The Impact of Gender and Age on Risk-Taking Attitudes

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Abstract

This paper investigates the extent of gender difference in attitudes towards risk, and its persistence across age-cohorts. Pooled micro data based on Canadian Surveys of Household Spending, conducted annually from 1996 to 2009, are used to estimate a multivariate regression equation. Also, by creating a panel data and using random effect method, presence of any statistically significant difference across Canadian provinces in insurance spending over this period is investigated. The multivariate regression estimates show that, in accordance with the previous literature, females are more risk averse than males. The gender risk-aversion gap appears to be closing for younger cohorts. The panel estimation reveals a pattern consistent with a positive relationship with mean income and expenditure on home-insurance.

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1. Introduction

Home insurance covers damages from theft, fire, water and other similar perilous events. The insurance premium depends on the characteristics of the house, such as the superficies and estimated price, the behavior of the policyholder, as well as the coverage options. The main variations in coverage options are the amount deductible, the type of peril, and percentage of loss covered, which are reflected in the cost of policy. Holding these characteristics constant, the amount of insurance purchased reveals the individual's level of risk aversion. This paper investigates whether female heads of household in Canada significantly differ from their male counterparts in their risk-taking behavior, and whether the gender difference is persistent across cohorts. This paper also documents the extent of provincial variations in spending on home insurance, using a panel dataset constructed by weighted means of individual household data of each province, over the period 1996-2009. The remainder of this study is organized as follows. First, the existing literature on determinants of risk attitude is briefly reviewed. The next section is devoted to a discussion of data and methodology. The discussion of the results comes next. This paper ends with a brief conclusion.

2. Literature Review

The gender difference in risk-taking is documented in the literature, by psychologists and economists, in the past few decades. Females are universally found more risk-averse than males. Byrnes et al.(1999) review these studies in a

meta-analysis. More recently, Cross and Gneezy(2009) conduct numerous real and hypothetical gamble experiments, using a sample of both males and females. The subjects could choose between a first option of a 100 dollars for certain, or a gamble that would pay 200 dollars with 50 percent chance, and nothing otherwise. They report that the number of males who opted for the risky option has been consistently larger than females. Adhikariand and O'Leary(2011) find evidence that females who work in the Nepalese banking sector exhibit more risk aversion than males. They attribute this difference to these females' lack of confidence in their financial knowledge. In fact, the gender difference in risk-taking is attributed to a number of personality characteristics whose prevalence differs across genders. Pulford and Colman(1997) posit overconfidence as a culprit and find that females are less overconfident than males. Niederle and Vesterlund(2007) argue that higher risk aversion of females results from that their less competitive attitude in social settings. A large portion of literature attributes the gender difference to the ways in which males and females are socialized. This strand of literate postulates that during formative years, males are encouraged to be more risk-taking than females(Siegrist et al., 2002). If "socialization hypothesis" is accurate, then younger cohorts of females must exhibit lower risk-aversion compared to their older counterparts, given that the way in which the two genders are socialized has evolved in the culture to become more similar. This paper considers both gender difference and its confluence with age-cohort.

Showers and Shotick(1994) report that insurance expenditure varies by income,

household size, number of earners in the family, and age of the decision-maker in the household. Halek and Eisenhauer(2001) report that level of risk aversion increases with education, age and income, while the unemployed and heavy alcohol consumers show higher risk-taking attitude. Katrina and Simon(2004) report that young investors tend to hold riskier stocks compared to the older ones. More recently, Albert and Duffy(2012) use Holt-Laury experiment to elicit the degree of variation of risk-aversion with age. They select twenty-six young adults and thirty-four older adults to buy ten different lotteries, replicating Holt-Laury setting. The result shows that 68 percent of older adults refrain from choosing the risky option, while only 32 percent of younger adults exhibit this pattern. Similarly, Mather et al.(2012) conduct gamble experiments to elicit the difference between younger and older adults, in risk attitude. Their experimental results also demonstrate that older adults are more risk-averse than younger ones. Weber(2013) reports that women and married individuals are more likely to be risk averse, and the age decreases risk tolerance. Both wealth and income are negatively correlated with risk aversion. In the regressions reported in this paper, all these validated determinants of risk behavior are included as controls.

3. Data and Methodology

The data set used is micro data obtained from the Canadian Survey of Household Spending, from 1996 to 2009. Various expenditure items are recorded at the household level. According to Statistics Canada (2009), "The main purpose of the

survey is to obtain detailed information about household spending as well as limited information on dwelling characteristics and household equipment". The survey contains information on respondents' various types of expenditure, demographic characteristics of the household and the features of the dwelling. The survey is conducted annually, across all Canadian provinces.

An individual's degree of risk aversion is reflected in her insurance expenditure. All else equal, a more risk averse person would spend more on insurance. Therefore, the natural logarithm of home insurance premium is used as the dependent variable to capture respondents' level of risk aversion. Demographic characteristics of the respondents and the features of the dwelling, are included as explanatory variables. First, exploiting the pooled cross-sectional data, the extent of gender difference in risk aversion is examined. Second, creating a panel dataset, this paper investigates whether Canadian provinces differ from each other, in their home insurance expenditure. Therefore, two equations are estimated. The first regression model uses the pooled cross-sectional dataset and ordinary least square(OLS) method. This estimation includes all the 14 years household level data, adding up to 198,739 observations. The generic format of the underlying equation can be specified as:

$$\boldsymbol{ln\, y = \delta_0 + \delta_1 Female\ Head\ of\ Household + X\beta + \varepsilon}$$

The natural logarithm of home insurance premium, $\boldsymbol{ln\, y}$, is the dependent variable. The matrix X includes all the controls. For the pooled cross section, the variable of interest is a dummy that takes the value of one for females who are head of household. They are identified based on the gender of respondent and the marital

status. A female respondent who is never-married or divorced is considered as female head of household. This variable can show the gender difference in risk aversion. The impact of age is also considered by interacting the variable of interest (female head of household) with age-cohort dummies (less than 25, 25 to 30, 30 to 35, and so on, until age over 85). Fourteen age group dummies are introduced into the model with cohorts of five years. Household size is recorded by number of members in the house, and it varies from 1 to 6. There are five types of dwellings, which are accounted for by the following dummies: single-detached, semi-detached, row or terrace, duplex, apartment and other. Natural logarithm of household income and other expenditures are included. There are two types of expenditure: one is expenditure on additional insurance, and the other one is spending on daily necessities.

The second regression model is a random effect model fitted to the panel data. A single observation is created for each of the ten Canadian provinces, which are observed over 1996 to 2009. The underlying equation is:

$$\boldsymbol{ln\, y_{it} = \delta_0 + \sum_{j=1}^{9} \delta_j J_j + X\beta + \varepsilon_{it}}$$

The dependent variable, $\boldsymbol{y_{it}}$, is the natural logarithm of mean home insurance premium in the province i, obtained by averaging household expenditures, after applying the survey's weights. Provincial dummies, $\boldsymbol{J_j}$, are included in the model, where Ontario is the omitted category. The explanatory variables included in the matrix X, are two types. The first group is general economic indicators which includes unemployment rate, minimum wage, exchange rate, annual inflation rate, oil

price and GDP. Those variables capture the relationship between expenditure in general and aggregate economic fluctuations. The urban to rural ratio, median age and gender ratio are in the second group to account for the validated determinants of risk attitude, at the individual level. Having controlled for all these variables, it is plausible to have all the coefficients for the provincial dummies losing their statistical significance. If it is not the case, there is evidence for idiosyncratic differences across Canadian provinces, in home insurance expenditure.

Since natural logarithm of insurance expenditure is employed as the dependent variable, the coefficients signify percentage changes in spending. Positive, statistically significant coefficients indicate higher premium expenditure, therefore, a higher degree of risk aversion.

4. Results and Discussion

Descriptive statistics are reported in Table 1. As the table shows, female heads of household constitute 24 percent of the sample. In this group, about 21 percent are below 35 years old, 33 percent are between 36 to 50 years old, and 46 percent are above 50 years old. More than 90 percent of households live with less than four family members. The average expenditure on home insurance is 0.6 percent of household income. Respondents spend the largest portion of their income on shelter, transportation and food.

The pooled OLS results are reported in Table 2. The results show that female heads of household are statistically significantly more risk averse than comparable males. On average, they pay 23 percent more on house insurance premium than their

male counterparts. This result is consistent with the extant literature(Pulford and Colman, 1997; Niederle and Vesterlund, 2007; Zuckman, 1994). To explore the persistence of this gender difference across cohorts, the gender dummy is interacted with age groups. The results show that a female head of household who is between 25 to 34 years old is less risk averse than otherwise identical females. As the general impact of age is controlled for, this results suggest that the gender risk version gap may be closing for the younger cohorts.

The coefficient of income is positive. The owners of single-detached are found to buy more insurance. Expenditure on daily items negatively correlates with the outcome. The coefficient of spending on tobacco and alcohol is positive and significant. Halek and Eisenhauer(2001) argue that "the decision to drink alcohol, for example, may result from a relatively low degree of risk aversion, or consumption of alcohol itself may reduce the degree of risk aversion". These results are consistent with this study.

The panel estimation controls for aggregate economic fluctuations occurring in Canada, as well as for some changes abroad which are likely to impact the Canadian economy. The set of variables accounting for such aggregate economic fluctuations are American and Chinese GDP, price of oil in international markets, annual inflation and minimum wage. A random effect regression model is fitted to the panel data. The results are reported in Table 3. The coefficient of the time trend variable is statistically significant and positive, indicating a rise in home insurance expenditure throughout the period 1996-2009.The inflation is controlled for, to adjust for the loss

of value of nominal dollar amounts. The income effect of the overall economic growth experienced in Canada, may explain part of the rise in expenditure on insurance. The increase in minimum wage and GDP has a positive relationship with the outcome. People not only enjoy a higher standard of living due to increase in these variables but also have additional resources to spend on insurance. Another reason may be the rise in educational attainment of the population that could not be directly controlled for, due to a lack of reliable provincial data. Higher education may facilitate individuals' access to coverage options provided in the market. The coefficient of the variable capturing the impact of median age, across Canadian provinces, is positive and significant, indicating that younger populations are less risk averse than older ones. Yao, Sharpe and Wang(2011) report that risk tolerance generally decreases as people age, people are more cautious and less risk taking when they become older. Halek and Eisenhauer(2001) contend that individuals aged 65 and older are significantly more risk averse.

The regression results show that one percent increase in urban to rural ratio increases home insurance expenditure, by 30 percent. The result indicates that Canadian urban residents spend more on home insurance than rural residents. Call and Ziegenfuss(2007) also report such outcome and suggest that one reason for this finding is that rural areas have more restricted access to insurance than urban areas. For example, the majority of Canadian insurance companies do not provide flood insurance to a resident who lives along the river. The other part of this large impact might be due to the difference in the prices between urban and rural dwellings.

Only two provincial dummies are statistically significant: Nova Scotia and New Brunswick. All else equal, residents of Nova Scotia and New Brunswick purchase 34 and 48 percent more house insurance than other provinces. In both Nova Scotia and New Brunswick, minimum wage was $5 in 1996, the lowest in Canada. But in 2009, the minimum wage increased to $9 for Nova Scotia, and $8 for New Brunswick. The rise in minimum wage in these two provinces, which was larger than in the other ones, and its spillovers might be the cause which can be investigated in a future study.

5. Conclusions

Using micro data extracted from the Survey of Household Spending over the period of 1996 to 2009, this paper finds that females are more risk averse than males. Considering the confluence of age and gender, it is revealed that females who are aged between 25 and 35 years are statistically significantly less risk averse than their counterparts of the same gender. It is plausible to assume that for the younger cohorts, the differential socialization of males and females has partially subsided in the society. Therefore, this result provides some evidence for socialization hypothesis as the basis of gender difference in risk preference. The robustness of this results needs to be tested in a future research.

The panel data estimations, controlling for nationwide and provincial level correlates of risk attitude and economic fluctuations, suggest that the two Atlantic provinces of Nova Scotia and New Brunswick may differ from other provinces in the percentage of household income that is spent on insurance. Further research is

required to explore the causes of provincial variations documented in this paper. These regression results also indicate that, all else equal, living in urban areas is a statistically significant and positive predictor of home insurance purchase, which is also an interesting area for further exploration.

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Tables and Figures

Table 1: Descriptive Statistics for Cross-Sectional Data

	Maximum	Mean	Std. Dev.
Homeowners' insurance premiums	15000	351.75	410.056
Female Head of Household	1	0.243	0.433
Female under 35 years old	1	0.208	0.217
Female between 35 and 50 years old	1	0.331	0.241
Female above 50 years old	1	0.461	0.344
Married	1	0.600	0.489
Age	87	49.52	16.413
Household income before taxes	750000	60018.15	47939.707
Vehicle insurance premiums	22868	1024.27	1140.968
Health insurance premiums	24192	489.38	822.539
Life insurance premiums, annuity contracts, and transfers to RRIFs	221000	471.48	1958.455
Public hospital, medical and drug plans	24192	156.66	375.907
Private health insurance plans	19300	333.59	721.957
Personal insurance and pension fund	224948	3300.83	3971.392
Employment insurance premiums	4442	694.30	648.991
Retirement and pension fund payments	92118	2135.98	2831.361
Government pension payments	90000	383.78	1403.580
Total household size	6	2.530	1.370
Total expenditure	594846	58807.42	42586.493
Source: Statistics Canada, Annual Surveys of Household Spending, 1996-2009.			

Table 2: Multivariate Regression Results

Dependent variable: Natural logarithm of home insurance premium				
	Coef.	Std.Err.	t	P>|t|
Time	-0.007	0.001	-5.18	0.000
Age	0.032	0.001	69.11	0.000
Femaleheadofhousehold	**0.231**	**0.046**	**4.96**	**0.000**
Married	0.457	0.016	27.99	0.000
Housesize	-0.138	0.005	-25.58	0.000
Ln Income	0.193	0.008	23.42	0.000
Singledetached	0.426	0.026	16.27	0.000
Semi-detached	-0.880	0.035	-24.80	0.000
Roworterrace	-1.730	0.033	-52.95	0.000
Duplex	-1.902	0.034	-55.98	0.000
Apartment	-3.083	0.028	-110.9	0.000
Ln Vehicleinsurancepremiums	0.062	0.002	31.13	0.000
Ln Healthinsurancepremiums	0.042	0.004	9.55	0.000
Ln Lifeinsurancepremiums	0.053	0.002	28.66	0.000
Ln Publichospitalmedicaldrugs	0.020	0.004	5.48	0.000
Ln Privatehealthinsuranceplan	0.001	0.004	0.16	0.871
Ln Personalinsurance	0.041	0.004	10.44	0.000
Ln Employmentinsurance	0.021	0.003	6.06	0.000
Ln Retirementpension	0.0711	0.004	17.13	0.000
Ln Governmentpensionpayments	0.0115	0.002	6.33	0.000
Ln Food	-0.047	0.011	-4.41	0.000
Ln Shelter	0.552	0.007	82.63	0.000
Ln Householdoperation	0.065	0.008	7.64	0.000
Ln Furnishing and equipment	0.055	0.003	20.60	0.000
Ln Clothing	-0.017	0.005	-3.29	0.001
Ln Transportation	0.059	0.004	16.78	0.000
Ln Healthcare	0.039	0.004	10.34	0.000
Ln Personalcare	0.039	0.006	6.19	0.000
Ln Recreation	0.056	0.004	15.57	0.000
Ln Reading	0.043	0.002	17.30	0.000
Ln Education	0.023	0.002	12.88	0.000
Ln Tobacco and alcohol	-0.030	0.002	-16.09	0.000
Ln Netgames	0.001	0.002	0.19	0.850
Femalebelw25	0.363	0.060	6.01	0.000
Female25to29	-0.053	0.059	-0.91	0.364
Female30to34	-0.004	0.058	-0.06	0.950
Female35to39	0.134	0.056	2.39	0.017

Female40to44	0.199	0.055	3.63	0.000
Female45to49	0.279	0.054	5.13	0.000
Female50to54	0.442	0.055	8.06	0.000
Female55to59		0.056	8.67	0.000
Female60to64	0.444	0.056	7.92	0.000
Female65to69	0.403	0.055	7.26	0.000
Female70to74	0.418	0.054	7.76	0.000
Female75to79	0.318	0.053	6.02	0.000
NL	-0.279	0.020	-14.03	0.000
PEI	-0.113	0.026	-4.42	0.000
NS	0.032	0.019	1.67	0.095
NB	0.068	0.020	3.41	0.001
QC	0.319	0.018	18.01	0.000
MB	0.358	0.019	18.43	0.000
SA	0.152	0.020	7.54	0.000
AL	0.019	0.012	0.98	0.326
BC	0.256	0.019	13.42	0.000
Cons	-6.471	0.098	-66.10	0.000
R-squared	0.531			
Number of Observations	198,739			
Note: OLS estimation results based on Annual Surveys of Household Spending, Statistics Canada, 1996-2009.				

Table 3: Panel Estimation Results

Dependent variable: Natural logarithm of home insurance premium				
	Coef.	Std.Err.	z	P>|z|
Time	0.0707	0.023	3.13	0.002
Unemployment rate	0.005	0.008	0.59	0.558
Minimum Wage	0.124	0.013	9.4	0.000
Median Age	0.0433	0.012	3.63	0.000
CAD\USD	-0.395	0.080	-4.92	0.000
Annual Inflation Rate	0.009	0.006	1.64	0.102
LN China GDP	-0.051	0.008	-6.1	0.000
LN USA GDP	-0.167	0.031	-5.3	0.000
LN Oil price	-0.023	0.029	-0.77	0.444
LN Gender ratio	-1.715	1.340	-1.28	0.201
LN Urban to Rural Ratio	0.305	.1362	2.24	0.025
LN Other insurance	0.111	0.092	1.20	0.229
NL	0.293	0.221	1.33	0.184
PEI	0.212	0.276	0.77	0.442
NS	**0.343**	**0.204**	**1.68**	**0.093**
NB	**0.479**	**0.239**	**2.00**	**0.045**
QC	-0.079	0.054	-1.44	0.149
MB	0.173	0.109	1.60	0.111
SA	0.162	0.158	1.03	0.303
AL	0.003	0.073	0.04	0.965
BC	0.013	0.035	0.39	0.698
Cons	8.081	3.484	2.32	0.020
R squared within	0.945			
R squared between	0.958			
Number of observations	140			
Note: Random Effect panel-data estimation results based on Annual Surveys of Household Spending, Statistics Canada, 1996-2009.				