The Relationship Between Growth and Profitability: An Empirical Analysis of U.S. Property and Liability Insurers

B. Paul Choi and Jin-Gil Jeong

Abstract

Using a data set of insurers operated in the U.S. property and liability (P-L) insurance market during the sample period, this study examines the interactions between firm growth and profitability. Dynamic panel regressions are conducted to investigate its relationship and other factors in the growth and profit equations. GMM regression models include firm specific variables and industry cycle variables to control and deliver a better estimation. The results of this study show that past profits have a major impact on future profits, thereby supporting that profits continue to be generated in the P-L insurance sector. The findings are consistent with two additional profit measures. Additionally, this research finds that lagged growth is benefitting present profit, specifically assessed by ROE. The growth model shows a positive association between lagged profit and current growth. This study further demonstrates how quickly smaller-sized businesses expand in this market. Other firm characteristics are identified in the profit and growth models as well.

JEL Classification: G22, G32, H11
Keywords: Firm growth, profitability, persistence of profit, insurance market

I. Introduction

Two popular theories about the persistence of profit (POP) are studied and empirically tested over the years. One is that it is possible to forecast that all companies' profit levels will eventually converge to the same long-term average value and that entrance and exit will be sufficiently free to eliminate any anomalous benefit. Alternatively, some businesses are able to avoid copying or obstruct entry mostly due to specialized knowledge or other advantages. If this is the case, abnormal profit can continue year after year and variances in average profit rate may be kept up indefinitely. POP studies in the banking industry shows evidence of POP (Berger et al., 2000, Goddard et al., 2004, and Hirsch, 2018).

Comparing the insurance industry to other financial sectors, some distinctive features are present. Customers can obtain insurance in a variety of ways, and the methods used to do so vary depending on factors including costs and entrance obstacles (see Regan, 1997, Seog, 1999, and Regan and Tennyson, 2000). To distribute insurance, some insurers employ independent agents or brokers, particularly for complex insurance categories like commercial liability. Direct writer system is an alternative. Direct writers rely disproportionately more on elements like promotion and (computer) automation. P-L insurers should decide which distribution strategy to use when they first enter the market. So, it may be inferred that constraints in the insurance market include creating distribution infrastructure and advertising or brand name awareness.

B. Paul Choi (bchoi@howard.edu), corresponding author, Howard University; Jin-Gil Jeong (jjeong@howard.edu), Howard University.

As argued by Goddard et al. (2004), regulatory entry barriers or unobservable threat of entry can be a factor of the speed of convergence. In the existence of market failures in the insurance industry, governmental interventions could be justified to protect social welfare and increase market efficiency (Klein, 2012). Significant information asymmetry issues and principal-agent conflicts may cause market failure. Unfavorable market results, such as higher than fair prices, a lack of insurance options, etc., that stem from factors influencing the cost of risk. Because most regulations are at the state level rather than the federal level, insurance regulation in the United States is extensive and complex (Lencsis, 1997).

Unlike other industries, the property and liability insurance industry is exposed to the market cycle (Harrington, 2004 and Kousky, 2020). The property-liability insurance industry is notorious for its lengthy underwriting cycles. A series of profitable upswings followed by profitable downswings are known as an underwriting cycle (e.g., Cummins and Danzon, 1997, Weiss and Chung, 2004, and Lei and Browne, 2017).

These particular to the U.S. P-L insurance sector characteristics may have an impact on how profitable and expanding the businesses are. Additionally, no information regarding the factors that influence business growth in this industry and other industries has been provided. By putting the POP to the test and finding the factors that influence business growth and profitability, this study contributes to the body of knowledge in this field. Because of the concern regarding rapid market shifts, rates of business growth, and their relationship to firm profits, the findings from this study are significant to consumers, insurers, and regulators.

The following section provides more background on the profit and growth relationship. This is followed by data and model specification for empirical study. The next section provides a presentation and discussion of empirical results. The last section draws conclusions.

II. Literature Review

Mueller (1977) was the first to demonstrate profit convergence and suggest long-run equilibrium profit rates in the POP literature. Two sets of studies are used to empirically examine the POP hypothesis. The first group of literary works makes a case for the long-term equilibrium profitability. This body of work contends that all firms' profit rates tend to converge on the same long-run average value and that entry and exit are sufficiently unfettered to quickly wipe out any abnormal profit. Studies at the firm level imply that there are variations in the rate of convergence. (e.g., Geroski and Jacquemin, 1988 and McGahan and Porter, 1999).

The second group of research proposes that entry and exit are sufficiently free to swiftly eradicate any aberrant profit. This alternative viewpoint holds that some businesses have unique expertise or other advantages that allow them to prevent imitation or restrict entry. If this is the case, abnormal profits may have a tendency to continue from year to year, and variations in average profit rates may last indefinitely (Levonian, 1994, Berger et al., 2000).

Berger et al. (2000) have presented extensive evidence of POP in U.S. banking. Using nonparametric measures of persistence for the 1970~1997 period, this study finds that U.S. banking industry persistence has increased substantially over the testing period. They find that the increases in persistence across the testing period vary in magnitude. The boom years showed the greatest increase. According to their research, market dominance resulting from barriers to product market competition and informational opacity has an impact on banks' performance.

Goddard et al. (2004) examine how company expansion and profitability interact. They use data from 583 banks with diverse ownership characteristics that are spread throughout five main European Union (EU) nations. Over the years 1992 to 1998, growth and profit rates were tracked

on a yearly basis along with a number of control variables that measured the effects of various macroeconomic, industry-level, and firm-level factors. This study attempts to methodologically integrate the growth and profit strands of the earlier empirical banking and industrial organization work. Using dynamic panel regressions, they find that there are some differences in the estimated short-run persistence between ownership types and between nations. They also discover that savings and cooperative banks tend to have higher persistence rates than commercial banks.

A meta-regression analysis is used in Hirsch's 2018 survey study, which looked at 36 empirical publications in the POP literature. According to this study, a number of variables, such as testing procedures, economic sectors, and testing duration, have a substantial impact or biased implication on the conclusions.

Overall, the results and conclusions in this field have been inconsistent, and no earlier research have looked at how this perspective might relate to the insurance sector. This study will discuss the POP hypothesis in the U.S. P-L insurance business because it has many distinctive features in terms of distribution systems, ownership structures, regulations, and marketing strategies.

III. Data and Model Specification

Data

Various firm-specific variables are obtained from the Annual Statement that all property-liability insurers report to the National Association of Insurance Commissioners (NAIC) for the period 1998 to 2014[1]. Data for the insurer agency system is obtained from Best's Key Rating Guide (A.M. Best Co.). The completed panel time series data for the sample period are pooled in the models.

Model Specification

In this article, firstly, we conduct a company level analysis for the period to examine the persistence of firm profit (POP), using the U.S. Property and Liability (P-L) insurance panel data. In addition, a relationship between firm growth and firm characteristics is tested. The generalized method of moment (GMM) dynamic panel regressions are employed to investigate growth equation and profit equation for the sample period. From this potential sample, insurers with negative values of surplus, assets, premiums, inputs, or outputs are deleted to conduct a meaningful empirical test. A total of 19,224 firm-year observations was analyzed for the tests. As suggested by Goddard et al. (2004), the multivariate regression models are employed since the inclusion of a lagged growth term and other control variables tends to be a better estimate of this type of study.

Regression models include firm specific variables and industry cycle variables. GMM regression models are:

$$Profit_{i,t} = \alpha + \beta_{1,1} Profit_{i,t-1} + \beta_{1,2} Growth_{i,t-1} + \beta'_3 X_{i,t} + ln(\varepsilon)_{i,t} \quad (1)$$

$$Growth_{i,t} = \alpha + \beta_{2,1} Size_{i,t-1} + \beta_{2,2} Profit_{i,t-1} + \beta'_3 X_{i,t} + ln(\varepsilon)_{i,t} \quad (2)$$

[1] These are the most recent data currently available to the author. However, there has been no substantial change in the U.S. P-L insurance market including a market cycle since then.

In the testing model, subscript *i* represents the i^{th} insurance company, *t* is a time index, and ε_{it} is a random error term with zero mean and a constant variance (see Fier and Pooser, 2016). In Equation (1), the coefficient, $\beta_{1,1}$, tests the abnormal profits and shows the persistence of profit and $\beta_{1,2}$reflects the impact of past growth on current profit. In Equation (2), $\beta_{2,1}$, tests the size-growth relationship, while $\beta_{2,2}$ reflects the past profit's impact on current growth.

To obtain an insurer's profitability (*Profit*), a form of the underwriting profit margin (*Profit Margin*) is used in addition to the conventional accounting profit, rate of return on equity (ROE). The profitability of a firm in year *t* was normalized by subtracting the average profitability of the industry in year *t* (Goddard et al., 2004 and Hirsch 2018). *Profit Margin* is defined as one minus adjusted loss ratio, which is losses and loss adjustment expenses incurred over premiums earned[2]. This variable is typically used for the measure of insurers' profitability (e.g., Ma and Pope, 2003). Prior studies report an unpredictable relation between profitability and firm growth (e.g., Santomero and Babbel, 1997 and Hardwick and Adams, 2002). Current and lagged value of *Profit* are used. *Growth* is measured by changes in the total assets in logarithm form, i.e., $ln(Size)_t - ln(Size)_{t-1}$. Financial conditions of the firm are influenced by, among other factors, the size of the firm. To capture the interactive relationship between growth and profitability, a normalized *Growth* variable is used by subtracting the average growth rate of the industry in year *t* (see Goddard et al., 2004, and Barth and Eckles, 2009)

The control variables follow the existing literature. They include Market Share (MS), Advertising Intensity, Investment Ratio, Leverage, Reinsurance Utilization, Personal Lines, Market Concentration, Business Diversification, Geographic Diversification, GDP Changes, dummies for membership in an insurance group (Group Dummy), stock vs. mutual organization (Stock Dummy), independent agency system vs. direct writers (Agent Dummy), and hard market vs. soft market (Market Cycle Dummy).

Market Share is defined as the proportion of total premiums accounted for by insurer *i* in total market at time *t* and is computed based on direct premiums written. *Advertising Intensity* is measured as a ratio of advertising expenses over premiums written. Advertising has an impact on profitability and growth because it is an integral part of the way that the business operates and because of the connection between advertising intensity and market structure(see Chen and Waters, 2017 and Choi, 2019).

Investment Ratio is defined as net investment income over premiums written. Investment income may have an impact on the profit and growth because it is one of their primary business operations, and the testing model may include controls for investment activities. The asset portfolio of insurers, as well as their capacity and eagerness to invest, may have an impact on the company's performance.

Next, we control for risk-taking behavior of insurers since risk is closely related to the decision of the level of capital holding. *Leverage* is used to assess an insurer's capital sufficiency, and a Kenney ratio is calculated for this variable (Doherty and Phillips, 2002). The ratio is defined as the ratio of premiums written to surplus and it is used by the NAIC as an indicator of financial stability, where a higher figure suggests that the insurer might not have enough room for unforeseen losses.

Reinsurance effectively increases the firm's capacity to provide insurance services, stabilizes loss experience, and shields the firm from catastrophe. Reinsurance utilization (the ratio

[2] For more discussion and use of this price variable, refer to Winter (1994), Cummins and Danzon (1997), and Choi and Weiss (2005).

of reinsurance ceded to the total of reinsurance assumed and direct premiums written) may have an impact on the insurer's overall riskiness and efficiency. Reinsurance deals therefore touch on underwriting risk and capacity and may have an impact on profits and growth.

The model also takes account of the business lines. The ratio of personal lines to all written insurance business is referred to as the proportion of personal lines. This indicator reveals if the insurer places a greater emphasis on commercial line products than personal lines products, which are less complex (high complexity). The Herfindahl index is used to measure *Market Concentration* in the P-L insurance industry, which is consistent with numerous research on industrial organization[3]. The Herfindahl index is defined as the sum of the squared market share of each insurer in the U.S. market.

We have two business diversification variables. First, an insurer's lines of business might have an impact on the risk and overall profitability of the company. *Business Diversification* is measured using a Herfindahl index which is defined as

$$\sum_{i=1}^{34}\left(\frac{PW_i}{TPW}\right)^2 \tag{3}$$

where PW_i is the value of premiums written in each line of business in the insurer's annual statement and *TPW* represents the insurer's total premiums written[4]. While the lowest amount of diversification (i.e., higher score) would suggest that the insurer's operation is totally devoted to a single line of business, the highest level of diversification (i.e., lower value) would suggest that the operation is well dispersed across various lines of business.

Another control variable related to the insurers' diversification strategy is the Herfindahl index of geographical operations (*Geographic Diversification*). This variable is calculated as follows:

$$\sum_{i=1}^{58}\left(\frac{PW_i}{TPW}\right)^2 \tag{4}$$

where PW_i is the value of premiums written in each state and *TPW* represents the insurer's total premiums written. Similar to company diversification, a greater value denotes a firm's operation in one state or a small number of states, whereas a lower value denotes a firm's geographic operations are more diverse. It is anticipated that insurers with more varied product or regional mix will have a more varied revenue stream and, as a result, more stable capital inflow from premiums.

The testing model also includes GDP change to control for broader economic conditions. We used the percentage changes from the previous year's index. To control for the impact of each on profitability and growth, binary variables are assigned for group membership, organizational form, distribution system, and market cycle. The difference in efficiency between group members and non-members in insurance operations and marketing strategy can be taken into account by controlling for group membership.

[3] Stigler (1964) argues that the Herfindahl index is superior to the concentration ratio (e.g., four-firm concentration ratio) for measuring concentration to assess the likelihood of effective collusion.

[4] We use the data in the NAIC annual statement – Underwriting and Investment Exhibit, Part 1B-Premiums Written.

Each organizational structure can effectively resolve particular incentive conflicts between the parties to a contract (Mayers and Smith, 1994). As a result of, among other things, managers of a mutual firm being scrutinized less than those of stock firms, conflicts between policyholders and owners are reduced in mutual organizations, while those between owners and managers are increased (Baranoff and Sager, 2003). The possibility of different levels of profits and growth influence among stock and mutual enterprises is made possible by controlling for organizational type. Independent agency systems and direct writer systems are the two main categories of insurance distribution systems (e.g., Regan, 1997 and Seog, 1999).

The testing model also includes a cyclical variable to account for business cycle economic fluctuations. The underwriting cycle that exists in the property and liability insurance sector is taken into account by the model. Given that insurance options are relatively limited during the hard market period, a negative relationship between it and the dependent variable is anticipated. Additionally, it is anticipated that this variable will accurately reflect the firm's riskiness at various stages of the business cycle (see Bassett and Brady, 2002). Years 2000 ~ 2003 are assigned to a hard market and all other years are deemed to be a soft market (Hartwig, 2016).

IV. Results

All P-L insurers that write property-liability insurance and submit data to the NAIC for the years 1998 to 2014 consist of the prospective sample of insurers. Insurers having negative surplus, assets, or premiums were excluded from this prospective sample. For the purposes of this study, a complete panel data was used, and the final sample included 19,924 surviving and reporting firms for the sample period (Table 1). Generalized moments of methods (GMM) is used to capture endogeneity and unobserved heterogeneity.

For the variables included in the regressions for the testing period's surviving firms, the results include means and standard deviations. The U.S. property and liability insurance market grew by 5.9 percent a year on average during the study period. According to the Market Concentration (0.0084), the U.S. P-L insurance business is generally a competitive and non-concentrated market.

On average, U.S. P-L insurers return 4.39 percent on equity (ROE), while the mean of the profit margin (0.3085) shows that every $1 of premium sample insurers spend $0.6915 on losses and loss adjustment expenses. On average, the primary insurers transfer 30.28% of their business to reinsurers. Advertising intensity is high as reported at 42.7%. Two diversification variables reflect that insurers are less likely diversified in terms of business lines and geographical operations. Table 1 also presents that the sample insurers use more independent agency system (78.46%), more affiliated with a group (72.27%), and more in stock form of ownership (70.9%, which are generally consistent with previous studies.

In Results, the full models as in Equations (1) and (2) are reported to capture the POP effect and the relationship between firm profit and corporate growth for the sample period (Tables 2, 3, and 4). Further, a robust check is conducted in Results. No evidence of multicollinearity among variables is found in any testing models.

Table 1: Summary Statistics

	Mean	Standard Deviation
Growth	0.0590	0.1969
Growth (t-1)	0.0680	0.2176
Firm Size	18.5560	1.9015
Firm Size (t-1)	18.4970	1.9047
ROE	0.0439	0.1674
ROE (t-1)	0.0453	0.1622
Profit Margin	0.3085	0.2438
Profit Margin (t-1)	0.3047	0.2424
Market Share	0.0005	0.0022
Advertising Intensity	0.4271	0.3028
Investment Ratio	0.0336	0.0525
Leverage	1.0073	0.7928
Reinsurance Utilization	0.3028	0.2691
Proportion of Personal Lines	0.3837	0.3737
Herfindahl (Market Concentration)	0.0084	0.0005
Business Diversification	0.4649	0.2972
Geographic Diversification	0.5381	0.3851
Group Dummy	0.7227	0.4477
Agent Dummy	0.7846	0.4111
Stock Dummy	0.7090	0.4542
Hard Market Dummy	0.2163	0.4117
GDP Change	1.0175	0.0161
Observation	19,224	

Growth is defined as total assets growth from last year.
Profit Margin is defined as 1 minus adjusted loss ratio.
Herfindahl Index is defined as the sum of the squared market share of each insurer in the US market.

Table 2: Profit (ROE) Model

Dependent Variable	**ROE**		
Independent Variable	Coeff.	Std. Err.	
Intercept	-0.5594	0.0725	***
Lagged ROE	0.6007	0.0208	***
Lagged Growth	0.0344	0.0075	***
Market Share	0.4584	0.3993	
Advertising Intensity	-0.0254	0.0223	
Investment Ratio	0.2986	0.1011	***
Leverage	-0.0174	0.0035	***
Reinsurance Utilization	-0.0309	0.0043	***
Proportion of Personal Lines	0.0158	0.0039	***
Herfindahl (Market Concentration)	-8.1538	3.3815	**
Business Diversification	0.0166	0.0043	***
Geographic Diversification	-0.0124	0.0032	***
Group Dummy	0.0039	0.0028	
Stock Dummy	0.0113	0.0026	***
Agent Dummy	0.0061	0.0028	**
Hard Market Dummy	0.0036	0.0048	
GDP Growth	0.6070	0.0661	***
Observations	19,924		
Adjusted R^2	0.2662		

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level.
Note: Generalized moments of methods (GMM) is used to capture endogeneity and unobserved heterogeneity.

Table 3: Profit (Profit Margin) Model

Dependent Variable	**Profit Margin**		
Independent Variable	Coeff.	Std. Err.	
Intercept	-0.6180	0.0872	***
Lagged Profit Margin	0.7644	0.0138	***
Lagged Growth	0.0159	0.0079	**
Market Share	-0.5691	0.3503	***
Advertising Intensity	-0.0628	0.0239	***
Investment Ratio	-0.0834	0.0251	***
Leverage	-0.0172	0.0019	***
Reinsurance Utilization	-0.0422	0.0054	***
Proportion of Personal Lines	-0.0071	0.0039	*
Herfindahl (Market Concentration)	-14.8564	4.1622	***
Business Diversification	0.0187	0.0060	***
Geographic Diversification	0.0001	0.0041	
Group Dummy	-0.0107	0.0035	***
Stock Dummy	0.0097	0.0031	***
Agent Dummy	0.0067	0.0036	*
Hard Market Dummy	0.0069	0.0055	
GDP Growth	0.7399	0.0819	***
Observations	19,924		
Adjusted R^2	0.4827		

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level.
Note: Generalized moments of methods (GMM) is used to capture endogeneity and unobserved heterogeneity.

Table 4: Growth Model with Lagged ROE

Dependent Variable	**Growth**		
Independent Variable	Coeff.	Std. Err.	
Intercept	-0.8362	0.0970	***
Lagged ROE	0.0880	0.0122	***
Lagged Firm Size	-0.0108	0.0012	***
Market Share	4.5650	0.7360	***
Advertising Intensity	0.0675	0.0870	
Investment Ratio	-0.4260	0.1324	***
Leverage	0.0354	0.0032	***
Reinsurance Utilization	-0.0245	0.0078	***
Proportion of Personal Lines	-0.0411	0.0050	***
Herfindahl (Market Concentration)	19.3989	4.5260	***
Business Diversification	0.0075	0.0059	
Geographic Diversification	-0.0179	0.0044	***
Group Dummy	0.0062	0.0041	
Stock Dummy	0.0065	0.0029	**
Agent Dummy	-0.0009	0.0032	
Hard Market Dummy	0.0288	0.0060	***
GDP Growth	0.8660	0.0873	***
Observations	19,924		
Adjusted R^2	0.0664		

*** significant at 1% level, ** significant at 5% level, and * significant at 10% level.
Note: Generalized moments of methods (GMM) is used to capture endogeneity and unobserved heterogeneity.

Results attest to the persistence of profitability of the P-L insurance sector. A positive coefficient on lagged profit in Table 2 indicates that past profit (ROE) significantly affects current growth. The same result is shown in Table 3 when *Profit Margin*, another profit measure, is used. Past profits are important and both favorable in the ROE and Profit Margin models in the insurance sector. It only measures and discusses short-run persistence. In Tables 2 and 3, we also discovered a favorable and substantial association between lagged growth and current profits[5].

The results of Table 4 demonstrate a strong correlation between firms' profit (ROE) and lagged growth that is positive and significant at the 1% level during the testing period, while lagged size is strongly and negatively correlated with current growth price. This result suggests that smaller size businesses grow more swiftly the next year than their larger counterparts, which is consistent with earlier research results for this industry (Choi, 2010).

[5] Univariate and bivariate regressions draw the same conclusions on these key variables.

Overall, we can properly infer that the P-L insurance sector has seen persistent profitability (POP). This result is in line with what Berger et al. (2000) found in their banking research. According to the insurance industry's aging phenomenon, new business has a loss ratio that is much higher than average but that gets lower with each renewal (Cohen, 2001 and D'Arcy and Gorvett, 2004). In other words, as insurers become more selective about high-risk policyholders, their long-term business is profitable. Therefore, this theory is supported by the study's findings.

Each of the two coefficients for profitability is significant in the growth model[6]. The U.S. P-L insurance market exhibits a favorable correlation between lagged profitability and current growth, in contrary to what Hardwick and Adams (2002) discovered. According to this result, profitability may be an indication of future business growth in this industry. Current growth and the coefficient on lagged firm size show a strong and negative correlation[7]. As a result, this data suggests that smaller size firms in the insurance market expand more quickly, which is consistent with earlier findings (Choi, 2010).

The results of the Profit (ROE) model show that companies with a larger market share, a higher investment ratio, and a less risky capital structure often grow fast. The computed coefficients for reinsurance utilization are negative and significant for all testing models. This shows that reinsurers develop more slowly than insurers who employ less reinsurance or who take on more risk from the primary insurers. The primary insurer may utilize the reinsurance contract as a chance to increase the policy limit while maintaining a manageable level of retention. However, the growth is typically slower for companies who cede more reinsurance. The findings thus demonstrate that primary insurers may experience modest expansion at the expense of a constant flow of earnings (reduced risk).

The coefficients on the geographic diversification variable are negative in all three models, and they are significant in the ROE and Growth model. As a result, this finding suggests that insurers who broaden their customer base develop more quickly than those who focus on a smaller number of states. In other words, more diversified U.S. property and liability insurers do experience faster growth rates, and this market does exhibit some degree of economies of scale. This is in line with the discovery made by Hardwick and Adams (2002).

Results are mostly equivalent in Tables 2 and 3, however there are minor differences between the two profit models. The coefficients on market share, investment ratio, the percentage of personal lines, and the group dummy reveal a positive and insignificant correlation with ROE in contrast to the Profit Margin model.

According to the test results for the growth model, insurers who concentrate more on commercial lines and employ less reinsurance develop more quickly. We also find a link between current growth and insurers with more leverage (i.e., risky capital structure) and more diversified company operations.

Additionally, the findings demonstrate that group and stock dummy variables are positive and significant in all testing models. Compared to non-stock corporations, stock companies are more likely to have faster growth and better profitability. Because stock companies have easier access to financial markets, their better utilization of capital may have a favorable impact on firm growth. As would be predicted, the P-L insurance market in the U.S. tends to see greater growth among insurers linked with a group. In a difficult market environment (hard market), insurance businesses should expect lower earnings even though they typically see higher growth. The results show that insurers are more likely to experience larger profits during economic booms, as predicted.

[6] Table 4 reports the Growth model with lagged ROE only.

[7] According to the Law of Proportionate Effect (LPE), no association between the two variables is expected.

V. Conclusions

This article examines the firm growth and profitability for the P-L insurance market in the United States as well as the factors that influence the POP. This study uses a sample of insurers that have reported their annual data to the NAIC for the full sample period to assess the application of the POP in U.S. P-L insurers.

The findings of this study offer compelling evidence that prior profits have a significant influence on the profits of the subsequent year, supporting the persistence of profit in the P-L insurance industry. Two alternative profit measurements are consistent with the findings. Furthermore, we find that lagged growth increases current profits in both models. Lagged profit and current growth are determined to have a positive correlation in the growth model. This paper also confirms that smaller size firms grow fast in this industry.

The results confirm that investment outcome, riskiness of business, lines of business, market concentration, geographic diversification, economic conditions, market cycle, group affiliation, and forms of ownership are determinants of current profitability of insurers.

As to the determinants of firm growth, we find that firms with less investment, higher leverage and more business with commercial lines tend to positively affect current growth. Some degree of economies of scope is found in this industry, since more geographically diversified insurers tend to grow faster than specialized insurers.

This study is the first to evaluate the POP and the effect of firm growth and profitability in the P-L insurance sector in the United States. The study's findings add new knowledge on the connection between company growth and business profitability in the U.S. P-L insurance industry. The empirical results from this study offer guidance on this subject to the general public, regulators, and insurers because no earlier research has looked at these causal links in this business.

References

Baranoff, E. and T. Sager (2003) "The Relations among Organizational and Distribution Forms and Capital and Asset Risk Structures in the Life Insurance Industry," *Journal of Risk and Insurance*, vol. 70(3), p. 375-400.

Barth M.M. and D.L. Eckles (2009) "An Empirical Investigation of the Effect of Growth on Short-Term Changes in Loss Ratios," *Journal of Risk and Insurance*, vol. 76(4), p. 867-885.

Bassett B. and T. Brady (2002) "What Drives the Persistent Competitiveness of Small Banks?" *Finance and Economics Discussion Series working paper* 2002-28, Board of Governors of the Federal Reserve System.

Berger, A.N., DeYoung R., Genay H., and Udell, G.F. (2000). Globalization of Financial Institutions: Evidence from Cross-Border Banking Performance. *Brookings-Wharton Papers on Financial Service*, 3, 23-123.

Chen, J. and G. Waters (2017) "Firm Efficiency, Advertising and Profitability: Theory and Evidence," *The Quarterly Review of Economics and Finance*, vol. 63(C), p. 240-248.

Choi, B.P. and M.A. Weiss (2005) "An Empirical Investigation of Market Structure, Efficiency, Performance in Property-Liability Insurance," *Journal of Risk and Insurance*, vol. 72(4), p. 635-673.

Choi, B. Paul (2010) "The U.S. Property and Liability Insurance Industry: Firm Growth, Size and Age," *Risk Management and Insurance Review*, vol. 13, p. 207–224.

Choi, B. Paul (2019) "Advertising, Market Concentration, and Firm Performance on the Distribution System, *International Journal of Business and Finance Research*, vol. 13(2), p. 21– 32.

Cohen, A., (2001) "Asymmetric Information and Learning in the Automobile Insurance Market," Harvard University Working Paper.

Cummins, J. D., and P. M. Danzon (1997) "Price, Financial Quality, and Capital Flows in Insurance Markets," *Journal of Financial Intermediation*, vol. 6(1), p. 3-38.

D'Arcy, S.P. and R.W. Gorvett (2004) "The Use of Dynamic Financial Analysis to Determine Whether an Optimal Growth Rate Exists for a Property-Liability Insurer," *Journal of Risk and Insurance*, 71, 583-615.

Doherty, N.A. and R.D. Phillips (2002) "Keeping up with the Joneses: Changing Rating Standards and the Buildup of Capital by U.S. Property-Liability Insurers," *Journal of Financial Services Research*, vol. 21, p. 55-78.

Fier, S.G. and D.M. Pooser (2016) "Advertising Effectiveness for Financial Services Firms: Evidence from the Life Insurance Industry," *Journal of Insurance Issues*, vol. 39(2), p. 137-168.

Geroski, P.A., Machin, S.F., and Walters, C.F. (1997). "Corporate Growth and Profitability," *The Journal of Industrial Economics*, 45, 171-189.

Goddard, J., Molyneux, P., and Wilson, J.O.S. (2004) "The Profitability of European Banks: A Cross-Sectional and Dynamic Panel Analysis," *The Manchester School*, 72 (3), 363-381.

Hardwick, P. and M. Adams (2002) "Firm Size and Growth in the United Kingdom Life Insurance Industry," *Journal of Risk and Insurance*, 69, 577-593.

Harrington, S.E. (2004) "Tort Liability, Insurance Rates, and the Insurance Cycle,". *Brookings-Wharton Papers on Financial Services 2004*, p. 97-138.

Hartwig, R. (2016) "Trends, Challenges and Opportunities in the P/C Insurance Industry in 2017 and Beyond," *Insurance Information Institute Presentations Archive.*

Hirsch, S. (2018) "Successful in the Long Run? A Meta-Regression Analysis of Persistent Firm Profits," *Journal of Economic Surveys*, 32 (1), 23-49.

Klein, R.W. (2012) "Principles for Insurance Regulation: An Evaluation of Current Practices and Potential Reforms," *The Geneva Papers on Risk and Insurance – Issues and Practices*, vol. 37, p. 175-199.

Kousky, C. (2020) "Managing Natural Catastrophe Risk: State Insurance Programs in the United States," *Review of Environmental Economics and Policy*, vol. 5 (1), p. 153-171.

Lei, Y. and M.J. Browne (2017) "Underwriting Strategy and the Underwriting Cycle in Medical Malpractice Insurance," *The Geneva Papers on Risk and Insurance – Issues and Practice*, vol. 42, p. 152-175.

Lencsis, P. M. (1997). *Insurance regulation in the United States: An overview for business and government*, Greenwood Publishing Group.

Levonian M.E. (1994) "The Persistence of Bank Profits: What the Stock Market Implies." *Economic Review-Federal Reserve Bank of San Francisco*, Iss. 2, p. 3-17.

Ma, Y. and N. Pope (2003) "Determinants of International Insurers' Participation in Foreign Non-Life Markets." *Journal of Risk and Insurance*, vol. 70(2), p. 235-248.

McGahan, A.M. and M.E. Porter (1999) "The Persistence of Shocks to Profitability." *Review of Economics and Statistics*, vol. 81, p. 143-153.

Mayers, D. and C. Smith, Jr. (1994) "Managerial Discretion, Regulation, and Stock Insurance Company Ownership Structure," *Journal of Risk and Insurance*, vol. 61(4), p. 638-655.

Mueller, D.C. (1977) *Profits in the Long Run*, Cambridge University Press.
Regan, L. (1997) "Vertical Integration in the Property-Liability Insurance Industry: A Transaction Cost Approach," *Journal of Risk and Insurance*, vol. 64(1), p. 41-62.
Regan, L. and S. Tennyson (2000) Insurance Distribution Systems, in: G. Dionne ed., *Handbook of Insurance* (Boston: Kluwer Academic Publishers).
Santomero, A.M. and D.F. Babbel (1997) "Financial Risk Management by Insurers: An Analysis of the Process," *Journal of Risk and Insurance*, 64, 231-270.
Seog, S.H. (1999) "The Coexistence of Distribution Systems When Consumers Are Not Informed," *Geneva Papers on Risk and Insurance Theory*, vol. 24(2), p. 173-192.
Stigler, G.L. (1964) "A Theory of Oligopoly," *Journal of Political Economy*, vol. 72(1), p. 44-61
Weiss, M.A. and J.H. Chung (2004) "U.S. Reinsurance Prices, Financial Quality, and Global Capacity," *Journal of Risk and Insurance*, vol. 71(3), p. 437-467.
Winter, R.A. (1994) "The Dynamics of Competitive Insurance Markets," *Journal of Financial Intermediation*, 3, 378-415.