January 2016

# PRODUCT DIVERSIFICATION IN HEALTH INSURANCE WITH COMPREHENSIVE COVERAGE BENEFITS U.S. HEALTH INSURERS

Bo Shi
*Morehead State University*, bo.shi@moreheadstate.edu

Etti G. Baranoff
*Virginia Commonwealth University*

Thomas W. Sager
*The University of Texas at Austin*

Follow this and additional works at: http://scholars.fhsu.edu/jiibr

Part of the Business Commons

# PRODUCT DIVERSIFICATION IN HEALTH INSURANCE WITH COMPREHENSIVE COVERAGE BENEFITS U.S. HEALTH INSURERS

Bo Shi, Department of Accounting and Finance, Morehead State University
Dr. Etti G. Baranoff, Department of Finance, Insurance and Real Estate School of Business, Virginia Commonwealth University
Thomas W. Sager, Department of Information, Risk, and Operations Management, The University of Texas at Austin

*This paper studies the relationship between product diversification and financial performance in U.S. health insurers during 2005 – 2014. We focus on diversification among different types of comprehensive coverage – termed related diversification. We use a modified Herfindahl-Hirschman Index (HHI) as a proxy for product diversification and measure financial performance by both return on assets and return on capital. We find a robust positive relationship between product diversification and performance. Moreover, the positive relationship still holds when the performance measures are adjusted for volatility. These findings support the theoretical foundation of economies of scope and risk-reduction, as adapted to the U.S. health insurance industry. We also develop two empirical proxies for the underwriting and asset investment risk taking of health insurers. For health insurers, the relationship between performance and risk-taking in product and asset management is similar to other types of insurers. A noteworthy finding is that the positive relationship between product diversification and performance is stronger during the financial crisis years than in the recent healthcare reform era. This suggests that diversification as a risk reduction strategy may be less effective when reform changes the healthcare environment.*

Keywords: Product Diversification, U.S. Health Insurers, Performance, Economies of Scope, Risk-Reduction

## INTRODUCTION

In recent years, U.S. health insurers have experienced continual macro environment changes. The financial crisis of 2008 – 2009 challenged health insurers' asset portfolio management and increased uncertainties on investment returns. Following the financial market turmoil, the Affordable Care Act (ACA) of 2010 generated additional challenges. With major provisions implemented in 2010 – 2014, the ACA has significantly affected the operations of health insurers generally and their comprehensive lines in particular.[1] Health insurance products with comprehensive coverage include Individual and Group Comprehensive insurance, Federal Employees Health Benefit Plans (FEHBPs), Medicare Advantage plans, and Medicaid managed care plans. In response to various ACA requirements, such as the health insurance mandate, health insurance exchanges, Medicaid expansion, and the small business group insurance requirement, health insurers have been expanding comprehensive coverage product lines. They have also experienced enrollment shifts among existing comprehensive coverage products. All these changes have affected the product diversification of health insurers (see Table 1). It is reasonable to inquire if changes in product diversification affect the financial performance of health insurers. The relationship between product diversification and firm performance has been studied extensively in economics and finance literature but relatively little in the health insurance industry.

Our study examines this relationship for U.S. health insurers in the period 2005 – 2014. We have a number of interesting findings. We find that product diversification in insurance plans with comprehensive coverage is positively related to health insurers' performance during 2005 – 2014. In addition, the positive relationship holds when performance is adjusted for volatility. In other words, product diversification improves insurers' performance without adding to the risk. Another insightful observation is that the positive relationship is stronger during the financial crisis years (2005 – 2009) than the ACA reform years (2010 – 2014). The positive impact of product diversification on performance and risk-reduction becomes less obvious when each product is affected by the ACA

---

[1] Health Reform Implementation Timeline, the Henry J. Kaiser Foundation, http://kff.org/interactive/implementation-timeline/

14

provisions. In addition to these major findings, we see consistent results for the control variables commonly used in other sectors.

To put our study of product diversification and performance for U.S. health insurers into context, we review the literature in finance, economics, and insurance industries. The literature has developed various theoretical foundations such as economies of scope, risk-reduction, and agency theory to interpret sometimes contradictory relationships empirically observed in different sectors. To our knowledge, no previous studies have addressed this topic for U.S. health insurers. In this paper, we adapt existing theories to an industry with unique business operation – U.S. health insurers, who serve as both healthcare services managers and financial intermediaries between healthcare providers and patients. Economies of scope suggest that comprehensive product diversification is positively related to health insurer performance. Risk-reduction theory suggests that comprehensive product diversification is positively related to risk-adjusted performance.

In our empirical study, a modified Herfindahl-Hirschman Index (HHI) is used to measure the level of product diversification. Taking into account the nature of U.S. health insurers' business, we develop new measures for their asset investment and underwriting risk taking. Since health insurers need high liquidity for paying claims, we propose as asset risks measure the proportionate value of the asset portfolio that is invested in low liquidity and low quality investments. As to underwriting risk, we observe empirically that Medicaid managed care plans exhibit the greatest volatility of underwriting performance during 2005-2014. We propose as product risk the ratio of Medicaid covered members to total members in all comprehensive plans of the insurer. The data are extracted from health insurers' annual financial statements filed with the National Association of Insurance Commissioners (NAIC). Fixed effect panel regression adjusted for the endogeneity of product diversification is run to estimate the empirical model.

The rest of the paper is organized as follows: Section II is an introduction to U.S. health insurers' business operation; Section III reviews relevant literature and develops major hypotheses; Section IV discusses the model, variables, and statistical methods; Section V presents empirical results; and Section VI concludes the paper.

## U.S. HEALTH INSURANCE INDUSTRY BUSINESS OPERATIONS

As insurance companies, health insurers are similar to life/health and property-liability insurers in that they underwrite insurance policies and manage asset portfolios. Health insurers collect premiums by underwriting health insurance policies and pay for claims to healthcare providers when medical services are delivered to insureds. For insurers to be profitable, premiums collected need to surpass the amount of claims plus the underwriting cost. In addition to underwriting health insurance policies, health insurers manage investment portfolios that serve as sources of funds to pay claims and that generate investment income. More than most other types of insurers, health insurers need liquidity in their asset portfolios because medical claims need to be reimbursed on a fast and frequent basis. Therefore, the majority of their asset portfolios is invested in high quality and liquid asset classes such as short-term money market securities, government bonds and high grade corporate bonds.

Most importantly, health insurers manage the delivery of healthcare services to insureds through their provider networks, a process called 'managed care'. Managed care both extends and limits services. On the one hand, a health insurer builds up its provider network by contracting with a number of healthcare providers and signing 'managed care contracts'. These contracts specify extensive services to be delivered. Major terms usually include healthcare service type, quantity, reimbursement rate and method. The goal of the managed care contract is to align healthcare providers' and insurers' interests in terms of cost containment and healthcare quality improvement. On the other hand, insurers control policyholders' healthcare service utilization by managed care techniques such as gatekeepers, pre-authorization, copays, and deductibles. Insurers' varying managed care skills affect medical claim costs.

Health insurers underwrite various health insurance products with respect to coverage, insured population, and payer. Major types of products include Individual/Group Comprehensive, Federal Employee Health Benefit Plans (FEHBPs), Medicaid Managed Care, Medicare Advantage, Dental, Vision, and Medicare Part D (Prescription Drug). Among these, Dental, Vision, and Prescription Drug cover only partial healthcare needs. Individual/Group Comprehensive, FEHBPs, Medicaid, and Medicare provide comprehensive medical coverage. For products with

comprehensive coverage, insured populations and payers are different. Individual Comprehensive insurance is paid by individuals not qualified for Medicare or Medicaid. Group Comprehensive insurance is paid by employers to cover employees' healthcare plans. FEHBPs are paid by the federal government to cover federal government employees' medical needs. Medicare Advantage plans are paid by Medicare beneficiaries. And Medicaid managed care plans are financed by state and federal government to cover indigent population's medical needs. Therefore, health insurers with more than one product line collect premiums from different payers and navigate different patients on their physician networks. Our study focuses on insurers with majority of business operations in insurance products with comprehensive coverage: Individual/Group Comprehensive, FEHBPs, Medicare, and Medicaid.

## LITERATURE AND HYPOTHESES

The relationship between product diversification and firm performance has been studied extensively in the finance literature (Stultz, 1990, Graham et al., 2002, Villalonga, 2004a and 2004b, Santalo and Becerra, 2008, Kuppuswamy and Villalonga, 2010). In the insurance literature, similar studies have examined life/health and property/liability insurance industries (Liebenberg and Sommer, 2008, Elango, et al., 2008, Cummins, et al., 2010). To explain product diversification – firm performance relationship, researchers extended theories such as economies of scope, agency theory, and risk-reduction. But empirical studies do not provide conclusive results because of sample and research design limitations in different industries. To explore this important relationship for U.S. health insurance industry, we adapt existing theories to U.S. health insurers considering the special nature of business described in Section II and formulate the following hypotheses.

**Economies of scope dominate agency theory: product diversification is expected to improve performance of U.S. health insurers with major business in comprehensive products.**

Health insurers with major business in comprehensive products may benefit from product diversification when economies of scope are realized. Teece (1980) defined economies of scope as the internalization of knowhow and other inputs common to two or more production processes. Berger, et al. (1999) contended that economies of scope can originate from cost complementarity such as sharing the input and managerial expertise. Similarly, in studying Health Maintenance Organizations (HMOs) efficiency, Given (1996) summarized economies of scope as 'the existence of a fixed cost or 'quasi-public' input that can be utilized in the production of a number of different outputs'. In fact, the business operation features of health insurers with major business in comprehensive products favor the realization of economies of scope. Besides sharable fixed cost of underwriting, claim processing, and administration among different products that are common to the other industries, sharable physician network provides health insurers a unique cost advantage as follows. First, though payers and population demographics vary, patients with comprehensive coverage can be taken care of on the same physician network. This saves insurers' managed care contracting cost substantially. Second, managed care skills aiming at healthcare cost saving and quality improvement as described in Section II are applicable across product lines with comprehensive coverage. However, the cost advantage of physician networks will not be significant if health insurers diversify to product lines with partial coverage such as dental and vision insurance since new physician networks would be needed. Finally, diversification of products with comprehensive coverage may increase the enrollment, which improves insurers' bargaining power in negotiating managed care contracts with providers. Insurers possessing more bargaining power get more favorable reimbursement rate to providers (Sorensen 2003 and Wu 2009). The favorable reimbursement rate lowers insurers' medical costs among multiple comprehensive product lines, which results in better performance. Therefore, from the perspective of economies of scope, diversification of products with comprehensive coverage is expected to benefit health insurers.

On the other hand, insurers may diversify, but diversification may not benefit firm performance. The type of diversification, unrelated or related, may be an important factor. Agency theory has been proposed as a possible explanation. Aminud and Lev (1981) advanced the agency cost model and attributed firm diversification to managers' risk-reduction in their non-diversifiable employment risk. Jensen (1986) and Stultz (1990) proposed that managers have an incentive to increase managerial perquisites in order to improve their power and compensation. Diversification under these managerial concerns may not be value maximizing for insurers or their investors. Moreover, this also may explain firms' diversification to unrelated business, which generates even greater penalty. In fact, using the Business Information Tracking Series (BITS) data, Villalonga (2004a) found evidence of a discount penalty for unrelated diversification but a premium for related diversification. In our study, we focus on the

16

diversification among comprehensive health insurance products, which is related diversification. Even though payers and population demographics vary, comprehensive lines of health products share similarities. Most importantly, comprehensive products may share the same physician network and managed care skills. Thus, we expect that the agency cost generated by managerial perquisites might be minor for health insurers that diversify in comprehensive health products.

**Payer mix and insured population mix reduce health insurers' performance volatility: product diversification is expected to improve risk-adjusted performance of U.S. health insurers.**

Diversified firms with imperfectly correlated cash flows from different lines of business can reduce the overall income volatility or the firm risk (Lewellen, 1971, Cummins, et al., 2001, and Cummins and Trainer, 2009). Firm risk-reduction decreases the cost of financial distress and increases the debt capacity. Using data on the issuance of public bonds by U.S. corporations 1990 – 2007, Franco, et al. (2010) found diversified firms paid significantly lower bond-offering yields. Hann, et al. (2013) also found lower cost of capital for diversified firms.

This study focuses on comprehensive health coverage, which offers a variety of payers and insured subpopulations with different demographics. As described in Section II, each comprehensive health product line collects premium income from a different source (individuals, employers, federal or state government). And each product line covers different subpopulations that differ in age, employment status, and morbidity, which result in varying claim costs. Each product line is underwritten independently. The underwriting results measured by loss ratios or medical loss ratios are imperfectly correlated because of the payer mix and population demographics mix. Therefore, it is expected that the overall firm performance volatility or risk can be reduced and health insurers' cost of capital is lowered accordingly. Further, the capital cost savings may boost health insurers' performance. Thus, we expect that diversification of products with comprehensive health coverage may benefit health insurers' risk-adjusted performance.

## MODEL, VERIABLES, AND STATISTICAL METHODS

In this section, we present the model and variables to test hypotheses developed for health insurers. Statistical methods are also discussed.

### Model

$$Performance_{i,t} = \alpha + \beta_1 \times Size_{i,t} + \beta_2 \times AssetRisk_{i,t} + \beta_3 \times UnderwritingRisk_{i,t}$$
$$+ \beta_4 \times ProdDiver_{i,t} + \delta \times ControlVarsVector_{i,t} + \gamma \times YearDummies + \varepsilon_{i,t}$$

The above model is the main statistical model we use in the analysis. The key research question to test is whether the level of diversification (ProdDiver) is significantly related to the health insurers' performance, controlling for the other covariates. In the statistical model, we are going to examine whether $\beta_4$ in the above model is statistically significant. The sign of $\beta_4$ determines whether diversification results in performance premium or discount. If economies of scope prevail, we expect to see significant and positive $\beta_4$. In the meantime, the model is capable of testing the impact of economies of scale by examining statistical significance of $\beta_1$. Moreover, $\beta_2$ and $\beta_3$ shows whether taking more asset risk and underwriting risk result in better performance as predicted by risk-return relationship. In addition, a vector of control variables includes predictors that are commonly used in the empirical literature in insurance industries such as type of organizational form and group affiliation.[2]

---

[2] Financial leverage is another control variable frequently used in firm performance literature. In the insurance industry, more capital lowers an insurer's probability of financial distress (Colquitt and Hoyt, 1997). And insurers with lower financial risk are able to charge higher price for insurance policies with similar coverage than insurers with higher financial risk (Sommer 1996). Unlike other types of insurers, health insurers may experience more uncertainties on claim cost and they need more capital to avoid insolvency. We examined the leverage of health insurers included in our sample 2005 – 2014. The industry practice is consistent and stable. The mean leverage level is maintained at above 0.50 all through, which is much higher compared to the other insurer types. More interestingly, the minimum leverage level is always around 0.40, and the standard deviation is always below 0.2. These statistics show that leverage does not vary from firm to firm significantly for health insurers underwriting comprehensive coverage products. In the meantime, leverage is usually endogenous in firm performance studies, which causes econometric difficulties. Therefore, we decide to exclude it from the analysis.

**Variable Definitions**

*Performance Measure*

Return on asset (ROA) and return on equity (ROE) in either book or market value are commonly used financial performance measures in finance, banking, and insurance literature (Amit and Livant, 1988, Brown, Carson, and Hoyt, 2001, Lai and Limpaphayom, 2003). Recently, researchers use Risk-Adjusted ROA (RAROA) or ROE (RAROE) to incorporate return volatility through years (Browne, et al., 2000, Elango, et al. 2008, and Berger, et al. 2010). We examine the financial performance of health insurers using both return-type and risk-adjusted return type measures. Following the previous literature, ROA is constructed as the current year net income divided by the book value of total assets. Randomly high or low return in a year usually results from the risk-taking in underwriting and asset portfolio investment. Risk-adjusted return on asset (RAROA) is meant to compensate for this impact. Following Elango, et al. (2008), we calculate RAROA as the current year ROA divided by the standard deviation of ROA in the past three years. In addition to return on assets, we examine return on capital (ROC) and risk-adjusted return on capital (RAROC) instead of return on equity since majority of health insurers are not publicly traded companies, and so lack market equity values.

*Diversification Measure*

The Herfindahl-Hirschman Index (HHI) is a commonly used measure for the level of diversification in industrial organization studies in economics. Researchers in finance and insurance industries also employ HHI or modified versions of HHI in product line mix and concentration research (Tombs and Hoyt, 1994, Sommer, 1996, Pottier and Sommer, 1997, and Elango, Ma, and Pope, 2008). Besides the primary HHI or modified HHI, entropy measure is first introduced by Jacquemin and Berry (1979) to incorporate different business segment information and to quantify unrelated product diversification. In our study, we use the primary HHI measure for the level of product diversification because we focus on insurers with majority of business in products with comprehensive coverage, which is under the same segment. Following Berry (1971) and Fiegenbaum and Thomas (1990), we define the level of product diversification as:

$$ProdDiver = 1 - \sum_{i=1}^{n} P_i^2$$

$P_i$ is the ratio of current year members covered by product i in proportion to total current year members in all products with comprehensive coverage. For each insurer included in the sample, there will be Individual Comprehensive, Group Comprehensive, FEHBPs, Medicare, and Medicaid to be included in the ProdDiver calculation. [3] Therefore, the minimum level of product diversification is 0, which means that the insurer focuses on one line of business only. And the maximum level of product diversification is 0.8, which means that the insurer writes all five lines of business evenly in terms of covered members. The higher value of ProdDiver means higher level of diversification. Table 1 shows the comprehensive product diversification trend for the entire industry 2005 – 2014. The industry HHI was only 0.5350 in 2005 and it went up continuously to 0.7345 by 2014. The health insurance industry has been evolving to be more and more diversified. Based on theoretical foundation developed in Section III, economies of scope / scale and risk-reduction, we expect that ProdDiver is positively related to both return and risk-adjusted return.

---

[3] *ProdDiver* = 1 – (Individual Comprehensive Members Current Year$^2$ + Group Comprehensive Members Current Year$^2$ + FEHBPs Members Current Year$^2$ + Medicare Members Current Year$^2$ + Medicaid Members Current Year$^2$) / (Individual Comprehensive Members Current Year + Group Comprehensive Members Current Year + FEHBPs Members Current Year + Medicare Members Current Year + Medicaid Members Current Year)$^2$.

**Table 1 U.S. Health Insurance Industry Diversification Level of Comprehensive Coverage Products using Members**

| Year | N | Individual Comprehensive Members | Group Comprehensive Members | FEHBPs Members | Medicare Members | Medicaid Members | Total Comprehensive Coverage Members | Industry Herfindahl* |
|------|-----|------------|------------|-----------|------------|------------|-------------|--------|
| 2005 | 550 | 5,875,339 | 54,718,056 | 5,776,744 | 4,197,328 | 13,024,496 | 83,591,963 | 0.5350 |
| 2006 | 573 | 6,436,847 | 54,990,911 | 6,086,830 | 4,868,529 | 14,603,305 | 86,986,422 | 0.5587 |
| 2007 | 585 | 6,757,025 | 53,077,264 | 6,404,091 | 5,447,749 | 15,255,769 | 86,941,898 | 0.5811 |
| 2008 | 610 | 7,024,816 | 50,824,128 | 6,269,410 | 6,244,833 | 16,761,757 | 87,124,944 | 0.6059 |
| 2009 | 594 | 7,948,197 | 48,337,939 | 6,242,740 | 7,255,169 | 18,908,974 | 88,693,019 | 0.6378 |
| 2010 | 576 | 8,504,356 | 44,753,597 | 6,218,916 | 7,443,587 | 20,794,618 | 87,715,074 | 0.6618 |
| 2011 | 567 | 8,989,823 | 43,549,298 | 7,143,815 | 8,210,405 | 22,728,013 | 90,621,354 | 0.6819 |
| 2012 | 565 | 9,233,946 | 42,373,230 | 7,413,978 | 9,026,004 | 25,118,384 | 93,165,542 | 0.6949 |
| 2013 | 564 | 9,267,007 | 40,895,443 | 7,272,919 | 9,866,733 | 24,759,132 | 92,061,234 | 0.7025 |
| 2014 | 604 | 13,456,042 | 35,295,574 | 7,121,185 | 12,329,358 | 33,075,917 | 101,278,076 | 0.7345 |

* Industry Herfindahl is industry-based, not firm-based. It is constructed using the summation of members in each comprehensive line of business in the study as shown in the table.

*Underwriting Risk Measure*

To measure health insurers' underwriting risk-taking, we propose an empirical proxy: percentage of Medicaid members in comprehensive product portfolio. Health insurers with major business in comprehensive products may underwrite Individual/Group Comprehensive, FEHBPs, Medicare Advantage, and Medicaid managed care plans. And underwriting performance can be measured by medical loss ratio (MLR), calculated as medical claim cost as a percentage of premium income. High MLR may lead to financial loss. In terms of risk, the variability of MLR throughout time shows how well insurers may control the risk pool of each line of business. High variability of MLR means that insurers' underwriting performance varies wildly or is risky. Among products with comprehensive coverage, different payers and population demographics expose health insurers to different MLR variability. In Table 2, we use two ways to examine MLR variability of each comprehensive product line (calculation details are explained in the table notes). Both methods show that Medicaid exposed health insurers to the highest MLR variability historically. Therefore, we propose to use the percentage of Medicaid members in health insurer's comprehensive product lines as the underwriting risk measure. If the classical risk-return relationship prevails in comprehensive health insurance products, we expect a positive relationship between Underwriting Risk and performance measured by returns. However, when risk-taking has been taken into account for performance measured by risk-adjusted return, the positive relationship is not expected any more.

19

**Table 2 Standard Deviation of MLR by Product across the Industry 2005 - 2014**

| Year | Comprehensive MLR | FEHBPs MLR | Medicare MLR | Medicaid MLR |
|------|------|------|------|------|
| 2005 | 0.1263 | 0.1796 | 0.2099 | 0.1988 |
| 2006 | 0.1221 | 0.1465 | 0.1866 | 0.1961 |
| 2007 | 0.1201 | 0.1345 | 0.1468 | 0.2196 |
| 2008 | 0.1380 | 0.1807 | 0.1138 | 0.2295 |
| 2009 | 0.1332 | 0.1766 | 0.1207 | 0.2197 |
| 2010 | 0.1233 | 0.1431 | 0.1511 | 0.1207 |
| 2011 | 0.1191 | 0.1420 | 0.1473 | 0.1490 |
| 2012 | 0.1453 | 0.1466 | 0.1228 | 0.1275 |
| 2013 | 0.1592 | 0.1516 | 0.1374 | 0.1669 |
| 2014 | 0.1372 | 0.1478 | 0.1119 | 0.1300 |
| Mean | 0.1324 | 0.1549 | 0.1448 | 0.1758 |
| Weighted Average of MLR Standard Deviation using Firm Members in Each Product as Weights* | | | | |
| 2005 - 2014 | 0.0415 | 0.0431 | 0.0599 | 0.0626 |

* To validate the risk level for each line of business, we employ two methods to calculate the average standard deviation of MLR. Method 1 in the top panel, we calculate the standard deviation of MLR across the entire industry in each year. Method 2 in the bottom panel, we calculate the standard deviation of MLR within each firm first 2005 – 2014. Then we calculated the weighted average across the industry using mean memberships 2005 – 2014 as the weights. Detailed Calculation Method: Step 1: standard deviation of MLR of each product in each firm is taken from 2005 - 2014; Step 2: mean members 2005 - 2014 of each product in each firm is calculated as weights; Step 3: weighted average of MLR of each product is calculated using weights in step 2.

*Asset Risk Measure*

Health insurers manage investment portfolios to maintain timely claims reimbursement to providers and to generate investment income. More return is expected by taking more investment risk. Among invested asset classes, stock, mortgages, and real estate are identified as riskier investment (Browne, et al. 2001). Elango et al. (2008) used these three asset classes, as percentage of total invested assets, for property-liability insurers' asset risk taking. Baranoff, et al. (2007) developed the opportunity asset risk, a volatility-based measure, to quantify life insurers' asset risk-taking. Unlike other types of insurers, health insurers are in greater need of liquid assets to reimburse healthcare providers quickly and frequently. Moreover, the high risk level of health insurance products may generate unexpected liquid asset needs.[4] In fact, liquidity is indeed health insurers' major concern to maintain the underwriting business even though taking less asset risk may erode the investment income (Table 3). Therefore, liquid and high quality asset classes (cash and short-term investment, U.S. Treasuries with less than 5 years maturity, and high quality corporate bonds) in percentage of total invested asset represents safe asset investment and the rest is used as asset risk proxy in our study. Table 3 gives an overview of asset holdings on liquid and high quality asset classes by U.S. health insurers historically. The data shows that U.S. health insurers with major business in comprehensive products always held at least 50% of liquid and high quality assets on average. During the financial crisis years 2008 – 2009, health insurers took the lowest asset risk at below 40%. Similar to the product risk-taking, health insurers may expect more investment returns by taking more asset risk. If the classical risk-return relationship holds, we expect positive relationship between Asset Risk and performance measured by returns. However, when risk-taking has been taken into account for performance measured by risk-adjusted return, the positive relationship is not expected any more.

---

[4] Baranoff, et al. (2007) extended Transaction Cost Economics (TCE) to rank risk level of life insurers' products. And health insurance carries the highest product risk.

20

**Table 3 U.S. Health Insurance Industry Investment on Liquid Asset Classes 2005 - 2014 in Millions**

| Year | N | U.S. Treasury with < 1 Yr Maturity | U.S. Treasury with 1 - 5 Yrs Maturity | High Quality Corporate Bonds* | Cash and Short-Term Investment | Total Invested Assets | Pct. of Liquid Assets | Asset Risk |
|------|-----|------|------|------|------|------|------|------|
| 2005 | 550 | $ 6,491.54 | $ 7,424.82 | $ 25,956.28 | $ 16,817.42 | $ 96,308.82 | 58.86% | 41.14% |
| 2006 | 573 | $ 6,290.33 | $ 7,711.19 | $ 29,852.71 | $ 20,138.41 | $ 110,484.70 | 57.92% | 42.08% |
| 2007 | 585 | $ 9,258.60 | $ 7,038.11 | $ 33,032.46 | $ 22,010.64 | $ 119,586.22 | 59.66% | 40.34% |
| 2008 | 610 | $ 10,182.41 | $ 7,362.88 | $ 31,915.46 | $ 21,339.21 | $ 114,207.24 | 61.99% | 38.01% |
| 2009 | 594 | $ 8,234.14 | $ 9,025.93 | $ 38,478.85 | $ 23,167.16 | $ 122,978.27 | 64.16% | 35.84% |
| 2010 | 576 | $ 8,916.74 | $ 9,453.56 | $ 41,180.93 | $ 22,600.52 | $ 135,806.09 | 60.49% | 39.51% |
| 2011 | 567 | $ 10,569.83 | $ 9,525.63 | $ 42,752.56 | $ 24,190.35 | $ 146,173.72 | 59.54% | 40.46% |
| 2012 | 565 | $ 7,772.36 | $ 7,891.02 | $ 45,052.12 | $ 25,623.75 | $ 155,042.98 | 55.69% | 44.31% |
| 2013 | 564 | $ 8,584.01 | $ 8,343.07 | $ 45,978.41 | $ 23,025.26 | $ 161,975.56 | 53.05% | 46.95% |
| 2014 | 604 | $ 6,158.28 | $ 8,716.34 | $ 50,024.07 | $ 25,905.53 | $ 165,104.73 | 55.00% | 45.00% |

* NAIC designate class 1 - 6 to invested corporate bonds according to asset quality. Class 1 is the highest quality, Class 2 is the high quality, Class 3-6 are medium, low, lower, and near default. High Quality Corporate Bonds are the summation of Class 1 and Class 2 corporate bonds.

*Firm Size*

Firm size is commonly used as the proxy for economies of scale in previous diversification-performance literature. In studying scope economies in the US insurance industry, Cummins, et al. (2010) differentiated scale versus scope economics and used logarithm of total assets to measure firm size. Liebenberg and Sommer (2008) also used natural logarithm of total assets and found positive relationship between the firm size and the performance in US property-liability insurance industry. In our study, we use the geometric mean of total assets, total liabilities, and total premium incomes as the proxy for the firm size. Economies of scale benefit health insurers without increasing firm risks. Therefore, we expect positive relationship between firm size and all performance measures.

*Organizational Form*

Stock and mutual are two major organizational forms for health insurers. In theory, stock insurers are faced with the agency cost resulting from the separation of ownership and management (Fama and Jensen, 1983 and Mayers and Smith, 1988). Since policyholders are the owners of the company, mutual insurers are supposed to result in less agency issues. However, the finding that stock insurers are more successful than mutual insurers in minimizing cost in Cummins, et al. (1999) suggests the existence of agency cost in mutual insurers. Liebenberg and Sommer (2008) also identified better performance for stock insurers in property-liability insurance industry. In our study, we include a dummy variable N-Type as the control of the organizational form, where a stock insurer has the value of 1 and a mutual insurer has the value of 0. And the impact of the agency cost on health insurers in different organizational forms is uncertain.

*Group Affiliation*

More than 70% of health insurers in our sample are group affiliated. Cummins and Sommer (1996) argued that group affiliation increased the risk of failure for a group member. They treated the insurance group as a portfolio of options, which is worth more to shareholders than policyholders. Therefore, policyholders would rather pay more for policies underwritten by an insurer without group affiliation. Both Liebenberg and Sommer (2008) and Elango, et al. (2008) found negative relationship between the firm performance and the group affiliation for US property-liability insurers. However, considering health insurers' business nature, the impact of group affiliation on firm performance is uncertain because of the following reasons. First, affiliated health insurers may enjoy broader physician networks, which gives insurers better access to providers and enable them to channel patients more efficiently. Second, affiliated insurers might process stronger bargaining power in negotiating managed care

21

contracts to get favorable reimbursement terms. In the model, insurers with group affiliation have 1 in the control variable N-Group and 0 otherwise.

Table 4 presents a summary of all dependent and independent variables used in the analysis. And Table 5 summarizes expected relationships between independent variables and performance measures.

**Table 4 Variables Definitions**

| | Variables | Definition |
|---|---|---|
| **Dependent** | ROA | Net income / total assets |
| | RAROA | ROA / Three-year standard deviation of ROA including the current year |
| | ROC | Net income / Book capital |
| | RAROC | ROC / Three-year standard deviation of ROC including the current year |
| **Independent** | Size | log(Total assets*Total premiums*Total liabilities)/3 |
| | Asset Risk | 1 - Sum (U.S. Treasury with Less Than 5 Yrs Maturity, High Quality Corporate Bonds, Cash and Short-Term Investment)/Total Invested Assets |
| | Underwriting Risk | Medicaid Members / Total Comprehensive Coverage Members |
| | Prod Diver | Modified Herfindahl index of Individual Comprehensive, Group Comprehensive, FEHBPs, Medicare, and Medicaid using Members |
| | N-Type | Organizational type (1 = Stock) |
| | N-Group | Group affiliation (1 = Yes) |

**Table 5 Expected Relationships of Independent and Dependent Variables**

| | *Size* | *Asset Risk* | *Underwriting Risk* | *Prod Diver* | *N-Type* | *N-Group* |
|---|---|---|---|---|---|---|
| Return | + | + | + | + | +/- | +/- |
| Risk-Adjusted Return | + | +/- | +/- | + | +/- | +/- |

The study uses health insurers' financial statements annual filings data to National Association of Insurance Commissioners (NAIC). And we focus on insurers with more than 90% of business income generated from comprehensive coverage products. From 2005 to 2014, there are 5,788 firm-years included in the study. Here is the summary statistics for all variables in selected years:

**Table 6 Summary Statistics of Variables in Every Three Years**

| Variables | 2005 | | 2008 | | 2011 | | 2014 | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Stdev | Mean | Stdev | Mean | Stdev | Mean | Stdev |
| ROA | 0.0709 | 0.1546 | 0.0280 | 0.1764 | 0.0608 | 0.1330 | -0.0220 | 0.1704 |
| RAROA | 1.6199 | 2.8967 | 1.0922 | 3.4009 | 1.2853 | 2.2791 | 0.6270 | 2.8698 |
| ROC | 0.1192 | 0.3827 | 0.0586 | 0.4285 | 0.1078 | 0.3608 | -0.0922 | 0.4786 |

22

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| RAROC | 1.6148 | 3.0627 | 1.3952 | 3.7911 | 1.4481 | 2.7479 | 0.6600 | 3.1746 |
| Size | 17.6867 | 1.9934 | 17.8160 | 1.9663 | 18.2046 | 1.9289 | 18.4275 | 1.8591 |
| Asset Risk | 0.1424 | 0.4250 | 0.0471 | 0.4882 | 0.1188 | 0.4476 | 0.1753 | 0.4318 |
| Underwriting Risk | 0.1976 | 0.3689 | 0.1895 | 0.3532 | 0.2363 | 0.3833 | 0.2506 | 0.3954 |
| Prod Diver | 0.1742 | 0.2145 | 0.2201 | 0.2231 | 0.2228 | 0.2294 | 0.2401 | 0.2396 |
| | N = 550 | | N = 610 | | N = 567 | | N = 604 | |
| N-Type | 397 | | 450 | | 422 | | 424 | |
| N-Group | 405 | | 444 | | 429 | | 458 | |

**Statistical Method**

For the 5,788 firm-years in 2005 – 2014 in the analysis, we ran the fixed effect model for the unbalanced panel data. Year dummies are included in all models. As reported in the finance literature, firms' diversification decision is possibly self-selected (Campa and Kedia, 2002 and Villalonga, 2004b). To control for this possible endogeneity issue, we use the lag of the diversification measure (LagProdDiver) in the statistical model. And we run the Durbin-Wu-Hausman test of endogeneity to make sure that the endogeneity issue is resolved after the adjustment.[5]

For the main model, both performance measures (return and risk-adjusted return) are used as alternative dependent variables. The purpose is to test whether product diversification benefits risk-adjusted return after controlling for asset and product risk-taking. Besides, using return on capital and risk-adjusted return on capital instead of return on asset provides robust check of model results. More importantly, we separate the entire sample into two time periods: the financial crisis period (2005 – 2009) and the ACA reform period (2010 – 2014). The goal is to check whether impact of product diversification on firm performance still exists and whether the impact exists in similar way under different market environment.

**RESULTS**

In this section, we present statistical analysis results on the relationship between comprehensive product diversification and health insurers' performance measured by ROA, RAROA, ROC, and RAROC. The major result in Table 7 covers 2005 – 2014, the entire study period. The sub-period of 2005 – 2009 studies this relationship during financial crisis (Table 8). And the sub-period of 2010 – 2014 shows the relationship in the healthcare reform era (Table 9). Results are consistent with our expectations. First, the comprehensive product diversification is positively related to health insurers' performance in all time-frame controlling for insurers' risk-taking on asset investment and underwriting, firm size, and other control variables. These results are robust using all performance measures. Second, for asset risk and underwriting risk, the positive relationships only hold for performance measured by returns. When performance risk is taken into account, the positive contribution from product risk and asset risk is gone. These observations validate that the risk-return relationship holds for health insurers and the proxies we propose to measure underwriting and asset risk-taking are effective. More importantly, it supports that product diversification is positively related to insurers' performance without adding the risk-taking. Finally, another insightful result is that the positive relationship of product diversification – performance relationship is slightly stronger during financial crisis period than healthcare reform period. During financial crisis years, product diversification might balance the negative impact of the financial market turmoil for health insurers. However, when the healthcare reform is affecting almost all comprehensive product lines, the positive diversification-performance relationship is dampened.

---

[5] Wooldridge, J. M., 2002, Econometric Analysis of Cross Section and Panel Data, The MIT Press, Page 118

23

**Major Results: health insurers with major business in comprehensive products 2005 – 2014**
**Table 7 Fixed-Effect Panel Regression Analysis Results 2005 - 2014**

| Variables | ROA | | RAROA | | ROC | | RAROC | |
|---|---|---|---|---|---|---|---|---|
| | Estimate | P-Value | Estimate | P-Value | Estimate | P-Value | Estimate | P-Value |
| Intercept | -0.2182 | <.0001 | -5.5422 | <.0001 | -0.5991 | <.0001 | -4.6568 | <.0001 |
| Size | 0.0166 | <.0001 | 0.4150 | <.0001 | 0.0438 | <.0001 | 0.3969 | <.0001 |
| Asset Risk | 0.0099 | 0.0509 | 0.0861 | 0.4763 | 0.0269 | 0.0413 | 0.2219 | 0.0659 |
| Underwriting Risk | 0.0167 | 0.0031 | -0.0519 | 0.6995 | 0.0372 | 0.0112 | 0.0540 | 0.6876 |
| LagProd Diver | 0.0362 | 0.0006 | 0.5102 | 0.0416 | 0.0864 | 0.0015 | 1.0000 | <.0001 |
| N-Type | 0.0366 | <.0001 | 0.4151 | 0.0003 | 0.1033 | <.0001 | 0.5895 | <.0001 |
| N-Group | 0.0153 | 0.0019 | 0.1591 | 0.1770 | -0.0305 | 0.0176 | -0.1061 | 0.3670 |
| | N=5,144 | | N=5,142 | | N=5,144 | | N=5,142 | |
| | $Adj.\ R^2$=0.0900 | | $Adj.\ R^2$=0.0602 | | $Adj.\ R^2$=0.0760 | | $Adj.\ R^2$=0.0618 | |

The main results in Table 7 confirm most of our expectations on relationships of predetermined variables with U.S. health insurers' performance. First, the coefficient of Lag Prod Diver is positive and significant at 1% level in three of the performance measures. Health insurers with higher level of comprehensive product diversification experienced better performance measured by ROA and ROC. More importantly, the positive impact is even stronger for risk-adjusted returns, RAROA and RAROC, which supports theoretical foundation of economies of scope and/or risk-reduction. Second, coefficient of size is always highly significant at 1% and positive using all performance measures. Economies of scale work perfectly for health insurers. Third, for the two risk-taking measures we introduce, asset risk and underwriting risk, their relationships with firm performance are also as expected. For underwriting risk, we use the proportion of Medicaid members in total comprehensive members as the empirical proxy. More underwriting risk-taking is positively related to higher firm performance and the relationship is highly significant. As to asset risk, we use the proportion of asset classes with less liquidity and lower quality in investment portfolios as the proxy. The higher investment performance is expected for higher asset risk-taking considering experience in the other insurance industries. Results show that more asset risk-taking was not improving firm performance so significantly using all performance measures. Though the equation using ROA as the dependent variable produces significant coefficient for Asset Risk at 10%, the magnitude is marginal at 0.0099. However, the result again confirms that liquidity, instead of generating investment income, should be health insurers' major concern. Other important observations regarding Underwriting Risk and Asset Risk are the insignificant coefficients when performance variability is controlled using RAROA and RAROC. On the one hand, results confirm that the better performance in ROA and ROC equations is generated from more risk-taking. On the other hand, results on Underwriting Risk and Asset Risk highlight the positive impact of product diversification on firm performance from the perspective of economies of scope and risk-reduction instead of risk-taking. Finally, results on control variables are similar to findings in the other insurance sectors. Stock insurers (N-Type = 1) performed better. As to group affiliation (N-Group = 1), result using ROC as the dependent variable is consistent with findings in the other insurance industries.

**The Financial Crisis Period 2005 – 2009**
**Table 8 Fixed-Effect Panel Regression Analysis Results 2005 – 2009**

| Variables | ROA | | RAROA | | ROC | | RAROC | |
|---|---|---|---|---|---|---|---|---|
| | Estimate | P-Value | Estimate | P-Value | Estimate | P-Value | Estimate | P-Value |
| Intercept | -0.2023 | <.0001 | -6.0480 | <.0001 | -0.5324 | <.0001 | -3.7077 | 0.0002 |
| Size | 0.0163 | <.0001 | 0.4434 | <.0001 | 0.0427 | <.0001 | 0.3622 | <.0001 |
| Asset Risk | 0.0003 | 0.9682 | 0.0704 | 0.7018 | 0.0021 | 0.9082 | 0.2062 | 0.1919 |
| Underwriting Risk | 0.0108 | 0.2040 | -0.1787 | 0.4059 | 0.0292 | 0.1723 | 0.0645 | 0.7271 |
| LagProd Diver | 0.0434 | 0.0058 | 0.3690 | 0.3513 | 0.1220 | 0.0020 | 1.0793 | 0.0015 |
| N-Type | 0.0207 | 0.0034 | 0.0461 | 0.7961 | 0.0574 | 0.0012 | 0.2439 | 0.1111 |
| N-Group | 0.0146 | 0.0369 | 0.2126 | 0.2285 | -0.0409 | 0.0200 | -0.1397 | 0.3571 |
| | N=2,563 | | N=2,562 | | N=2,563 | | N=2,562 | |
| | $Adj.\ R^2$=0.0678 | | $Adj.\ R^2$=0.0543 | | $Adj.\ R^2$=0.0601 | | $Adj.\ R^2$=0.0618 | |

24

During the financial crisis years, taking more asset risk or product risk no longer brought higher returns or risk-adjusted returns for health insurers. Coefficients of Asset Risk and Underwriting Risk are not significant any more. However, product diversification helped health insurers weather the financial turmoil. The coefficient of Lag Prod Diver at 0.0434 is greater than the whole period result of 0.0362 and highly significant in the ROA equation. Greater coefficients are also observed in ROC and RAROC equations. For the other control variables, economies of scale still work for large insurers in securing better performance.

**The Healthcare Reform Period 2010 – 2014**

The Affordable Care Act (ACA) of 2010 revamps the entire healthcare industry. Major provisions of ACA affect almost all comprehensive health insurance products. Under these substantial changes in the healthcare market, diversification does not work as effectively as before. In ROA equation, the coefficient of Lag Prod Diver at 0.0311 is lower than results during financial crisis years and significant at 5% level. Risk-takings in asset and product again relate positively to performance after the turmoil of the financial crisis. Coefficients of the other control variables did not change significantly.

**Table 9 Fixed-Effect Panel Regression Analysis Results 2010 – 2014**

| Variables | ROA | | RAROA | | ROC | | RAROC | |
|---|---|---|---|---|---|---|---|---|
| | Estimate | P-Value | Estimate | P-Value | Estimate | P-Value | Estimate | P-Value |
| Intercept | -0.2590 | <.0001 | -5.3575 | <.0001 | -0.7114 | <.0001 | -5.8331 | <.0001 |
| Size | 0.0164 | <.0001 | 0.3771 | <.0001 | 0.0431 | <.0001 | 0.4228 | <.0001 |
| Asset Risk | 0.0209 | 0.0030 | 0.2606 | 0.0950 | 0.0587 | 0.0019 | 0.2405 | 0.1893 |
| Underwriting Risk | 0.0221 | 0.0030 | 0.0820 | 0.6202 | 0.0444 | 0.0270 | 0.0443 | 0.8197 |
| LagProd Diver | 0.0311 | 0.0265 | 0.6772 | 0.0297 | 0.0578 | 0.1256 | 0.9675 | 0.0082 |
| N-Type | 0.0527 | <.0001 | 0.8068 | <.0001 | 0.1493 | <.0001 | 0.9312 | <.0001 |
| N-Group | 0.0152 | 0.0288 | 0.0793 | 0.6083 | -0.0210 | 0.2628 | -0.0820 | 0.6515 |
| | N=2,581 | | N=2,580 | | N=2,581 | | N=2,580 | |
| | *Adj. $R^2$*=0.1095 | | *Adj. $R^2$*=0.0686 | | *Adj. $R^2$*=0.0889 | | *Adj. $R^2$*=0.0615 | |

**CONCLUSION**

U.S. health insurers have been challenged since the financial crisis of 2008 – 2009. Following the financial crisis, the Affordable Care Act (ACA) took effect in 2010 and has been restructuring the whole industry ever since. Major provisions of the ACA such as health insurance mandate, Medicaid expansion, health insurance exchanges, and small business group insurance requirement affect most of health insurers' comprehensive product lines. At this critical moment, our study presents a picture on historical and ongoing relationships between product diversification and firm performance for this industry.

In theory, economies of scope, risk-reduction, and agency theory were developed to explain the diversification-performance relationship in finance, economics and insurance. We adapt these theories to the unique business operations of U.S. health insurers. Theories predict that product diversification in comprehensive lines of business is positively related to health insurers' performance even when performance risk is controlled.

To facilitate the empirical study, we employ the commonly used measure for the level of product diversification, modified Herfindahl-Hirschman Index (HHI). Moreover, we develop new measures for health insurers' risk-taking in underwriting and asset investment taking account of the nature of health insurers' business. The proportion of asset classes with low liquidity and low quality in investment portfolios is used to proxy the asset risk because health insurers need high liquidity and quality of their assets to reimburse healthcare providers promptly. The proportion of Medicaid managed care members in health insurers' product portfolio is treated as the underwriting risk since Medicaid MLR experienced highest volatility throughout the years.

Using health insurers' annual financial statements filings data to NAIC, we find that product diversification among Individual/Group Comprehensive insurance, Federal Employee Health Benefit Plans, Medicare Advantage plans, and Medicaid managed care plans is positively related to health insurers' performance 2005 – 2014. And the positive relationship holds when performance volatility is controlled. This finding is consistent with other insurance

25

sectors. And it is illuminating to health insurers because results show that product diversification improved insurers' performance without adding risk. An interesting observation is that the positive relationship is not so strong when each line of business in the product portfolio is affected by ACA provisions in the reform years. In fact, this finding supports the theoretical foundation of risk reduction: when the systematic risk increases, each product in the portfolio is affected and the diversification effect is dampened.

## REFERENCES

Amihud, Y. and Lev, B. (1981) Risk Reduction as a Managerial Motive for Conglomerate Mergers, *Bell Journal of Economics*, 12(2): 605 – 617.

Amit, R. and Livant, J. (1988) Diversification and the Risk-Return Trade-Off, *Academy of Management Journal*, 31(1): 154 – 166.

Baranoff, E.G., Papadopoulos, S., and Sager, T.W. (2007) Capital and Risk Revisited: A Structural Equation Model Approach for Life Insurers, *Journal of Risk and Insurance*, 74(3): 653 – 681.

Berger, A.N., Demsetz, R.S., and Strahan, P.E. (1999) The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future, *Journal of Banking & Finance*, 23: 135 – 194.

Berger, A.N., Hassan, I., Korhonen, L., and Zhou, M. (2010) Does Diversification Increase or Decrease Bank Risk and Performance? – Evidence on Diversification and Risk-Return Tradeoff in Banking, *Institute for Economies in Transition*, Bank of Finland.

Berry, C.H. (1971) Corporate Growth and Diversification, *Journal of Law and Economics*, 14(2): 371 – 383.

Browne, M.J., Carson, J.M., and Hyot, R.E. (2000) Dynamic Financial Models of Life Insurers, Working Paper

Campa, J.M. and Kedia, S. (2002) Explaining the Diversification Discount, *Journal of Finance*, 57(4): 1731 – 1762

Colquitt, L.L. and Hyot, R.E. (1997) Determinants of Corporate Hedging Behavior: Evidence from the Life Insurance Industry, *Journal of Risk and Insurance*, 64: 649 – 671.

Cummins, J.D., Weiss, M.A., and Zi, H. (1999) Organizational Form and Efficiency: An Analysis of Stock and Mutual Property-Liability Insurers, Working Paper

Cummins, J.D., Phillips, R.D., and Smith, S.D. (2001) Derivatives and Corporate Risk Management: Participation and Volume Decisions in the Insurance Industry, *Journal of Risk and Insurance*, 68(1): 51 – 91.

Cummins, J.D. and Trainer, P. (2009) Securitization, Insurance, and Reinsurance, *Journal of Risk and Insurance*, 76(3): 463 – 492.

Cummins, J.D., Weiss, M.A., Xie, X., and Zi, H. (2010) Economies of Scope in Financial Services: A DEA Analysis of US Insurance Industry, *Journal of Banking & Finance*, 34: 1525 – 1539

Elango, B., Ma, Y., and Pope, N. (2008) An Investigation Into the Diversification-Performance Relationship in the U.S. Property-Liability Insurance Industry, *The Journal of Risk and Insurance*, 75(3): 567 – 591

Fama, E.F. and Jensen, M.C. (1983) Separation of Ownership and Control, *Journal of Law and Economics*, 26: 291 – 325

Fiegenbaum, A. and Thomas, H. (1990) Strategic Groups and Performance: The U.S. Insurance Industry, 1970-84, *Strategic Management Journal*, 11: 197 – 215.

26

Franco, F., Urcan, O., and Vasvari, F.P. (2010) the Value of Corporate Diversification: A Debt Market Perspective, Working Paper

Given, R.S. (1996) Economies of Scale and Scope as an Explanation of Merger and Output Diversification Activities in the Health Maintenance Organization Industry, *Journal of Health Economics*, 15 (1996) 685 – 713.

Graham, J.R., Lemmon, M.L., and Wolf, J.G. (2002) Does Corporate Diversification Destroy Value? *Journal of Finance* 57(2): 695 – 720

Hann, R.N., Ogneva, M., and Ozbas, O. (2013) Corporate Diversification and the Cost of Capital, *Journal of Finance*, 68(5): 1961 – 1999

Health Reform Implementation Timeline, the Henry J. Kaiser Foundation, http://kff.org/interactive/implementation-timeline/

Jacquemin, A.P. and Berry, C.H. (1979) Entropy Measure of Diversification and Corporate Growth, *Journal of Industrial Economics*, 27: 359 – 369.

Jensen, M.C. (1986) Agency Cost of Free Cash Flow, Corporate Finance, and Takeovers, *American Economic Review*, 76(2): 323 – 329.

Kuppuswamy, V. and Villalonga, B. (2010) Does Diversification Crate Value in the Presence of External Financing Constraints? Evidence from the 2007 – 2009 Financial Crisis, working paper

Lai, G.C. and Lympaphayom, P. (2003) Organizational Structure and Performance: Evidence from the Nonlife Insurance Industry in Japan, *Journal of Risk and Insurance*, 70(4): 735 – 757

Lewellen, W.G. (1971) A Pure Financial Rationale for the Conglomerate Merger, *Journal of Finance* 26, 521-537.

Liebenberg, A.P. and Sommer, D.W. (2008) Effects of Corporate Diversification: Evidence from the Property-Liability Insurance Industry, *Journal of Risk and Insurance*, 75(4):893 – 919

Mayers, D. and Smith, C.W. Jr. (1988) Ownership Structure Across Lines of Property-Casualty Insurance, *Journal of Law and Economics*, 351 – 378.

Pottier, S.W. and Sommer, D.W. (1997) Agency Theory and Life Insurance Ownership Structure, *Journal of Risk and Insurance*, 64: 529 – 543.

Santalo, J. and Becerra, M. (2008) Competition from Specialized Firms and the Diversification-Performance Linkage, *Journal of Finance*, 63(2): 851 – 883

Sommer, D.W. (1996) The Impact of Firm Risk On Property-Liability Insurance Prices, *Journal of Risk and Insurance*, 63: 501 – 514.

Sorensen, A.T. (2003) Insurer-Hospital Bargaining: Negotiated Discount in Post-Deregulation Connecticut, *Journal of Industrial Economics*, 51(4): 469 – 490

Stultz, R.M. (1990) Managerial Discretion and Optimal Financing Policies, *Journal of Financial Economics*, 26(1): 3 – 27.

Teece, D.J. (1980) Economies of scope and scope of the enterprise, *Journal of Economic Behavior and Organization* 223 – 247

Tombs, J.W. and Hoyt, R.E. (1994) The Effect of Product Line Focus On Insurer Stock Returns, *Proceedings of the International Insurance Society*, 331 – 339

27

Villalonga, B. (2004a) Diversification Discount or Premium – New Evidence from the Business Information Tracking Series, *Journal of Finance*, 59(2): 479 – 506.

Villalonga, B. (2004b) Does Diversification Cause the 'Diversification Discount'? *Financial Management*, 33(2): 5 – 27

Wooldridge, J.M. (2002) Econometric Analysis of Cross Section and Panel Data, The MIT Press

Wu, V.Y. (2009) Managed Care's Price Bargaining with Hospitals, Journal of Health Economics, 28(2009): 350 – 360.

28