Geographic Expansion Strategy of Property-Liability Insurers: Patterns and Determinants

1. Introduction

Business expansion decisions have profound implications for firms' future profitability and growth opportunities. In the U.S., the most common way for an insurance company to expand its business is either through writing more lines of business or through expanding to a new state. No matter which method is used, managers make such decision by trading off alternative investment opportunities and reallocating organizational resources. The failure or success of the expansion will reshape the company's future direction. Thus, realizing the importance of business diversification, researchers have extensively investigated the motivation and the effect of diversification in the past decades (Montgomery, 1994; Berger and Ofek, 1995; Villalonga, 2004; Cummins, Weiss, Xie, and Zi, 2010; Berry-Stolzle et al., 2012). However, most of the existing insurance literature focused on product diversification; little evidence exists concerning the heterogeneity of geographic expansion decisions in P/L insurers.

It is still a myth that why insurers choose to diversify their business, even though numerous empirical evidence presents a diversification discount (Lang and Stulz, 1994; Berger and Ofek, 1995; Liebenberg and Sommer, 2008). Figure 1 shows the recent trends of geographic diversification and expansions for insurance companies from 1995 to 2016.[1] We can see that there are around 60% of insurers are geographically diversified before 2000, after the "dot-com bubble," the portion of diversified insurers are stable around 50%. Even though the number of diversified insurers is relatively stable, every year there are around 30% of diversified insurers are expanding to new states. In this study, we hope to take a closer look at the geographic expansion decision and

[1] The sample in Figure 1 only includes affiliated and non-affiliated firms, in another word, group insurers are not included.

shed some lights on the mechanism behind it.

The studies of geographic location choice can be traced back to as early as the 1950s. There is a substantial literature investigates the underlying mechanism and factors that influence firms' location decisions (Arauzo-Carod et al., 2005; Van Dijk and Pellenbarg, 2000; Lafuente et al., 2010).[2] The three main categories of a theoretical perspective that explains firms' location choices are neoclassical, institutional, and behavioral perspective (Bagchi-Sen and Hayter, 2001). Neoclassical perspective indicates that firms choose their location by maximizing its profits or minimizing its costs. Institutional perspective suggests that firms make their location choices in response to regulatory actions taken by the state authorities, which may impact the economic activities in the state. While both neoclassical and institutional perspectives are based on "external" factors that affect a company's decision making, behavioral perspective emphasizes the "internal" nature of the firm, such as size, age, growth rate. Most of the existing literature on geographic location choices are conducted on manufacture companies (Badri, 2007; Crone, 1997), knowledge-intensive business sector, such as biotechnology and high-tech firms (Goetz and Morgan, 1995; Koo et al., 2009; Su and Hung, 2009; Hackler, 2004).[3] Limited evidence is observed in the insurance industry. It is interesting to learn what is the driving force for an information-sensitive industry such as insurance to expand geographically.

The questions of interest are twofold. First, we investigate what kind of firm characteristics are the "push" factors of companies' geographic expansion decisions. Understanding the expansion decision is not only critical to companies themselves, but also very crucial to the state, local, and federal authorities who demand to encourage economic development in specific areas. Second, once the firm decided to expand, what are the "pull" factors of the state that attract

[2] More detailed literature review on geographic location choice can be found in Arauzo-Carod, Liviano-Solis, and Manjón-Antolí (2010) and Vlachou and Iakovidou (2015).
[3] Kimelberg and Williams (2013) has more detail on classifying business location factors.

insurance business? Do insurers prefer to expand to "similar" states, in term of physical distance and insurance-relatedness? Does higher tax rate discourage business expansion? How important is the wage and labor quality for insurers? The current study addresses these types of questions.

Our findings indicate that insurers with more excessive resources and stronger managerial mechanism are more likely to expand geographically. Other than that, we find contradicted results to the strategic growth view that insurers circumvent growth barriers by expanding to new markets. The premium growth rate does not significantly stimulate neither the status of expansion nor extent of expansion. Furthermore, insurers prefer to expand their business to states that are closer to the existing markets for better utilize resources and more accessible communications among divisions. States with higher premium tax rate are more likely to be chosen, implying that insurers may not choose a state purely for tax minimizing purpose. Last but not least, the state's quality of life is more appealing than a relatively loose regulatory environment to insurers.[4] This finding provides some insights to state authorities that it might be more useful to improve the quality of life to attract business than changing regulatory stringency.

The paper proceeds as follow. Section 2 presents hypotheses development. Section 3 and 4 describe the econometric model and data. Section 5 contains discussions on the results. Finally, section 6 concludes the paper.

2. Hypothesis Development

2.1. Whether to expand?

The underlying reasons for an insurer to expand geographically stem from diversification literature, where firms can benefit from economies of scope (Teece, 1980), risk pooling (Cummins and Trainar, 2009), and larger internal capital (Williamson, 1975; Stein, 1977). On the other hand,

[4] The insignificant coefficients on rate regulation and Gov_ideology may due to collinearity of other state controls.

expanding across different geographic areas significantly increase agency costs and managerial discretion (Harris, Kriebel, and Raviv, 1982; Rotemberg and Saloner, 1994). Other than agency costs, the inefficient internal capital market is another concern when a firm is thinking about expansion because the manager needs to divert resources from alternative profitable investment opportunities for the new business.

The costs and benefits analysis of expansion decision vary substantially across firms with different characteristics and institutional culture.[5] One unique feature of insurance companies is the co-existence of different types of organizational forms. Mutual firms may expand because they need access to the larger internal capital market, however, expanding to another state requires a stronger managerial mechanism to control the self-interested managers. It is likely that mutual firms are discouraged from expanding due to lack of sufficient managerial discretion. Therefore, we state the following hypothesis:

Hypothesis 1: Mutual insurers are less likely to expand geographically.

The resource-based view considers a company as a bundle of resources and capabilities (Wernerfelt, 1984; Dierickx and Cool, 1989; Penrose, 1955). Resources of a company can be a collection of tangible assets, human, and intangible assets. At all times, it is rare that a firm can fully utilize all its resources, there exist pools of unused or excessive capacity, to some extent, are the driving force for business expansion (Caves, 1980). In such a case, large firms may possess more resources and knowledge in term of expanding to a new market.

Publicly traded insurers can easily raise additional capital than non-publicly traded firms, such that they are more likely to fund the expansion. On the other hand, a publicly traded insurer may find it challenging to persuade its shareholders to approve the expansion, because of the high

[5] We are assuming geographic expansion decision is only affected by firm characteristics, not state characteristics. It is a reasonable assumption since firms generally make such decisions based on which grow phase the firms are in.

upfront costs and the chance that misses the alternative profitable investment opportunities. Therefore, we state the following hypotheses:

Hypothesis 2(a): Larger firms are more likely to expand geographically.

Hypothesis 2(b): Publicly traded firms are less likely to expand geographically.

The coinsurance theory predicts that firms can reduce the income volatility by entering a new market that is not perfectly correlated with the existing markets. Firms can achieve this risk pooling by either expanding its product line or expanding geographically. For companies that are already operating in multiple product lines, they should have less incentive to expand to a new state since they are diversifying some of the income volatility away. Therefore, we hypothesize:

Hypothesis 3: Firms that have operated in multiple lines of business are less likely to expand geographically.

2.2. Where to grow?

Once the company decided to expand to a new state, the next step is to decide where to expand. We focus on two types of state characteristics: similarity to existing states and regulatory environment. Two measures we used to capture the similarity between targeted state(s) and existed state(s). The first one is geographic distance, which is commonly seen in the location choice literature. The second measure is the relatedness of pairs of states from insurers' perspectives. The detail construction of this variable is described in the next section. We expect that firms are more likely to expand to a "similar" state rather than an entirely new market. Other than the state's nature, the regulatory environment is another crucial factor for business expansion. We investigate two aspects of the regulatory environment; the first one is whether the state has stringent rate regulation on insurance premium and the political leaning of the state government. The second perspective is how much premium tax liability the state imposes. We expect firms are more likely to choose a

state with friendly policy regulation and lower tax liability. Therefore, we have the following hypotheses.

Hypothesis 4: The probability of choosing a given state is higher when the state is similar to, geographically or insurance-relatedly, the firm's existing markets.

Hypothesis 5: The probability of choosing a given state is higher when the state has a friendly regulatory environment and lower premium tax rate.

3. Methodology

The first question of interest is what firm characteristics will influence the geographic expansion decision. We look at this question from two standpoints. First, what are the determinants of geographic expansion decision; second, how many states to expand? In fact, the scope of expansion does not limited to one state. Accordingly, we employ the approach developed by Cragg (1971), which allows us to analyze the determinants of expansion decision and extent separately. Cragg's two-tier model is widely used in modeling participation and volume (Cummins, Phillips, and Smith, 2001; McShane and Cox, 2009; Berry-Stolzle et al., 2012).

The first stage of the Cragg's model is a Probit model, estimating the status of geographic expansion,

$$Prob\big(expansion = 1 | firm\ characteristics\ x_{i,t-1}\big) = G(x_{i,t-1}\beta) \qquad (1)$$

Where $G(x_{i,t-1}\beta)$ is a function such that $0 < G\big(x_{i,t-1}\beta\big) < 1$.

The second state is a truncated regression for geographic expansion extent.

$$num_{i,t} = \alpha_0 + \beta' x_{i,t-1} + \varepsilon_{i,t} \qquad (2)$$

where $num_{i,t}$ is the number of states to which firm i expand in year t.

The second layer of the study focuses on how firm and state characteristics influence an insurance company's decision on expanding to a given state. The model seeks to estimate the

probability of a particular state is chosen conditional on the given state choice set of each firm. When making such a decision, the managers are presumably comparing the potential profitability across states. Thus, given a state is being chosen, its characteristics should yield the highest profit among all other states with the same set of characteristics.

The most widely used econometric model to analyze choices among discrete alternatives is the conditional logistic model (CLM) developed by McFadden (1974). To apply CLM to our case, suppose π_{is}, the profit of firm i in state s, is written as

$$\pi_{is} = \beta' X_{i,s} + e_{ist} \tag{3}$$

where $X_{i,s}$ is a set of state and firm characteristics. Following McFadden (1974), the error terms, e_{is}, are assumed to be i.i.d. and follow a Weibull distribution. Under this assumption, we have

$$Prob(I_{is} = 1) = \frac{\exp(\beta' X_{i,s})}{\sum_{j=1}^{S} \exp(\beta' X_{i,j})}, \text{ j=1, … S} \tag{4}$$

where I_{is} is a dummy variable equals to one if firm I has chosen state s, and zero otherwise. Equation (4) can be estimated by maximum likelihood.

The concern of applying CLM to our case is that it is very likely that the assumption of "independence of irrelevant alternatives (IIA)" is violated. In our context, it implies that some unobservable factors make the error terms correlated across alternative states. McFadden (1978) and many others try to address this limitation by using Nested Logistic Model (NLM), which relaxes the IIA assumption in a way that it allows the disturbance terms to be correlated within some choices.[6] However, in our context, there are two obstacles to use NLM. The first limitation due to our sample consists a portion of firms that expand to more than one state in the same year, which violates the assumption of NLM that firms can only pick the optimal choice. Second, NLM

[6] For example Christiadi and Cushing (2007), Schmidheiny and Brulhart(2011), and Benson, Kumar, and Tomkins (2016),

cannot apply to panel dataset. Therefore, we have to admit that the possibility of violating the IIA assumption is one of the caveats of this study.

4. Sample and Data

The purpose of this study is to understand the determinants of insurance companies' geographic expansion. The richness of insurance data provides detail on when and how much business an insurance company expands to a given state, which is a perfect setting to study this question. There are three sets of control variables in the model. The first set is firm-specific variables, which are the internal forces that possibly influence the expansion decisions.[7] The firm-specific variables are from the National Association of Insurance Commissioners (NAIC) over 1995 to 2016. The second set is state-specific variables that reflect features of each state, such as the business environment, quality of life. The state-specific variables do not vary across firms within a state.

The last set is the firm-state-specific variables, which are the similarity measures: geographic distance and insurance-relatedness to existing states. These two variables vary across firms and states. In the studies of location choice decisions, it is common to include a measure of distance from the targeted market to existing markets in which the firm operates. Thus, we construct a variable, Distance, to measure the average distance from the center of the targeted state(s) to the center of existed states.[8] The average distance is expected to negatively relate to the expansion decision, because firms expand to a nearby state may benefit from economies of scope,

[7] The choice of firm-specific variables is following Berry-Stolzle et al. (2012). Here we assume that the same set of underlying forces that drive the company to expand, no matter is product line expansions or geographic expansions.

[8] We assume that when a firm decided to expand, the firm chooses geographic location before it finalizes how much business is written in the new state. In this case, the firm only considers the distance of targeted state to its operating states. On the other hand, if the firm decides the amount of business it will expand ex ante, the distance measure should be weighted by the share of premium written in targeted state and operating states. Should be included as a robustness check.

such as brand reputation and other marketing resources (Porter, 1985; Cummins and Trainar, 2009), and less managerial discretion (Landier, Nair, and Wulf, 2009).

The second measure, Related, captures the relatedness of two states from insurers' perspective. Initially, Bryce and Winter (2009) construct this measure to see the inter-relatedness of two industries. We follow Berry-Stolzle et al. (2012) to apply it within the P/L insurance industry to measure the inter-state relatedness. The intuition of this index is that if many firms operate in both state A and state B, it is likely that these two states have some unobservable factors that are favorable to the insurance industry. Therefore, they are "insurance-related." The construction of the variable is described in the following steps[9].

Step 1: count the number of companies writing business in state i and state j, denoted as C_{ij}. To address the randomness of diversification decision, we standardized the raw count C_{ij} as

$$\tau_{ij} = \frac{C_{ij} - \mu_{ij}}{\sigma_{ij}} \tag{4}$$

where

$$\mu_{ij} = \frac{n_i n_j}{K} \tag{5}$$

$$\sigma_{ij}^2 = \mu_{ij}(1 - \frac{n_i}{K})(\frac{K - n_j}{K-1}) \tag{6}$$

n_i is the number of insurers operating in state i, and K is the total number of insurers.

Step 2: The result from equation (4) is based on raw state participation counts, it does not reflect the economic importance. Therefore, we adjust for economic importance by assigning a weight as following:

$$w_{ij} = \frac{\sum_k \min(DPW_i, DPW_j) I_{ijk}}{\sum_k I_{ijk}} \tag{7}$$

[9] For further details, please refer to Bryce and Winter (2009) and Berry-Stolzle et al. (2012)

where I_{ijk} is a indicator variable, equals to 1 if insurer k=1,…, K writes business in both state i and j, 0 otherwise. DPW_i is the direct premium written for insurer k in state i. Scores in step 1 are converted to a distance matrix by subtracting all cells from the maximum value of τ_{ij}. Then each cell in the distance matrix is divided, no multiplied, by the weights in equation (7). A lower value represents a higher relatedness of a pair of states.

Step 3: Convert the weighted matrix to a similarity matrix by subtracting all scores from the maximum value. In this matrix, the larger the score, the higher relatedness. We then transformed the scores into percentile relatedness ranks for more straightforward interpretation.[10]

The process repeats step1 1 through 3 for each year 1996 to 2016 separately, and the final relatedness scores are the average scores across years.

Tax is another commonly tested business location factor in the literature (Buss, 2001; Gius and Frese, 2002; Hanson and Rohlin, 2011; Grace and Sjoquist, forthcoming; 2018;).The tax incentives set by the state are one of the essential factors in business location decision, however, not always and everywhere. In a related study conducted by Grace and Sjoquist (2018), they constructed a firm-state level premium tax schedule and found a small but statistically significant negative effect of the premium tax on companies' locations. Following Grace and Sjoquist (2018), the state-specific premium tax can be estimated as:

$$T_{s,t} = \alpha_0 + \delta_{s,t} Premium\_written_{s,t} + \mu_{s,t} \qquad (4)$$

[10] In the initial method of Bryce and Winter (2009), they have one more step before convert the matrix to similarity matrix. They apply the shortest path algorithm to solve for the unobservable pair of combination. In our case, we have observations for each pair of the 51 states. However, we still run a shortest path algorithm to make sure the observed score is the shortest pathway.

Where $T_{s,t}$ is the total tax paid in state s in year t, $Premium\_written_{s,t}$ is the total premium written in state s in year t, and $\mu_{s,t}$ is the error terms.[11][12]

We include two variables measuring how competitive the insurance business in a given state (number of operating firms and Herfindahl Index (HHI) of DPW across firms in a state). The prediction on state competition level is ambiguous. A state with high competition may discourage firms' expansion because it is hard to compete for market share unless cutting product prices. On the other hand, having a large number of insurance firms in a state may indicate a regulatory-friendly environment, or it offers a pooled market for workers with insurance-specific skill or customers with strong demand (Krugman 1991). As noted that the stringency of state's regulatory environment will affect the likelihood of a state is chosen. Thus, we use insurance rate regulation to be one of the proxies of the state's regulatory environment, and it is expected to be positively related to the expansion decision.[13] Additionally, we use political ideology (Gov_Ideology) to reflect the state government's political leanings (Berry et al., 1998). A higher value of Gov_Ideology represents a more liberal state government, which suggests the state relies heavily on government intervention to economic activities. Thus, Gov_Ideology is expected to be negatively correlated to the expansion decisions

The rationale for other state control variables is relatively intuitive. A set of variables measuring the characteristics of the labor force (percentage of unionization, annualized weekly

[11] As noted in Grace and Sjoquist(2018, forthcoming), states are allowed to discriminate against foreign (out-of-state) insurers. In that case, the higher tax rate of the state of domicile and that of the state in which the policy is written is imposed to insurers. In another word, each firm's tax liability in a targeted state is also depends on the state of domicile. To simplify, we only consider the average actual premium taxes rate that impose to insurers in each state.

[12] In addition, the variable, $T_{s,t}$, is from NAIC state page. The variable includes taxes, license, and fees, however, Grace and Sjoquist (forthcoming) shows that licenses and fees are less than 4% of the taxes paid. Therefore, we use this total of taxes, licenses, and fees as a proxy for taxes paid by insurers.

[13] Generally, there might be different filing methods according to different lines of business a firm writes. We first identity the filing methods for most of the property-casualty lines from NAIC's compendium of State Laws on Insurance Topics (2005). Due to subscription requirement, we only have the 2005 document. Next, we cross-check each insurance law citations in Westlaw and determine the initial effective date and repeal date.

salary of insurance agents, and the percentage of college graduates) is included in the model. Following Grace and Sjoquist (2018), we include three measures of state's quality of life: CNBC's state ranking, urbanized population, and heating days, which are believed to be attractive to the professional labor force. Firms are more likely to write business in states with higher rankings, higher urbanized population, and less heating days. Summary statistics are presented in Table 2. (see Appendix I for variable definitions, expected signs, and data sources in detail).[14]

5. Results and Discussions

The results from the Cragg regression are reported in Table 3. The dependent variable in the first stage regression is Expansion, equals to 1 if an insurer expands to at least one new state in year t, 0 otherwise. Most of the firm control variables in Table 3 are consistent with our expectations. Since we have discussed the reasoning for the expected signs of each control variables in the previous section, we will focus on the variables that contradict our expectations. First, we expect the effects of firm size and age on expansion status are similar and are positively related to expansion status (Denis, Denis, and Sarin, 1997; Berry-Stolzle et al., 2012). However, in the results, Age is negatively related to expansion status. One possible explanation for the negative correlation is due to sample selection bias that firms have been operating in a long time may have business spread out all states; therefore, we could not observe expansion decision for older firms within our sample period. The positive coefficients on Stock suggest a stronger managerial mechanism boosts geographic expansions. Publicly traded insurers are less likely to involve in geographic expansion than non-publicly traded insurers, because the expansion decision may not seem attractive to the shareholders and board of directors.

[14] The variable heating days measures the heating degrees for days that average temperature falls below 65 Fahrenheit. A smaller value of heating days indicates the state have gentler climate, less snow or extreme weather.

The results from second-stage of the Cragg model provide some interesting insights. First, larger firms are more likely to expand geographically. However, firm size is not as crucial on the extent of expansion after the decision is made. Stock insurers and group affiliated insurers are prone to expand to more states than their counterparts. Another interesting finding is that the number of product lines in which the firm operates does not significantly affect the geographic expansion status, however, the more product lines the firm operates, the lower geographic expansion extent. Technology investment negatively influences the extent of geographic expansion, because the more the firm invested in equipment and software, the higher upfront costs to set up a business in a new location. Surplus line writers are more likely to expand geographically and with a great extent because they are not strictly subject to regulations in states other than the state of domicile. To our surprise, neither premium growth rate nor reinsurance usage significantly affects the expansion status, implying that insurers' geographic expansions are not driven by circumventing barriers to business growth.

To study the second question where firms go once geographic expansion decision is made. We only include firms that expand in a given year (e.g., expansion=1), and states that the firms do not have any business yet, with that being said, existing states are dropped from the sample. Thus, the expansion sample consists of the chosen states and other possible candidates. The results from the CLM are reported in Table 4.

Column (1) are results of only consider firm-specific characteristics, and column (2) are the marginal effects. Column (3) reports results from including both firm and state characteristics in the model, and column (4) are the marginal effects. If we compare results in column (3) with results in Table 3, it is interesting that some of the firm-specific variables are still important factors in deciding which state to choose. However, once a firm decides to expand geographically, the effect of organizational form is indifferent in choosing from different states.

To our interest, it is more important to understand how state characteristics affect the probability of being chosen by an insurer. The negative coefficients on Distance suggest that insurers prefer to expand to state that is closer to their existing markets, such that they can share some of the resources (e.g., brand reputation, similar customers base). States with higher competition seem more attractive to insurers. More insurers operate in the state may imply some unobservable features that are more favorable to insurers. The most counter-intuitive finding is that the average state premium tax rate is positively correlated with the probability a state is chosen. We expect that higher premium tax rate will discourage an insurer to choose a given state, similar to findings in Grace and Sjoquist (2018).[15] However, I do not have a clear insight into this finding.

Both of Coefficients on Rate regulation and Gov_Ideology are not significant, and it seems to imply that insurers are not so concerned about the regulatory environment of a given state. On the other hand, labor and life quality of the state are more important. The state with higher insurance agent wages is more likely to be chosen. A possible explanation is that a higher salary for insurance agents may suggest a stronger demand in the market because insurance agents' wage highly relies on commissions. A state that is more urbanized and with gentler weather is more likely to be chosen because it is more attractive to talented employees.

6. Conclusions

The goal of this study is to investigate the determinants of geographic expansions in P/L insurance industry, which is an excellent laboratory. The question can be examined in two aspects. First, what are the "push" factors that drive the insurer to expand geographically? Our results indicate that larger insurers and group affiliated insurers are more likely to expand because they

[15] Grace and Sjoquist (2018) finds that higher premium tax will decrease the probability of a state becomes insurers' state of domicile.

are more likely to have excessive resources to support the expansion. Stock insurers exhibit a higher probability of geographic expansion and extent, suggesting that stronger managerial mechanism is one of the driving forces. Other than that, our results contradict the strategic growth view that insurers circumvent growth barrier by expanding. The premium growth rate is not significantly correlated with neither the status of expansion nor extent of expansion.

Second, what are the "pull" factors that attract insurers to locate their new business? We find that insurers prefer to expand their business to states that are closer to the existing markets for better utilize resources and more straightforward communications among divisions. States with higher premium tax rate are more likely to be chosen by an insurer, and we do not have an explicit explanation for this. However, it is consistent with Grace and Sjoquist(forthcoming) that insurers choose a given state is not purely for tax minimizing purpose. It is interesting to note that the state's life quality is more appealing than the regulatory environment to insurers.[16] This finding provides some insights to state authorities that it might be more useful to improve the quality of life to attract business than changing regulatory action.

[16] The insignificant coefficients on rate regulation and Gov_ideology may due to collinearity of other state controls.

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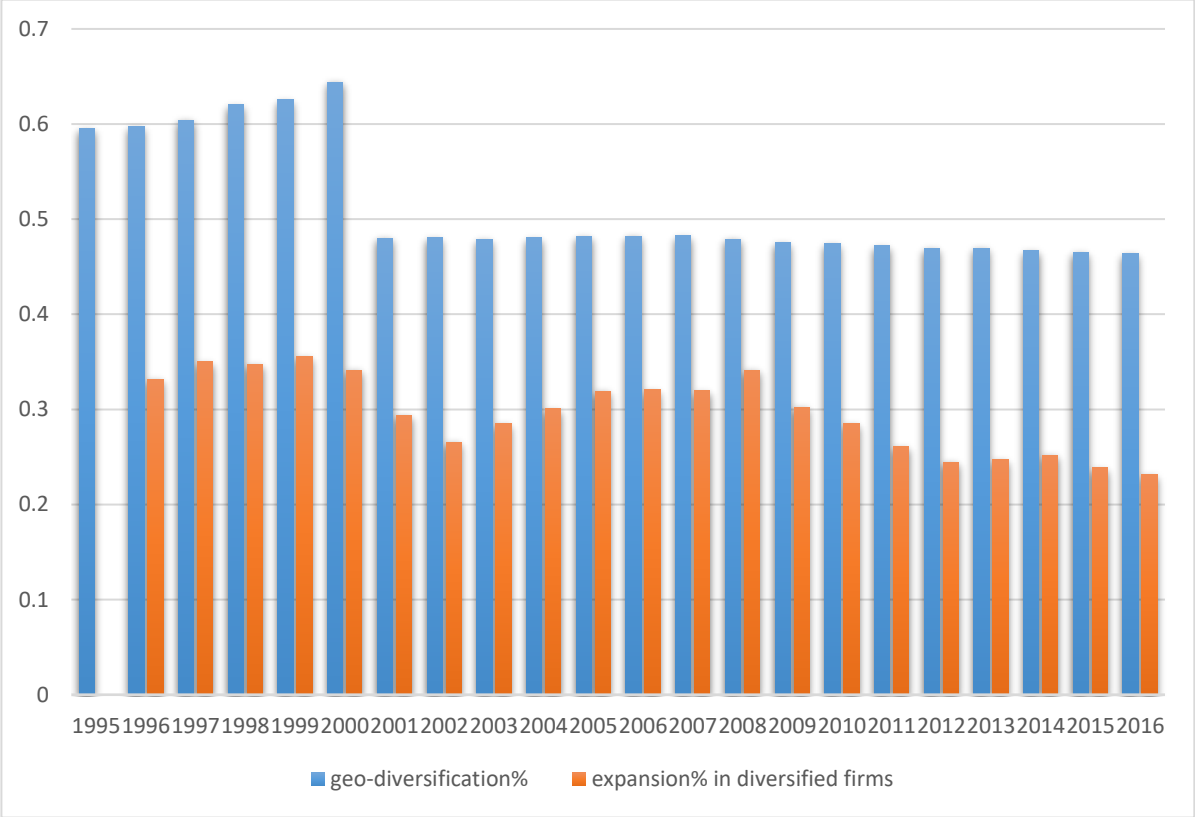
Figure 1
Trends of Geographic Diversification and Expansions



Note: the blue columns are the percentage of geographically diversified firms in each year. The orange columns represent the percentage of diversified firms that expand to at least a new state in each year. The sample includes affliated and non-affiliated insurers only.

Table 1
Comparison of Geographic Expansion by Stock and Mutual Insurers

Year	Percentage of Firm that Expand		
	Mutual	Stock	Diff.
1996	0.0814	0.2530	0.1716***
1997	0.0916	0.2650	0.1734***
1998	0.0894	0.2680	0.1785***
1999	0.0993	0.2859	0.1866***
2000	0.1019	0.2653	0.1635***
2001	0.0928	0.2263	0.1335***
2002	0.0702	0.2044	0.1341***
2003	0.0769	0.2211	0.1441***
2004	0.0581	0.2385	0.1804***
2005	0.1032	0.2492	0.1460***
2006	0.0985	0.2447	0.1461***
2007	0.0860	0.2411	0.1551***
2008	0.1189	0.2542	0.1353***
2009	0.1137	0.2249	0.1111***
2010	0.0878	0.2176	0.1298***
2011	0.0721	0.2037	0.1317***
2012	0.0749	0.1930	0.1181***
2013	0.0771	0.1949	0.1178***
2014	0.0876	0.1970	0.1094***
2015	0.0730	0.1916	0.1186***
2016	0.0870	0.1824	0.0955***

Table 2
Summary Statistics and Univariate Comparison

	Full sample		Expansion =1			Expansion =0	
VARIABLES	Mean	SD	Mean	SD		Mean	SD
Expansion	0.196	0.397	1	0		0	0
Stock	0.767	0.423	0.896	0.306	***	0.735	0.441
Public	0.0388	0.193	0.0466	0.211	***	0.0369	0.189
Group	0.723	0.448	0.810	0.392	***	0.701	0.458
Age	45.52	42.50	0.0226	0.00910	***	0.0225	0.00909
Size	18.03	1.973	18.44	1.607	***	17.93	2.040
Reinsurance use	8.047	1,544	0.463	4.763	***	9.899	1,722
Product line	7.642	5.322	8.169	5.407	***	7.513	5.293
Tech Investment	11.96	2.812	12.11	2.732	***	11.92	2.830
Advertisement	10.60	2.979	10.68	2.800	***	10.58	3.021
Premium Tax	0.0225	0.0091	0.116	0.0560	***	0.118	0.0563
Union Rate	0.117	0.0562	10.78	0.302	***	10.80	0.303
Wage	10.79	0.303	0.270	0.0655	***	0.273	0.0668
BA	0.272	0.0666	371.0	1,322	***	373.7	1,334
Population Density	373.2	1,332	25.46	14.44		25.46	14.44
State Ranking	25.46	14.44	0.720	0.151		0.722	0.151
Urbanization	0.722	0.151	46.12	14.94	***	45.85	15.18
Gov_Ideology	45.90	15.14	0.368	0.482	***	0.373	0.484
Rate Regulation	0.372	0.483	8.351	0.392	***	8.350	0.393
Heat	8.350	0.393	38.43	38.24		47.26	43.30

Table 3
Geographic Expansion Decision and Extent - Cragg Regression

VARIABLES	Expected Sign	Status (Probit) Expansion=1	Extent (Truncated) # of expanded states >0
Size	+	0.100***	0.106
		(13.056)	(0.574)
Age	+	-0.002***	-0.006
		(-6.969)	(-0.877)
Stock	+/-	0.516***	3.005***
		(20.079)	(3.616)
Group	+	0.104***	1.916***
		(4.310)	(3.071)
Public	+/-	-0.087**	0.090
		(-2.075)	(0.098)
Premium Growth	-	0.000	0.000
		(1.301)	(1.593)
Reinsurance Use	-	-0.001	-0.038
		(-0.267)	(-0.237)
Product Line	-	-0.002	-0.180***
		(-1.299)	(-3.789)
Tech Investment	+	0.008	-0.281**
		(1.468)	(-2.196)
Advertisement	-	-0.045***	-0.181*
		(-10.235)	(-1.838)
Surplus Line Writer	+	0.272***	1.874**
		(6.224)	(2.354)
Constant		-2.634***	-8.938***
		(-26.018)	(-2.800)
Sigma			5.716***
			(16.781)
Observations		27,054	27,054

Note: The dependent variable is Expansion, equals to 1 if the firm has expanded to at least one new state, 0 otherwise. All the independent variables are measured in year t-1. Size is measured by the natural logarithm of total assets. Age is the years that the firm is in business. Stock equals to 1 if it is a stock insurer, 0 if it is a mutual or reciprocal insurer. Group equals to 1 if the insurer belongs to a group, 0 otherwise. Public equals to 1 if the insurer is publicly traded, 0 otherwise. Premium Growth is calculated as $\frac{premium\ written_t}{premium\ written_{t-1}} - 1$. Reinsurance Use is calculated as $\frac{reinsurance\ ceded}{dpw + reinsurance\ assumed}$. Product line is the number of business lines the insurer operates in. Tech Investment is the natural logarithm of sum of EDP and equipment expenses. Advertisement is the natural logarithm of total advertisement expense. Surplus Writer equals to 1 if the insurer is a surplus line writer, 0 otherwise.

Table 4
Determinants of Which State to Expand - Conditional Logistic Model

	(1)	(2)	(3)	(4)
VARIABLES	Firm	Marginal	State	Marginal
Size	0.424***	0.000***	0.400***	0.003
	(22.861)	(3.874)	(18.347)	(1.352)
Age	0.003***	0.000***	0.003***	0.000
	(5.210)	(2.750)	(4.800)	(1.276)
Stock	-0.040	-0.000	-0.114	-0.001
	(-0.336)	(-0.328)	(-0.953)	(-0.752)
Group	0.352***	0.000***	0.405***	0.003
	(6.754)	(3.026)	(7.482)	(1.329)
Public	0.473***	0.000**	0.549***	0.004
	(2.762)	(2.106)	(3.076)	(1.221)
Premium Growth	-0.000***	-0.000***	-0.000***	-0.000
	(-3.977)	(-2.659)	(-2.881)	(-1.226)
Reinsurance Use	0.013**	0.000**	0.017***	0.000
	(2.474)	(2.029)	(3.060)	(1.232)
Product line	0.058***	0.000***	0.080***	0.001
	(11.058)	(3.181)	(14.564)	(1.343)
Tech Investment	-0.051***	-0.000***	-0.029***	-0.000
	(-5.554)	(-2.746)	(-3.003)	(-1.160)
Advertisement	-0.037***	-0.000***	-0.038***	-0.000
	(-4.835)	(-3.007)	(-4.735)	(-1.326)
Surplus Line Writer	0.996***	0.001***	0.968***	0.007
	(17.744)	(3.315)	(16.546)	(1.346)
Distance			-1.026***	-0.008
			(-46.226)	(-1.343)
Premium Tax			5.646***	0.041
			(5.074)	(1.340)
Rate regulation			0.012	0.000
			(0.579)	(0.515)
Gov_Ideology			-0.001	-0.000
			(-1.060)	(-0.780)
State_HHI			-0.040	-0.000
			(-0.031)	(-0.031)
Number of Competitors			0.002***	0.000
			(19.968)	(1.340)
Union rate			0.128	0.001
			(0.573)	(0.457)
Wage			0.331***	0.002*
			(4.679)	(1.691)
BA			0.143	0.001
			(0.537)	(0.434)
Population Density			-0.001***	-0.000
			(-16.850)	(-1.372)

Urbanization			1.144***	0.008
			(12.765)	(1.365)
Heat			-0.151***	-0.001
			(-5.261)	(-1.169)
Observations	175,823	175,823	171,651	171,651

Note: The dependent variable is New_state, equals to 1 if the firm has chosen this state, 0 otherwise. This sample only consists of firms that expand, namely, expansion=1 and states that insurers do not have business yet. All the independent variables are measured in year t-1. Size is measured by the natural logarithm of total assets. Age is the years that the firm is in business. Stock equals to 1 if it is a stock insurer, 0 if it is a mutual or reciprocal insurer. Group equals to 1 if the insurer belongs to a group, 0 otherwise. Public equals to 1 if the insurer is publicly traded, 0 otherwise. Premium Growth is calculated as $\frac{premium\ written_t}{premium\ written\ _{t-1}} - 1$. Reinsurance Use is calculated as $\frac{reinsurance\ ceded}{dpw+reinsurance\ assumed}$. Product line is the number of business lines the insurer operates in. Tech Investment is the natural logarithm of sum of EDP and equipment expenses. Advertisement is the natural logarithm of total advertisement expense. Surplus Writer equals to 1 if the insurer is a surplus line writer, 0 otherwise.

Appendix I

Variables	Definition	Expected sign	Source
	Firm Characteristics		
Size	Natural log of total assets	+	National Association of Insurance Commissioners (NAIC)
Age	Number of years insurers have been in operation	+	
Premium growth rate	Percentage of premium growth	-	
Group	=1 if the insurer is in a group, 0 otherwise	+	
Stock	=1 if the insurer is a stock insurer, 0 otherwise	+/-	
Reinsurance use	Reinsurance ceded/ (direct premiums written + reinsurance assumed)	-	
Public	=1 if the insurer is publicly traded, 0 otherwise	+/-	SNL and Compustat
Tech Investment	Natural log of Technology investment (sum of EDP and equipment)	-	NAIC
Advertisement	Natural log of advertisement expanse	?	NAIC
	State Characteristics		
Distance	New state's distance to current operating states	-	Google center of each state
Premium Tax		-	Calculated from NAIC state page
Insurance rate regulation	Equals to 1 if a state requires prior approval for P-C insurance rate adjustment, 0 otherwise	-	NAIC and Westlaw
Number of existing companies	Ln(number of existing companies)	?	Calculated from NAIC Schedule T
Competition	1-Herfindahl index of DPW across firms in each state	?	

Unionization percentage	Percentage unionized in state	-	U.S. Dept. of Labor, Bureau of Labor Statistics
Wage	Ln(average insurance agent wage)	-	BLS's Quarterly Census of Employment and Wages
BA	Percentage of persons over 25 years old with at least a college degree	+	U.S. Bureau of the Census and Current Population Survey (CPS)
Population Density	Ln(population per square mile)	+?	Statistical Abstract of the United States Census of Population
State_rankings	Annual state ranking of quality of life	+	CNBC annual state ranking
Urbanized population	State's population that is urbanized	+	U.S. Bureau of Census
Heating_days	Ln(the number of degrees that the daily average temperature falls below 65 degrees Fahrenheit)	-	U.S. Energy Information Administration, Annual Energy Review
Gov_ideology	State government's political leaning	-	Berry, et al. 1998