A Linear Regression Approach for Evaluating the Decline in Chartered Designations with the Effect of Economic Determinants

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ABSTRACT

The research tries to explore the decline in the number of CPCU society members and tries to evaluate the effects of economic determinants on the decline. The study takes into account various economic factors including the factor of number of CPCU society members, membership fees, number of total industry insurance underwriters and inflation and estimates the role of each factor in the decline. The study uses a quantitative method to evaluate the decline. The dependent variable taken into consideration is number of CPCU society members and the independent variables are the economic factors. The study uses a regression analysis to estimate the effects of the independent variable on dependent variable. Simple linear regression analysis is used to estimate effect of each independent variable on dependent variable. Also a multiple linear regression analysis is used to estimate the overall effect of the independent variable on the dependent variable. Overall the study concludes by evaluating each factor and exploring quantitative effects.

Introduction

Chartered Property Casualty Underwriters (CPCU) Society is a community of credentialed property and casualty insurance professionals who promote excellence through ethical behavior and continuing education. The Society has more than 30,000 members from every region of the United States, Europe, Japan, Korea, and Bermuda. These members hold the Chartered Property Casualty Underwriter (CPCU) designation, which requires passing rigorous undergraduate and graduate level examinations, meeting experience requirements, and agreeing to be bound by a strict code of professional ethics (Smith, Brandon, Rudolph, and Dusterhoff, 1996). The CPCU professional examination and designation is the most recognized certification system in the area of property and casualty insurance. The CPCU designation is earned through the successful completion of eight college level courses (Cooper and Frank, 2001). In general, once a professional has earned the CPCU designation, they are automatically enrolled in the CPCU Society which promotes networking among industry professionals and provides continuing education opportunities (Cooper, 2005). The CPCU Society offers tremendous opportunities that help you to propel in your career to new heights. The society also works hard to spread the message about the

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value of the CPCU designation to the industry and the public. Here are few of the benefits of membership.

Continuing education opportunities help to sharpen your skills with seminars, workshops, and symposia. Professional development programs helps to enrich career through leadership training, public speaking opportunities, courses from prestigious CPCU Society Center for Leadership, and more (Jones, 2010). Local and Global Networking helps to interact on a local level by joining one of 148 chapters in the United States, Bermuda, Europe, Japan, and Korea; and, network with other CPCU society members who share similar professional expertise. CPCU Society's Job Network is used as an interface to post resume, build personal career profile, and review job openings (Choudhury and Jones 2011). This is also a critical resource for insurance industry employers and recruiters.

In recent years, the number of CPCU society memberships is in declining phase. Therefore, the objective of this study is to understand the cause of this decline of membership and to understand the possible factors affecting this attrition. The decline of the society membership may be the result of both internal and external factors; it may also be a direct consequence of declining CPCU designees (Lowry, Avila, and Baird, 1999). At the external level, we would like to explore what aspects of economic buoyancy were most important in influencing the trend of membership growth or decline. Here we would like to study factors responsible for the decline such as interest in other fields of management, finance or marketing etc. Increase in opportunities in these fields, could have declined the likelihood of people taking CPCU exams and ultimately affecting the attrition rate.

Also internal factors within the society like the privileges of being a part of the society might not be rewarding enough for the people to continue being the member of the society, or even the factor that similar type of privileges are provided by other societies (Kensicki, 2009). As for example, company environment that supports and encourages society membership will also influence the membership decision making process. Among other things, salary level, tenure level with the company, job category, age, and gender may also play important role. These factors aggregate into important differences in the number of membership over time. Depending on the direction these changes take, changes in the distribution of the work-force across different job categories within the insurance industry will then affect the trend in the aggregate membership. Finally, it is also apparent that a variety of institutional policy changes can also affect the trend in society membership. Thus, in this project we would like to explore ideas and identify factors that are associated with the CPCU society membership trend.

Literature Review

At first, investigations into the causes of attrition among CPCU members have conceptualized few categories: socio-demographic factors, declining employment trend in the insurance industry, other job opportunities, salaries available in other domain, and students actually completing CPCU Exams (Mogel, 2003).

Second, studies by CPCU Society have discovered that maximum number of members fall under the age group of 50-59 as compared to other age groups (Hurzeler, 2004). These research studies found that only 34% of females were society members as compared to 66% of males. Studies also depict that maximum

members were from 'Insurance Company' background depicting 23.7 % of the count and lowest from the regulatory which is 0.4% only. Such studies conclude that people from insurance background are the only ones more keen on obtaining CPCU certification and being part of the CPCU society.

Kelly (2009) in her research paper "The CPCU Society: Diversity is Key to Our Future" has made comparison between the responses of those who are CPCU to those who are working toward the CPCU or those considering the CPCU. Respondents those who have CPCU accounted for only 16%, others with CPCU in Progress accounted for 19%, thirdly respondents considering CPCU accounted for 26% and highest percentage of 39% was of respondents with no desire for CPCU.

In addition, data prepared by Overman (1994) gives an insight on CPCU designees where they represent salary range by various job titles like underwriter, claims manager, insurance underwriter, and commercial property underwriters. Salary range specified for the job titles are as follows: $44,258 - $71,463 for Underwriter, $74,816 - $102,715 for Claims Manager, Insurance etc. Salaries were divided into categories like by job, by years' experience, by employer type, by state or province, by city, by company size and many more. Similarly other data like Salary by gender, by degree /major subject has been also provided. This gives an insight to the factors that may be responsible for the high attrition rate.

Employment in insurance from 1999 to 2008 also depicts a declining trend over the past years. It is more of a discontinuous graph in which employment in insurance companies like Life, Health and Medical, Property/Casualty etc increased in year 2002 to 2003 and declined from 2003 to 2004 and it again increased from 2004 to 2008 (Bradford, 2005).

Jim Marks (1994) in his paper "The CPCU Society Story" writes about chapter Development and Activity and Expansion about CPCU. Chapters also play an integral part in the decline or increase of the attrition rate of the CPCU members. In addition, it is hoped that this study can contribute to efforts geared toward improving attrition rate in the long-term. In summary, on reviewing previous studies, we have found factors contributing to CPCU attrition are diversified and complicated. Very little attention has been given to other factors like awards and recognition, economic trend and recession, chapter involvement etc.

Research Hypothesis

Hypothesis 1: More than 70% of variation in the dependent variable will be explained by individual independent variable in simple regression analysis. The six independent variables conversion rate, attrition rate, membership fee, total industry insurance (sales), inflation, and program completers will individually explain more than 70% variation in dependent variable number of society members.

Hypothesis 1 takes into all the factors that affect the dependent variables, number of society members in a simple regression analysis method where each factor is considered individually to evaluate the correlation between that factor and the number of society members. The independent variables used are conversion rate, attrition rate, membership fee, total industry insurance (sales), inflation, and program completers. Each of these variables is independently used to predict mean of the dependent variable number of society.

Coefficient of determination is used as an indicator to evaluate the amount of variation explained by the factor (independent variable) about the dependent variable. A cut off of 70% is used as a reliable indicator of goodness of fit. Being a time series data the goodness of fit gradually would increase as more data would be available in the future for analysis. Even though with limited data a goodness of fit would be pretty achievable in case of strong relationship between the two variables. Also the relevancy of data is administered by considering higher significance level in the research.

Hypothesis 2: There exists no correlation between same variable over a certain span of time. Data used is of time series in nature and there exists a chance of having correlation between a points in a given time with a same point in lagged time. For example 2003 value of variable total industry insurance may correlate with 2009 value of same variable, resulting in reduction in statistical significance of overall model.

Hypothesis 2 tries to prevent any kind of correlation present due to overlapping effects that occur overtime for each variable. Durbin Watson test is used as an indicator to check for any kind of correlation present between variables overtime. Biggest constraint of using time series data is presence of autocorrelation in residuals because of the use of same variables over different time periods.

Hypothesis 3*:* More than 80% of variation in the dependent variable will be explained by independent variable in multiple regression analysis. The six independent variables conversion rate, attrition rate, membership fee, total industry insurance (sales), inflation, and program completers will explain more than 80% variation in dependent variable number of society members when taken together in a single equation.

Hypothesis 3 is designed to evaluate the combined effects of the factors taken together in a single equation. The independent variables used are conversion rate, attrition rate, membership fee, total industry insurance (sales), inflation, and program completers. The claim also tries to find the correlations between factors, which may persist due to overlapping of residuals over time. Multicollinearity test, a correlation matrix is carried out to check for any correlations between independents variables. These correlations also explain how this correlated independent variable influence the effect of other variable.

Methodology

Data

Data is collected in two parts first data set from Katie school of Insurance, Illinois State University and second set from US census bureau website in their data subset "Census 2000 dataset". Data regarding conversion rate, attrition rate, membership fees, and program completers is collected from Katie school of insurance while as data regarding total industry insurance and inflation is collected from US census bureau. Data used is of secondary data type and is in metric form. Attrition rate, conversion rate, and inflation are in percentage form, other variable used membership fees, total industry, and program completers are not percentages and numeric in nature. Data collected is from year 1999 to 2008 including year 1999. Data collected is of ten years and is in time series nature.

Regression Analysis

Regression analysis is a method used to analyze the relationships between variable (Sykes, 1986).

It is used to check any causal relationship that may exist between variables. The data being metric in nature, regression analysis fits to be a better option compared to other methods. In this research regression analysis tries to evaluate the impact of each factor on the dependent variable number of society members. Regression analysis uses least square method to estimate the mean, at the same time minimizing the residuals in the prediction.

Multivariate Correlation Matrix

Multivariate correlation matrix is a method used to check for existence of correlation among independent variables (Sykes, 1986). In this research it is important to identify any correlations existing between independent variables as existence of Multicollinearity would hinder the efficiency of regression analysis to interpret the effects of each factor on the variate. VIF value is used to access Multicollinearity.

Durbin- Watson Test

Data used in this research is of metric type and is a time series (Sykes, 1986). There is chance that auto correlation may exist which may try to overlap the effects of a particular independent variable in a particular period. This autocorrelation suppress the effect of the variable and reduces the overall efficiency of the regression analysis. To prevent this effect from taking place Durbin Watson test is carried out to check for Durbin Watson number.

Results

Conversion Rate

$$\hat{Y}_1 = 1.17 + 4.58X_1$$

From the results it can be concluded that conversion rate has a positive effect on the dependent variable, number of society members. The results are found significant at 0.1% significance level. The t statistics parameter calculated is 4.58, which means that one unit increase in the independent variable (conversion rate) increases the value of dependent variable (no of society members) by 4.58 units. Thus it can be concluded that for 1% increase in conversion rate the number of society members increase by 5. Durbin Watson value is 2.31, which indicates no autocorrelation present in the residuals.

Attrition Rate

$$\hat{Y}_2 = 3.75 - 0.27X_2$$

From the results it can be concluded that attrition rate has a negative effect on the dependent variable, number of society members. The results are found significant at 0.1% significance level. The t statistics parameter is 0.27. One unit increase in the independent variable (Attrition rate) decreases the value of dependent variable (no of society members) by 0.27. Thus it can be concluded that for 1% increase in attrition rate the number of society members decreases by 0.27, which is at least by 1. Durbin Watson value is 1.71, which indicates no autocorrelation present in the residuals.

Membership Fees

$$\hat{Y}_3 = 17.53 - 5.32X_3$$

From the results it can be concluded that membership fees has a negative effect on the dependent variable, number of society members. The results are found significant at 0.1% significance level. The t statistics parameter is 5.32. One unit increase in the independent

variable (Membership fees) decreases the value of dependent variable (no of society members) by 5.32. Thus it can be concluded that for 1% increase in membership fee decreases the number of society member by 6. Durbin Watson value is 2.003, which indicates no autocorrelation present in the residuals.

Total Industry Insurance

$$\hat{Y}_4 = 5.19 + 3.92X_4$$

From the results it can be concluded that total industry insurance has a positive effect on the dependent variable, number of society members. The results are found significant at 0.1% significance level. The t statistics parameter is 3.92. One unit increase in the independent variable (Total industry insurance) increases the value of dependent variable (no of society members) by 3.92. Thus it can be concluded that for 1% increase in total industry insurance increases the number of society member by 4. Durbin Watson value is 1.91, which indicates no autocorrelation present in the residuals.

Inflation

$$\hat{Y}_5 = 17.63 - 2.38X_5$$

From the results it can be concluded that inflation has a negative effect on the dependent variable, number of society members. The results are found significant at 0.1% significance level. The t statistics parameter is 2.38. One unit increase in the independent variable (Inflation) decreases the value of dependent variable (no of society members) by 2.38. Thus it can be concluded that for 1% increase in inflation, the number of society member decreases by 3. Durbin Watson value is 2.11, which indicates no autocorrelation present in the residuals.

Program Completers

$$\hat{Y}_6 = 28.95 + 0.05X_6$$

From the results it can be concluded that inflation has a positive effect on the dependent variable, number of society members. The results are found significant at 0.1% significance level. The t statistics parameter is 0.05. One unit increase in the independent variable (program completers) increases the value of dependent variable (no of society members) by 0.05. Thus it can be concluded that for 1% increase in inflation, the number of society member increases by 1. Durbin Watson value is 1.78, which indicates no autocorrelation present in the residuals.

Multiple Regression Analysis

$$\hat{Y}_N = 32.21 + 0.35X_1 - 0.62X_2 - 1.92X_3 + 1.42X_4 - 0.62X_5 + 0.09X_6$$

The multiple regression model above takes into consideration all the six factors together. From the results we can see that there is no change with respect to sign but coefficient values change for each factor and raises the chances of Multicollinearity to be present among the factors. It can be concluded that total industry insurance has the highest positive effect on the number of society members while as membership fees shows the highest negative effect. The multiple regression analysis considers the effects of all the factors together and brings in the necessity of testing correlations among independent variables. The multiple regression model is followed by a correlation matrix to help improve the multiple regression model to better predict the variation in the dependent variable. Overall the model explains 92% of variation in the dependent variable and the goodness of fit is evaluated by F value of 603.41 which is found to be higher than the table F value at 0.1% significance level.

Multicollinearity

Table 1 : Multivariate Correlation Matrix

	CPCU Society Member	Membership Fee ($)	Total Industry Insurance	Inflation	CPCU Program Completers	Conversion Rate	Attrition Rate
CPCU Society Member	1.0	-0.88	-0.81	-0.64	0.01	0.85	0.09
Membership Fee ($)	-	1.0	0.88	0.67	0.27	-0.79	-0.24
Total Industry Insurance	-	-	1.0	0.60	0.33	-0.89	-0.45
Inflation	-	-	-	1.0	-0.15	-0.59	-0.10
CPCU Program Completers	-	-	-	-	1.0	-0.18	-0.35
Conversion Rate	-	-	-	-	-	1.0	0.34
Attrition Rate	-	-	-	-	-	-	1.0

The correlation matrix above shows the relationship between all the independent variable (factors) used in the simple and multiple regression analysis. All the results are found significant at 1% significance level. It can be stated from the table that conversion rate is seen to have high negative correlation with membership fees and total industry insurance. Also total industry insurance and membership fees are both seen to correlate positively. Overall controlling this variable the multiple regression model can be altered for achieving higher significance with greater effectiveness in its predictive validity.

Discussion

From the results above it can be concluded that all factors except total industry insurance are able to explain more than 70% variation in the dependent variable, number of society members. The reason for this may be due to variation in the sales seasonality of insurance in the American insurance market. It has been observed that the seasonality of high peak sales usually occurs following an occasion like fire, storm which produces a casualty between the relationship of sales and the occurrence. Also different types of insurances produce different types of sales effects, thus affecting the total industry insurance. Also it is of no surprise that conversion rate has the highest positive effect and a membership fee has the negative effect on the number of society members. The only factor that surprises is program completers who are seen to have the least positive effect.

The Durbin Watson test results prove that in spite of using time series data there exists no auto correlation. The multiple regression model provides a different approach simulating all the effects together. The only drawback to this method is the presence of Multicollinearity among the factors which produces a redundancy among the variables and influences the predictive validity of the model. Finally the correlation matrix gives a complete overview of the correlation and guides the model into a more effective predictive tool by pointing out the correlated factors. Overall from the research it can be concluded that the three hypotheses are proved to be correct through methodology and analysis.

Limitations and Directions For Future Research

This research stands to be the basic foundation for future research on this subject. Future research should try to segregate segments, which would include study of different regions from different countries. This data being taken from US census takes into account only the factors affecting the CPCU society in United States of America. A research can be carried out to evaluate different factors affecting such an independent variable in different countries. Secondly, it has been found in the research by Rice (1997) that alternative like MBA and specialized masters in accounting and finance have been becoming more popular compared to CPCU certification. This shows that there is also a need to compare the popularity of other certification programs and degrees like CFA, CPA, and MBA with CPCU. Exploring these two factors will provide more insights on the factors affecting the number of society memberships.

References

- Bradford, M. (2005). CPCU designation offers elite status to risk managers. *Business Insurance*, 39 (43), 4, 40.
- Choudhury, A., and Jones, J. R. (2011). Society Membership Trend Determinants for Sustainability: An Analysis in the Insurance Industry, *Journal of Business Case Studies*, 7 (2), 61-69.
- Cooper, R.W. (2005). Working to Regain The Public Trust: Considerations For Cocas. *CPCU Journal*, 58 (6), 1-22.
- Cooper, R.W. and Frank. G. L. (2001). Key Ethical Issues Facing The Property And Casualty Insurance Industry: Has A Decade Made A Difference? *CPCU Journal*, 54 (2), 99-111.
- Hurzeler, D. (2004). Support of CPCU Society Makes Dollars and Sense. *National Underwriter / Property & Casualty Risk & Benefits Management*, 108 (40), 34.
- Jones, J. (2010). Katie School of Insurance and Financial Services. *CPCU Journal*, 63 (6), 1-8.
- Kelly, M. (2009). The CPCU Society: Diversity is Key to Our Future. *National Underwriter / Property & Casualty Risk & Benefits Management*, 113 (15), 20.
- Kensicki, P. R., (2009). A Guide to Organizational Ethics Policy. *CPCU Journal*, 62(7), 1-8.
- Lowry, J.R., S. M. Avila, and T. R. Baird (1999). Developing a Niching Strategy for Insurance Agents. *CPCU Journal*, 52 (2), 74-83.
- Marks, J. (1994). The CPCU Society Story. *CPCU Journal*, 47 (1), 5.
- Mogel, G. S. (2003). CPCU Society Prez Spreads Word on CPCU Designation. *National Underwriter /Property & Casualty Risk & Benefits Management*, 107 (42), 8.
- Overman, E. S. (1994). The Evolution of Professional Insurance Studies by Industry. *CPCU Journal*, 47 (4), 226-234.
- Rice, P. (1997). Theoretically speaking, CPCU is a big plus. *National Underwriter / Property & Casualty Risk & Benefits Management*, 101 (28), 13-16.
- Smith, R., Brandon, L., Rudolph, R., and Dusterhoff, J. (1996). Five Perspectives on Mandatory Continuing Education Requirements for the CPCU Designation. *CPCU Journal*, 49 (2), 116-124.
- Sykes, A. (1986). An Introduction of Regression Analysis. *Chicago working paper in law and economics*. 1- 33.