratios or higher-than-average investment yields can charge lower-than-average premiums and still expect positive profitability.

Another important feature of auto insurance in Alberta is that contract wording is standardized for the mandatory coverages. This fact makes it appear on the surface that the product provided by different companies is homogeneous; however, both the supplemental coverages and the quality and type of service offered by insurers are not. Some insurers sell

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[5] Here loss ratio is computed as [(Total Incurred Claims + Claims adjustment expenses)/Direct Premiums Earned]

insurance through the brokerage network, some sell via commodity channels such as the internet or call-centres. Firms that deliver insurance through face-to-face channels, all else held equal, have higher expenses than firms that sell insurance through commodity channels.

Claims service and subsequent claimant satisfaction also vary by insurer. The Alberta regulator does not track claims satisfaction for automobile insurance, but the Financial Services Commission of Ontario (FSCO) does.[6] Although Ontario claimant satisfaction may not directly match the Alberta experience, it offers valuable insights if we assume claims handling procedures are consistent across a firm. Using FSCO data for 2003, 38 of the 66 firms in our data set were required to complete the Ontario survey. The percentage of those surveyed that stated they were "very satisfied or somewhat satisfied" with their claims experience ranged from 70 percent to 95 percent, with the average being 86 percent. It is conceivable that those firms who provide superior claims service have higher claims adjustment costs, all else being equal. In addition, a consumer that values superior claims service could reasonably choose to pay more to receive such service.

III.   The Role of Capital in Insurance

One aspect of capital in insurance companies is that consumer protection laws and regulations require its presence. An unusual dimension of Canada's system of regulatory oversight is that, at least for most companies, the capital requirements (as well as other elements of solvency regulation) emanate from the federal regulator – the Office of the Superintendent of Financial Institutions (OSFI) – separately from the requirements of this Board and other aspects of provincial regulation:

> "OSFI's mission is to protect the rights and interests of depositors, policyholders, pension plan members and creditors of financial institutions, and to advance and administer a regulatory framework that contributes to public confidence in a competitive financial system."[7]

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[6] Each year FSCO asks automobile insurance companies in Ontario to have an independent market research firm survey a sample of their customers chosen at random from a listing of claims closed in the previous year, taking care to match the proportion of claim types in the survey to the actual claims experience of the firm. In 2003, a total of 47 insurance companies and the facility association were surveyed.

[7] OSFI Mission Statement. Accessed January 4, 2005 at http://www.osfi-bsif.gc.ca/eng/about/mission/index.asp .

The key regulatory test of solvency is the minimum capital test (MCT) for Canadian insurers and the branch adequacy of assets test (BAAT) for foreign insurers. Both were introduced in 2003. One goal of these tests is to harmonize solvency requirements between federal and provincial regulators; another is to better reflect the risk of both an insurer's assets and its liabilities. The test adjusts for the default risk of asset holdings of insurers and corrects for the differences in capital risks across the various lines of property/casualty insurance written in Canada. One key goal of the MCT, when introduced, was to be neutral across the industry (Kovacs, 2002)[8]. While some firms were expected to see an increase in required capital levels, other firms were expected to see a reduction in required capital levels, resulting in an expected zero net change for the industry.

Considering both on- and off-balance-sheet items, the MCT calculates the amount of capital held by the insurer (that is allowed to count under the regulation) and the amount of capital needed to offset the riskiness of that firm's assets and liabilities. The test results in a ratio of total capital available / capital required. The minimum acceptable "pass" ratio is 150 percent, but OSFI requires insurers to set targets between 170 percent and 210 percent (Baker, 2005).[9]

Within these solvency requirements, each firm still makes its own decisions about how much, if any, expected capital to hold ABOVE its target MCT, observing once again that the firm's actual experience will be different from its expected. For 2005 (with outliers removed), actual MCT ratios for Canadian insurers that write auto insurance in Alberta ranged from a low of 157.4 to a high of 694. Across our sample, the 25th percentile was 210.5; the 50th percentile (median) was 251.75; and the 75th percentile was 306.

Some risk is always present that those who provide the capital – the investors in the case of a publicly traded firm – will lose some or all of their invested funds. Investing in equity is risky, and shareholders need to be compensated for this risk. Some of the risk of stock is eliminated when investors hold a broad portfolio of investments. Because investors can eliminate this risk, known as firm specific or idiosyncratic risk, it is not priced in the market. Some of the risk of each company (known as systematic risk) cannot be eliminated even when investors hold

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[8] P. Kovacs. (2002). "Weighing in MCT." *Canadian Underwriter* **69**(12): 24, 26.
[9] J. Baker. (2005). "Swimming in Capital Again." *Canadian Underwriter* **72**(10): 40.

a broad portfolio of investment. A firm's beta is the standard way to measure the systematic risk of its stock. Beta measures how the stock's return changes when the market's return's changes. A beta of one means that for every 1 percent change in the market's return, the stock's return also changes by 1%. The riskless security (typically modeled as a short-term treasury bill) has a beta of 0, as its rate of return does not depend on market movement. Utilities in Canada have betas close to zero; historically Maple Leaf Foods has a beta around 0.26; Bank of Nova Scotia, 0.28; Rogers Communications, 1.17; and Nortel Networks, 3.61.[10]

A firm with a higher beta is more risky; investors require a greater return in order to invest in this company. Firms with higher betas typically have more cyclical revenues and higher operating leverage. A higher beta increases the hurdle rate of the firm – if a firm must compensate its shareholders more to hold the stock, then the firm must earn a higher cash flows on its projects to be profitable. To be profitable, one could argue that firms with higher betas either need to charge higher prices, all else equal, or have lower costs of productions. Quite simply, the cost of doing business is higher for firms with higher betas.

The quantity of capital the firm holds is one of several factors that affect the riskiness of an investment in that firm, in this case directly influencing the impact of leverage on the firm.[11] Leverage, in turn, is one risk characteristic that influences the risk-adjusted rate of return to be paid on invested capital. This is often referred to as a firm's financial risk and is often measured by the variability of a firm's earnings per share over time.

The second characteristic that affects the riskiness of any firm is its 'business side' risk – the uncertainty that arises from the operations of the company – what a company does as opposed to how a company funds its operations. This is typically measured by the variability in a firm's earnings before interest and taxes (EBIT) over time and is influenced by the sensitivity of its cash inflows and outflows to economic conditions, the ability of the firm to adjust its output prices, the composition of the industry in which it operates, and the relationship between its fixed and variable costs of production.

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[10] Ross, S.A., R.W. Westerfield, J.F. Jaffe, and G.S. Roberts (2005). *Corporate Finance, 4th Canadian Edition.* McGraw-Hill, Ryerson, Toronto.

[11] Although insurers are restricted in issuing long term debt, the presence of long-tailed loss reserves and unearned premium reserves generates substantial leverage.

Because Canadian firms operate in an efficient marketplace, investors require that all firms of similar risk (regardless of the industry) offer the same return.

IV. The Cost of Equity Capital

The focus of my presentation once again this year will be the cost of equity capital in property-casualty insurance companies writing automobile insurance in Canada. This submission summarizes prior work as well as emphasizing recent advances in our research. This work retains a definition that insurance pricing is "fair" in an economic sense if the insurer is indifferent between selling the policy and not selling it. That "fair" price also achieves "a fair, but not excessive, rate of return"[12] and produces a profit that permits the insurance firm to stay in business and to maintain its capital base. Similarly, the "fair rate of return" can be defined as the rate that will make investors indifferent as to whether they invest in an operation of property-liability insurance or any of the other options available in the same risk class.

The work we cited last year as "the best available" by J. David Cummins (Wharton School, University of Pennsylvania) and Richard Phillips (Georgia State University) recently received the Casualty Actuarial Society's Research Award for having made the most valuable contribution to property casualty actuarial science of any work appearing in 2005 in the *Journal of Risk and Insurance* (JRI). Published in September 2005, that paper was entitled "Estimating the Cost of Equity Capital for Property-Liability Insurers" improves on the prior insurance cost-of-capital literature by using more recent data (1997-2000) and by focusing on the relationship between the cost of capital and the lines of business written. It remains an example of state-of-the-art research globally. For their entire sample of insurers over the 1997-2000 period, these researchers estimated cost of equity capital for automobile insurance to be as follows:

	Average Auto Insurer – Industry wide	
	Equally – weighted	Value – weighted
CAPM	12.6%	10.3%
FF3F	20.7%	17.5%

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[12] D'Arcy, Stephen P. and Neil A. Doherty, "The Financial Theory of Pricing Property-Liability Insurance Contracts", Huebner Foundation Monograph # 15, Wharton School/University of Pennsylvania, 1988, 98 pages.

In producing these cost of equity capital estimates, Cummins and Phillips used the average market capitalization and average book-to-market ratio for property-liability insurers. They found "the long-run historical premia for the excess market return, the size factor, and the BE/ME factor as of December 2000 were 8.44 percent, 2.35 percent, and 3.85 percent" respectively. The risk-free rate incorporated into their analysis was 4.93 percent for the years 1997-2000.

Work undertaken over the past year at the University of Calgary's Risk Studies Centre adopts several of the methodological improvements introduced by Cummins and Phillips and applies it to our data from Canadian firms. This extension of U.S.-based research into Canada has required the incorporation of data on foreign-owned companies into the analysis as along with domestic companies. Therefore, the first step has been careful consideration of the advantages and disadvantages of alternative methodologies for normalizing values in order to ensure that appropriate currency standardizations are employed. Data were gathered on market valuations and from the financial statements of insurance companies operating in the property-casualty insurance market in Canada.

The research team has for the past six weeks been deeply involved in conducting the analyses needed to produce estimates for the cost of equity capital deployed in the writing of auto insurance in Canada. Our preliminary data set comprise 53 publicly traded groups that operate insurance companies in Canada and file annual statement and data with OSFI and with MSA Research. In some cases a group may own and operate several insurance companies; in fact, our 53 groups account for 114 insurers. Most of the groups included are traded on the Toronto Stock Exchange (11), the New York Stock Exchange (39), and NASDAQ (2) with one additional top-ten firm (Aviva) added from the London Stock Exchange. Included within this data set are approximately 40 insurers selling automobile insurance in Alberta that amounted to $1.34 billion in written premiums in 2005.

Data were collected for the period 1991 through 2005 and produced a total of 105,604 observations. This makes the average number of observations per traded group 1,992. To confirm that the model was behaving properly, the average beta (traditional CAPM) was computed as 0.825. Figure 2 shows a frequency distribution of betas for those Canadian insurers

that writing auto insurance. As expected, this number for Canadian insurers is somewhat higher than the result found for the US. The beta (β) of a firm was then translated into its cost of equity (i_e) by applying the following equation:

$$i_e = \text{risk-free rate} + \beta \times \text{market's equity premium}$$

Figure 3 shows the parallel frequency distribution of historical returns on equity (ROE) for Canadian insurers that write auto insurance. The average actual ROE for all property-casualty insurance groups in our sample was 10.60%; the average of only those groups that wrote automobile insurance was 10.45%. Comparing these average numbers for Canada (determined using equal weights for each company) with the U.S. results from Cummins and Phillips produces several immediate and interesting observations. The first is that the current Canadian rates are NOT higher than the earlier U.S. rates. That downward shift has undoubtedly been influenced by the inclusion in our study of the years 2001-2005 when interest rates have been lower. A second observation is that there is a much smaller difference in the cost of equity estimates for the average group writing property/casualty in Canada and those groups that write auto insurance in Canada. This too is consistent in that auto represents a relatively large share of P/C insurance in Canada.

A preliminary estimate of the return on equity that might emerge when work is complete on the Fama-French Three-Factor process was obtained by adding together (1) the CAPM estimate of market return; (2) the 2.35 percent adjustment for size as found by Cummins and Phillips, and (3) the 3.85 percent adjustment for BE/ME factor as found by Cummins and Phillips. These estimates are presented in the table below:

	P/C Insurance Groups	P/C Insurance Groups writing auto in Canada
Number of Groups	53	38
CAPM	10.60%	10.45%
FF3F (est.)	16.50%	16.65%

Every effort will be made to have additional updates on one or both of these adjustment factors for Canadian firms during 1991-2005 when this work is presented to the Board on November 8.

V. Summary and Conclusions

One of the most consistent messages in our review of the literature and in two consecutive years of testimony by the academic community is that basing prices on industry-wide costs of equity is likely to be value-destroying for many firms in the industry. Research has long identified size and financial distress as significant factors in the market's risk-return tradeoff. Empirical research is just now reaching the point where the influence of these two factors on the individual firms' cost of equity can be measured in practice. Given state-of-the art evidence we conclude that the cost of equity capital for auto insurers operating in Canada is in the range of 16%.

Research has shown that having a single target ROE will ultimately result in market failure. Given the diversity of insurers, it is preferable for regulators to recognize a range for cost of equity for property-casualty insurers who underwrite automobile insurance in this province in order to sustain a competitive marketplace. We believe that a cost of equity target in the range of 14.31 percent to 18.26 percent is most appropriate for the Board to use when setting automobile insurance rates.

VI.   Figures and Tables

Figure 1: Canada-Wide Direct Premiums for Insurers that Write Auto Insurance in Alberta

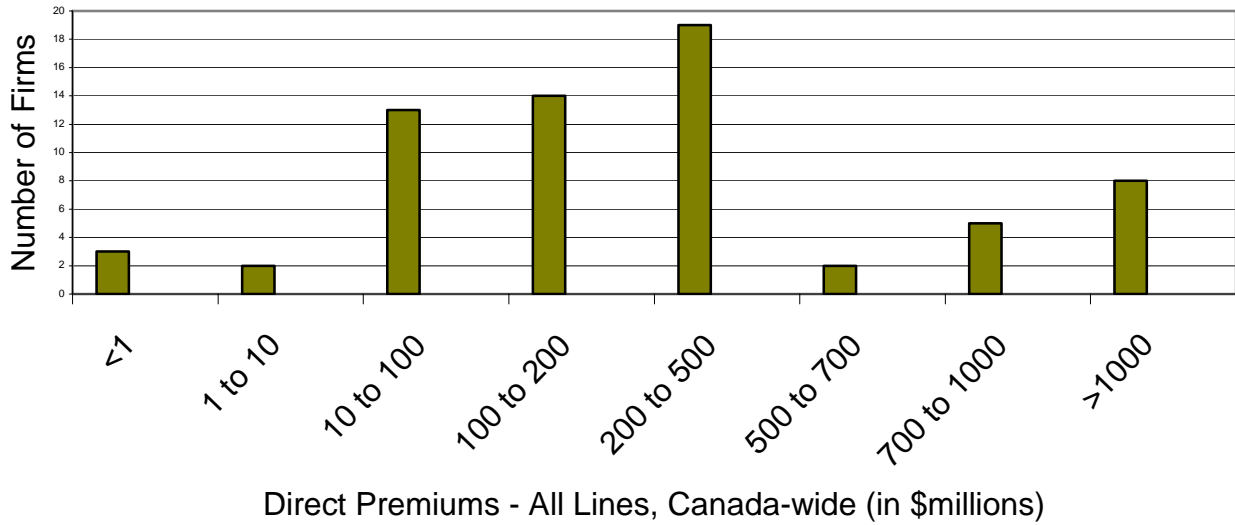Direct Premiums - All Lines, Canada-wide (in $millions)

Figure 2: Frequency Distribution of Beta for Insurers Writing Canadian Auto
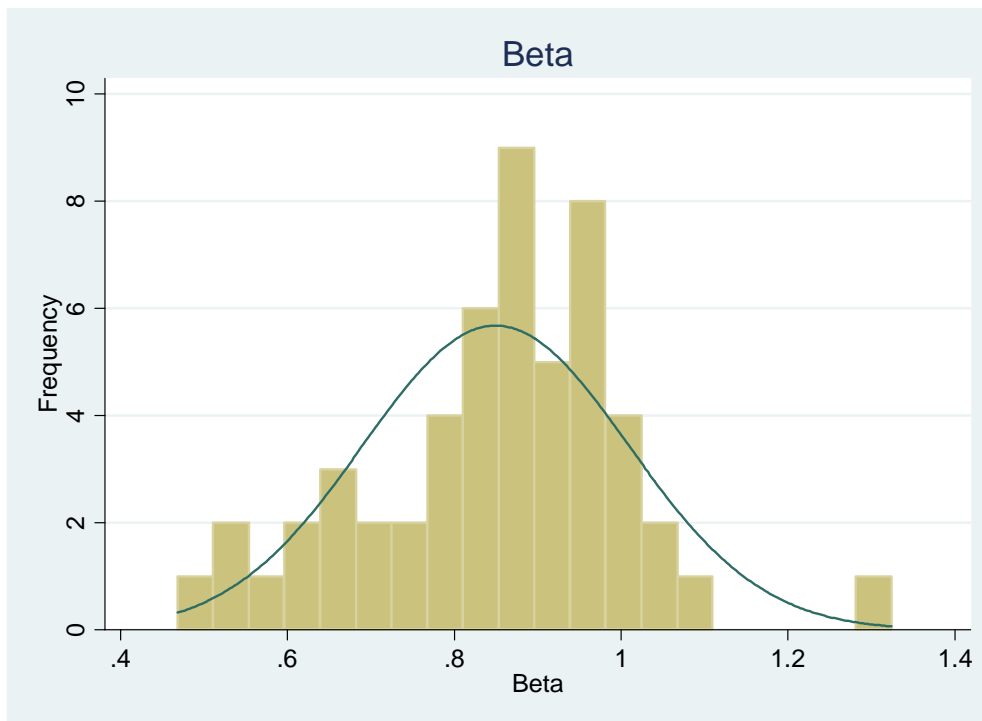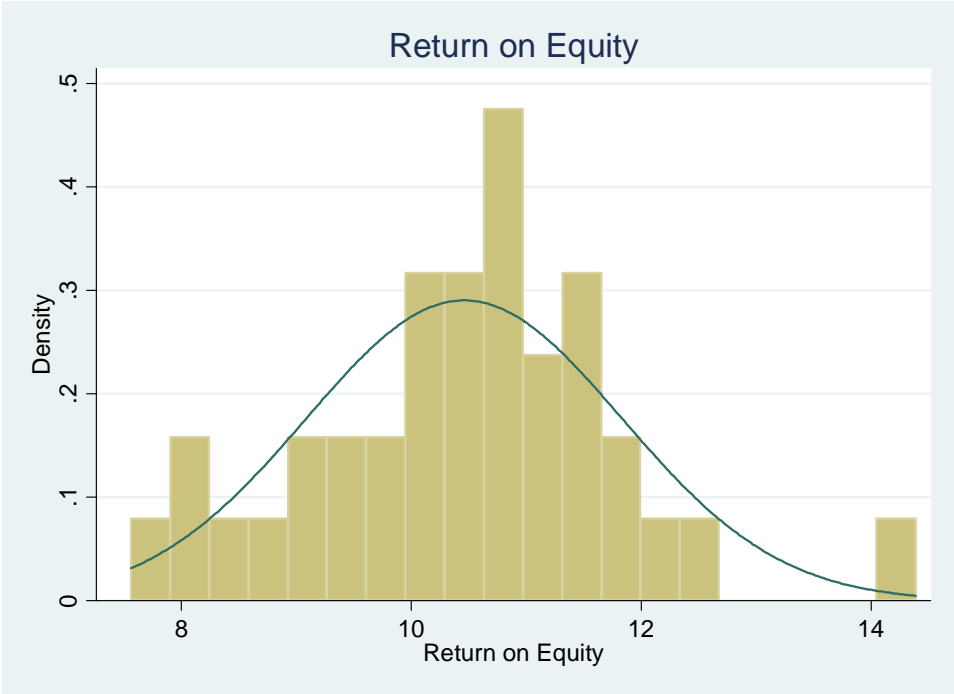
Figure 3: Frequency Distribution of Historical ROE for Insurers Writing Canadian Auto

VII. Appendix A: Presenter Biographies

Biography of Norma Nielson

Dr. Norma Nielson is a Full Professor in the Haskayne School of Business at the University of Calgary. There she also holds the Chair in Insurance and Risk Management and serves as the Interim Director of the Risk Studies Centre. Professor Nielson received her BSc (Northwest Missouri State University) in 1974, followed by an MA in 1976 and a Ph.D. in Managerial Science and Applied Economics in 1979, both from the University of Pennsylvania. Professor Nielson has been actively involved in research and training in insurance, risk management, and employee benefits for nearly twenty years before assuming her current responsibilities at the University of Calgary in July of 1997. She has taught the introductory insurance and risk management course as well as three different fourth-year courses covering all aspects of insurance and risk management. She also developed and has twice taught International Insurance Markets, accompanying the students on their visit to the markets in London and Bermuda. Increasingly her work is with doctoral students. Norma's research efforts, which have produced over forty publications, often have tackled difficult public policy issues. She recently completed a project with the National Program of Financial Services and Public Policy examining the impact of public guarantees for private pension funds and, in addition to extensive work on auto insurance issues during the past year, is nearing completion on a paper chronicling the evolution of risk management and a series of studies that examines the use of early retirement incentives. She appeared in 2004 as an expert witness on behalf of the Insurance Bureau of Canada before the Board of Public Utilities in Newfoundland and Labrador on the issue of target ROE rates for automobile insurance in that province and recently assisted with the development of similar testimony in New Brunswick.

SELECTED PUBLICATIONS

Peer-Reviewed Articles:

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Kelly, M. and N. L. Nielson. "Age as a Variable in Insurance Pricing and Risk Classification," *Geneva Papers on Risk and Insurance - Issues and Practice*. Vol. 31, No. 2 (April 2006) pp. 212-232

Kleffner, A. E. and Nielson, N. L. "Auto Insurance Reform for Canada's Tort Provinces," *Insurance and Risk Management.* Vol. 72, No. 1 (April 2004) pp. 91-121.

Lee, R. B., Nielson, N. L., and A. E. Kleffner. "A Framework for the Third Generation of Risk Management" *ICFAI Journal of Insurance Law,* Vol. 2, No. 2 (January 2004), pp. 25-47.

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Book (as a co-author)

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Brown, D. J., L. Gammill, N. L. Nielson, and M. A. Seville. "Information and Ethics in Insurance." *CPCU Journal* (Winter 1998), pp. 227-237.

Conferences (as a presenter)

Academy of Financial Services: 1991 (2), 2001

American Risk and Insurance Association: 1978, 1979, 1980, 1981, 1983, 1986, 1989, 1990, 1991, 1992, 1993, 1995, 1997, 1998, 1999, 2000, 2001, 2002 (2), 2003, 2006

European Group of Risk and Insurance Economists: 1981, 1992

Risk Theory Society: 1980, 1982, 1990

Second International Conference on Insurance Solvency: 1988

Western Risk and Insurance Association: 1981, 1988, 1996, 1997, 2001, 2002, 2004, 2005

Biography of Mary Kelly

Dr. Mary Kelly is an associate professor in the School of Business and Economics at Wilfrid Laurier University in Waterloo, Ontario. She received her B.Math in statistics and economics (University of Waterloo) in 1989, her M.Math in actuarial science (University of Waterloo) in 1992 and Ph.D. in Commerce, majoring in finance (University of British Columbia) in 1998. Professor Kelly spent two years at University of Calgary before moving to Wilfrid Laurier University in 1999. Before entering academia, she was employed as an actuary at both the Co-operators General Insurance Company and the Insurance Corporation of British Columbia. Since entering academia, Professor Kelly has taught courses at the undergraduate, MBA and doctoral level in finance and at the undergraduate level in insurance and risk management. She is one of the co-developers of the insurance and risk management concentration at Wilfrid Laurier University. Mary's research encompasses many areas of p/c insurance. She has recently completed projects with the National Program of Financial Services and Public Policy on the distribution of personal insurance in Canada (with Dr. Anne Kleffner) and with the Law Commission of Canada on age discrimination in insurance (with Dr. Norma Nielson). She currently holds two grants with the National Program of Financial Services and Public Policy - one with Dr. Peter Carayannopoulos on capital holdings of p/c insurers and a second one with Dr. Norma Nielson and Mr. David Chan looking at the cost of capital for p/c insurers in Canada. In 2003, she was an invited speaker at the CD Howe Institute and in 2004 she was an invited speaker at the Risk Studies Centre at University of Calgary.

SELECTED PUBLICATIONS

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The Costs of Distribution of Property/Liability Insurance in Canada (2006), (with A. Kleffner). *Journal of Insurance Issues* **29**:51-70.

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Age Distinctions in Insurance. Research Report for Law Commission of Canada (2005) with N.L. Nielson.

"The Future Distribution of P/C Insurance in Canada" (with A. Kleffner) in Christopher Waddell, ed., *Financial Services and Public Policy*, (2004) John Deutsch Institute for the Study of Economic Policy, McGill-Queens University Press, 291-319.

Conferences (as a presenter) since 1999:

Actuarial Research Conference: 1999, 2002

Administrative Sciences Association of Canada: 2004

American Risk and Insurance Association: 1999 (2), 2000, 2002, 2003 (2), 2004, 2006

International Insurance Society: 1999, 2000, 2004

National Research Program Conference on Financial Services and Public Policy: 2004

Northern Finance Association: 1999

Western Risk and Insurance Association: 2004