Captive Insurance Companies and Manager-Owner Conflicts

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ABSTRACT

This study proposes that the operation of single-parent captive insurers enhance the stature of managers and tests the hypothesis that corporations with heightened manager-owner conflicts of interest are more likely to operate a single-parent captive insurer. A time-series, cross-sectional sample of 4,212 observations is used. Corporate free cash flow and volatility of free cash flow are positively related to the likelihood of operating single-parent captive insurers while the availability of investment opportunities is inversely related to the likelihood of operating single-parent captive insurers. It appears, therefore, that corporations with heightened manager-owner conflicts of interest are more likely to operate captive insurers.

INTRODUCTION

Captive insurers are formal insurance subsidiaries established to primarily finance risks of their parent organizations. Over the past 35 years, captive insurers have become popular self-insurance mechanisms among corporate risk managers. The 1996 *Captive Insurance Company Directory* includes a total of 2,880 single-parent captive insurers, as compared to the 156 listed in 1975 when the directory was first published. The growth of captive insurers has been explained variously as an attempt by corporations to create income tax savings, a response to the inability of corporations to obtain favorable commercial insurance coverage, a way to reduce a corporation's cost of risk and to improve its cash flow, and as the creation of another profit center in the corporation. However, none of these reasons may fully explain the dramatic increase in the number of single-parent captive insurers.

An infrequently voiced hypothesis for the growth of captive insurers is that they enhance the stature of managers. Data are not available to accurately measure the benefits as compared to the costs of operating a single-parent captive insurer, or to whom such benefits and costs accrue. However, there are sufficient

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data to examine whether corporations with heightened manager-owner conflicts of interest are more likely to operate a single-parent captive insurer.

BACKGROUND LITERATURE

Income Tax Relief

The Internal Revenue Service (IRS) has changed its position on the tax-deductibility of premiums paid to captive insurers since the initial surge in formation of single parent captive insurers by United States corporations. Cross, Davidson and Thornton (1987, 1988), Wood, Glascock and Bigbee (1988) and Borch (1990) conclude that the initial popularity of captive insurers arose from their ability to provide income tax relief to their parent corporations. Before 1977 parent corporations were able to deduct the premiums paid to their captives from federal income tax. If the captive was domiciled in the United States, the Parent Corporation paid federal income taxes on the net income of its captive, but it could deduct from federal income tax the captive's reserves. If, however, the captive was located outside the United States, under Sub-part F of the Internal Revenue Code, the parent corporation could defer paying taxes on the net income of its captive until such income was repatriated to the United States. After 1977, with Revenue Ruling 77-316, the IRS prohibited corporations from deducting from their federal income tax the premiums they paid to their wholly owned captives. This prohibition was upheld in 1978 (*Carnation Co. vs. Commissioner*, 71 Tax Court 39, 1978) and on appeal in 1981. The Tax Reform Act of 1986 modified Sub-part F of the Internal Revenue Code. It reduced the ability of corporate parents that established captives outside the United States to defer payment of taxes on their captives' net income. Thus the original status of a captive insurer as a tax relief device cannot fully explain why the formation and operation of single-parent captive insurers by United States corporations has continued to grow at varying rates of intensity.[1]

Studies have also examined whether the formation of a captive insurer affects the price of a corporation's stock. Based on their studies Cross, Davidson and Thornton (1987, 1988) concluded that when the premiums paid by a parent corporation to its captive insurer are viewed as tax deductible, the stock market reacts favorably to the formation of a captive insurer. Conversely, when the premiums paid by the Parent Corporation to its captive insurer is considered not tax deductible, the stock market reacts unfavorably to the formation of a captive insurer. Wood, Glascock and Bigbee (1988) also have concluded that when the premiums paid by the parent corporation to its captive insurer are viewed as tax

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[1]In 1989 (*Humana vs. Commissioner*, 88 Tax Court 197, 1989) tax relief was restored to owners of single-parent captive insurers that write substantial unrelated third-party insurance. Also, in *Sears vs. Commissioner* (96 Tax Court 61, 1991), *AMERCO vs. Commissioner* (96 Tax Court 18, 1991), *Harper vs. Commissioner* (96 Tax Court 45, 1991) and *Ocean Drilling vs. Commissioner* (24 Claims Court 714, 1991) the courts have ruled that when a single-parent captive insures risks both related and unrelated to the parent, all risks qualify as insurance. The amount of unrelated risks, however, varies from case to case, from less than 30 percent to over 90 percent.

deductible, the stock market reacts favorably to the formation of a captive insurer, but the stock market is indifferent to the formation of a captive insurer when the premiums paid by the parent corporation to its captive insurer are not viewed as tax deductible.

Superior Coverage with a Cost Advantage

In the insurance industry press and in some insurance textbooks the continuing popularity of captive insurers is attributed to their ability to provide superior coverage. The arguments of Lenrow et. al., (1982), Ullrich (1992) Head, Elliott and Blinn (1993, 133-36), Redja (1995, 44) and Vaughan (1997, 340-44) in support of captive insurers are fairly typical. In their opinion, captive insurers should be favored over commercial insurers because: (1) they accrue investment income from reserve funds to the parent corporation instead of to the commercial insurer, (2) they reduce the cost of insurance for the parent corporation by eliminating commissions and profit markups, (3) they provide the parent corporation with access to the reinsurance market thus reducing transaction costs, (4) they can evolve, through competitive underwriting, into profit centers for the parent corporation, and (5) they isolate the parent corporation from the cyclical nature of the commercial insurance market.

Doherty (1985, 42-47), however, points out that deficiencies in commercial insurance do not explain why loss retention through a captive insurer is preferred over all other loss retention alternatives available to a risk manager. Forming and operating a captive insurer adds value (i.e., the captive is a positive net present value project) to corporate shares only if the after-tax, risk-adjusted return from the captive insurer is higher than the parent's opportunity cost of capital. It is not clear why a captive insurer provides a cost advantage over other well managed alternatives such as a loss financing program that combines a finite risk contract with excess commercial insurance coverage. Borch (1990, 273), suggests that reserving for a captive insurer is a particular problem since the number of contracts a typical captive writes are too few for the law of large numbers to apply. It should also be noted that empirical evidence provided by Schmit and Roth (1990) casts doubt on the cost effectiveness of captive insurers.

Schmit and Roth (1990) studied the cost effectiveness of risk management strategies of 162 United States corporations, and found that increased levels of retention result in significant reductions in the corporate cost of risk.[2] They also found that, corporations which use captive insurers have a statistically significant higher cost of risk as compared to corporations that do not use captive insurers, regardless of the parent's level of retention or the risk in the parent's business.

Status Symbol

Schmit and Roth (1990) offer several explanations as to why corporations that use captives have a somewhat higher cost of risk as compared to corporations that do

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[2]Schmit and Roth (1990) defined total cost of risk as insurance premiums plus uninsured losses, divided by total assets.

not use captives. One such explanation is that captive insurers may be status symbols. Porat (1987) agreed with this conclusion. In surveying the reasons risk managers operate captive insurers, he found that almost 10 percent of the 466 managers surveyed admitted that status and prestige motives influence formation of new captives. Porat and Powers (1995) have also guardedly speculated that captive insurers may enhance the stature of corporate risk managers, rather than add value to corporate stock. Others are less guarded in their speculations. For example, Kloman (1990, 18) ascribes the formation of a captive insurer to the desire of some managers to take part in the "...heady pleasures of playing the [insurance] game in New York and London..."

Diallo and Kim (1990) investigated whether the formation of captive insurers transfers wealth from one class of corporate claimholders to another. They examined whether the incorporation of 91 captive insurers influenced the stock price of their parent corporations and found that the stock market was indifferent to the information. The stock prices appeared unaffected, even though stockholders sustained a minute decrease in wealth when the captive insurers were incorporated. The researchers concluded "...the primary function of captive insurers is to provide insurance to their parents", and "the welfare gain derived from the creation of captives most likely goes to the managers of parent firms" (Diallo and Kim, 1990, 249).[3]

It is well accepted that the interests of managers often conflict with the interests of corporate owners. For example, managers may pursue a strategy of unrelated diversification to enhance their job security (Amihud and Lev, 1981). Managers may entrench themselves by favoring irreversible projects that require expertise possessed by only the current management (Schleifer and Vishny, 1989). Furthermore, managers or investors may simply mimic the decisions of their peers, even when they have substantive reason to question these decisions because they fear that if they deviate from the group they may damage their reputations (Keynes, 1936, 157-8; Scharfstein and Stein, 1990). The formation of single-parent captive insurers may be an example of such herding behavior.

DATA AND RESEARCH DESIGN

The Sample

A group of 1,200 United States corporations was randomly selected from the list of industrial corporations on the 1995 Compustat database. In order to identify which of these corporations operated a single-parent captive insurer, or was a member of a group-captive insurer or rent-a-captive insurer, these 1,200 corporations were checked against annual issues of the *Risk Management Reports*

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[3]Diallo and Kim (1990) examined the reaction of the stock market near the incorporation dates of captive insurers. The studies by Cross, Davidson and Thornton (1987, 1988) as well as the study by Wood, Glascock and Bigbee (1988), however, suggest that stock markets react to earlier dates when the formation of a captive insurer are announced, rather than to the later, incorporation dates.

and annual editions of the *Captive Insurance Company Directory* for each of the years 1976 through 1994. A total of 197 corporations operated captive insurers. Twenty-two corporations that were members of group-captive or rent-a-captive insurers were dropped from the sample. Corporations with missing data for any of the years 1976 through 1994 were also dropped from the sample (944 corporations), regardless of whether they had operated a captive insurer. Only corporations that operated single-parent captive insurers or had no captive insurers remained in the sample. After these eliminations 234 corporations remained in the sample. Thus, the sample used to estimate the models in this study consists of data on 234 corporations for each of the years 1977 through 1994. (Data from the 1976 year was needed to calculate the 1977 value of one of the variables used in this study.)

This cross-sectional, time-series design yields 4,212 observations. Of these observations, 68.7 percent are associated with corporations that operate single-parent captive insurers. The observations associated with the operation of single-parent captives are over-represented in the sample. This is because the corporations with missing data, which were dropped from the sample, are smaller corporations. Smaller corporations are less likely to operate a single-parent captive insurer.

Specification of the Model
The model tests the validity of the hypothesis that the operation of a single-parent captive insurer is partly explained by the degree of manager-owner conflicts of interest in the Parent Corporation. To test the validity of the hypothesis the model estimates how the magnitude of the variables that represent the size of free cash flow, the volatility of free cash flow, the interaction of size of free cash flow with its volatility, and the investment opportunities of a corporation influence the probability that a corporation will operate single-parent captive insurers.

The dependent variable of the model equals one if single parent-captive insurers are in operation and zero otherwise. The independent variables are undistributed cash flow divided by market value of equity, the first difference of undistributed cash flow and the q ratio to represent a corporation's size of free cash flow, volatility of free cash flow and investment opportunities, respectively. It is assumed that free cash flow, its volatility and the investment opportunities of a corporation adequately describe the degree of manager-owner conflicts of interest in a corporation. The model includes the size of the corporate parent as a control variable and the procedures used to estimate the model also control for the year the observation is taken and the industry affiliation of the captive's parent.[4]

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[4]The functional form of the model is: $Y_{it} = \beta_0 + \beta_1 \, UCFMVE_{it} + \beta_2 \, ACUCF_{it} + \beta_3 \, INT_{it} + \beta_4 \, MBV_{it} + \beta_5 \, MVE_{it} + IG_i + Yr_t$ The model is estimated using both a multiple regression procedure and a univariate probit procedure. The subscripts i and t denote individual corporation and years respectively, Y equals one if single parent-captive insurers are in operation and zero otherwise, and UCFMVE is undistributed cash flow scaled by the market value of equity, ACUCF is absolute change in undistributed cash flow from year to year, INT is an interaction term of UCFMVE multiplied by ACUCF, MBV is the market value of the corporation scaled by the book value of the corporation and MVE is market value of

Variables that Proxy for Manager-Owner Conflicts

The managers of a corporation are the fiduciaries of its owners. However, principals and fiduciaries may operate with different information sets and may not have the same utility functions. Thus, corporate decisions that enhance managerial welfare may not lead to the enhancement of stock value. Consequently, the compensation of management is designed to align the interests of management with the interests of stockholders, and managerial performance is monitored. However, even when monitoring expenditures are optimal, residual manager-owner conflicts of interest remain (Fama, 1980). This study proposes that the operation of single-parent captive insurers is explained by the degree of manager-owner conflicts of interest in the Parent Corporation. Corporations with heightened manager-owner conflicts of interest are expected to have a higher probability of operating single-parent captive insurers.

As explained by Jensen (1986) and Stulz (1990), these conflicts of interest are greater for corporations that generate large and volatile free cash flow (i.e., cash flow in excess of what is needed to fund all positive net present value projects available to the corporation) because managers spend this cash without creating value for stockholders rather than paying it out to them. It is not possible to determine the free cash flow of a corporation without knowing the available investment opportunities of the corporation. As an aid to analysis, Lehn and Poulsen (1989) suggest the use of undistributed cash flow as a proxy for a corporation's free cash flow. This study uses the Lehn and Poulsen (1989) measure, which is undistributed cash flow scaled by market value of equity.[5] An empirical relationship between the relative size of undistributed cash flow and the magnitude of manager-owner conflicts of interest has been established by, among others, Lehn and Poulsen (1989), Lang, Stulz and Walkling (1991) and Mann and Sicherman (1991). In a cross-sectional sample design the variability of a firm's undistributed cash flow would be measured as the standard deviation of the firm's undistributed cash flow divided by the firm's market value. Unfortunately, it is not possible to calculate a similar variable in this study and still maintain a cross-sectional, time-series design. Instead, to represent the volatility of undistributed cash flow this study uses the absolute change of undistributed cash flow over time.[6] If corporations with elevated manager-owner conflicts are more likely to operate a captive insurer, the estimated coefficients of relative undistributed cash

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equity. The codes IG and YR represent 21 industry groups and 18 years, respectively. They are stratification codes. Their effects are assumed to be random across corporations in the sample.

[5]Undistributed cash flow is measured as corporate operating income net of income taxes (minus change in deferred taxes from the previous income to the current year), gross interest expense on debt, preferred stock dividends and common stock dividends.

[6]The volatility of undistributed cash flow at time (t) is measured as |Undistributed Cash Flow at time (t) minus Undistributed Cash Flow at time (t-1)|. It is not possible to normalize this first difference by the market value of equity, because the normalized volatility of undistributed cash flow is correlated with the relative undistributed cash flow.

flow and the absolute change in the undistributed cash flow are expected to be positive and significantly different from zero.

Stulz (1990), suggests that the cost of monitoring managerial performance should be at its highest when free cash flow is both large and volatile. To examine how both a large and a volatile cash flow affects policyholder dividends, a multiplicative interaction term is included in the estimation of the model. The interaction term is the relative undistributed cash flow multiplied by the absolute change in the undistributed cash flow. Stulz (1990) also recognizes that corporations with more opportunities to invest their cash flow in profitable projects will have lower manager-owner conflicts of interest. Information is not available to directly measure the extent to which value-enhancing projects are available to the corporation. However, the ratio of market value to replacement value of assets (Tobin's q) is often used to represent a corporation's investment in value enhancing projects. The estimation of the replacement value of assets is not practical for this sample, but it is practical to estimate a q ratio as suggested by Chung and Pruit (1994).[7] If corporations with elevated manager-owner conflicts are more likely to operate a captive insurer, the estimated coefficient of the interaction term should be positive and significantly different from zero, while the estimated coefficient of the q ratio should be negative and significantly different from zero.

Control Variables
The model used in this study includes the size of the corporate parent (represented by the market value of equity) as an independent variable in the model. It also assigns each observation in the sample codes that represent the year and the industry group the observation is taken from. Observations are classified into industry groups according to the first two digits of the SIC number of the corporation that generated them. These industry groups are the same 21 groups used by the *Cost of Risk Survey*. Then, during the estimation of the model, the likelihood of operating a single-parent captive insurer is determined by the independent variables in the model that proxy for manager-owner conflicts, by the size of the corporate parent, and by the time and industry codes associated with each observation.

Estimation Procedures
The dependent variable in the model takes a value of one if a corporation is operating single-parent captive insurers, and takes a value of zero otherwise. Models with qualitative dependent variables can be estimated using multiple regression procedures. There is no assurance that the estimated coefficients will always be between zero and one. The univariate probit procedure or the univariate logit procedure, however, always produces estimated coefficients that are between zero and one. For comparison with the multiple regression procedure,

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[7]The q ratio is calculated as the sum of market value of equity plus liquidation value of preferred stock plus book value of long term debt plus net short term liabilities, all divided by book value of assets.

the model is also estimated using the univariate probit procedure. The probit procedure is used because of the availability of convenient estimation software. Green (1993, 638) states that it is difficult to justify the choice of the probit procedure over the logit procedure on theoretical grounds. Instead, according to Green (1993, 638) researchers favor one univariate procedure over the other for reasons of practical convenience.

The sample consists of both cross-sectional and time-series data. When a model is estimated using a cross-sectional, time-series sample a pooled, a fixed effects or a random effects estimator may be used. The pooled estimator assumes that year and industry group have no influence on the likelihood of operating a single-parent captive. The fixed effects estimator assumes that the influence of year and industry group on the likelihood of operating a single-parent captive is the same for all the corporations in the sample. By comparison, the random effects estimator assumes that the influence of year and industry group on the likelihood of operating a single-parent captive is different for each corporation in the sample. The Breush-Pagan Lagrange multiplier statistic is used to test the appropriateness of the random effects estimator against the pooled estimator, and the Hausman Chi-squared statistic is used to test the appropriateness of the random effects estimator against the fixed effects estimator. For this sample, the Breush-Pagan Lagrange multiplier statistic and the Hausman Chi-square statistic are 6230.37 and 0.07, respectively. Thus, for this sample, a random effects estimator for the multiple regression procedure and the univariate probit procedures is appropriate. Heteroskedastic and autoregressive consistent estimates for the multiple regression procedure and the univariate probit procedure, respectively, are obtained through the use of the Fuller-Battese random effects generalized least squares estimator and the Butler-Moffit random effects maximum likelihood estimator. (The model is also estimated using a fixed effects estimator in order to obtain estimated coefficients for each of the years and industry groups).

RESULTS

Sample descriptive statistics and a matrix of correlations among the variables in the sample are reported in Panel A and Panel B, respectively, of Table 1. Table 2 shows that the coefficient estimates of the model when the random effects generalized least squares (regression) procedure is used.

The estimated coefficients of the variables size of free cash flow (undistributed cash flow divided by the market value of equity), volatility of free cash flow (the first difference in undistributed cash flow) and their interaction are all positive and significantly different from zero. However, the moderating relationship captured by the interaction between these two variables affects the estimated coefficients size and volatility of free cash flow only at the fourth decimal place. Thus, a 1 percent increase in the size of free cash flow or a 1 percent change in the volatility of free cash flow increases the probability of operating a single-parent captive insurer by 8.9 percent and 2.8 percent,

respectively. The estimated coefficient of the variable investment opportunities set (q-ratio) is negative and significantly different from zero. The estimated signs of these coefficients support the hypothesis that corporations with heightened manager-owner conflicts of interest are more likely to operate single-parent captive insurers. The estimated effect of corporate size (market value of equity) on the probability of operating a single-parent captive insurer is statistically significant, but its economic impact is weak.

Table 1

Descriptive Statistics and Correlations for the Sample of 234 Industrial Corporations for the Years 1977 through 1994

Panel A: Descriptive Statistics

Variable	Mean Standard Deviation	10th Percentile	90th Percentile
Size of Free Cash Flow	0.163	1.584	0.026	0.266
Volatility of Free Cash Flow (In millions)	100.607	470.378	0.390	197.000
Investment Opportunities	0.871	0.754	0.285	1.694
Corporate Size (In millions)	3081.919	7849.172	16.393	6923.100

Panel B: Correlation Matrix

	Size of Free Cash Flow	Volatility of Free Cash Flow	Investment Opportunities	Corporate Size
Size of Free Cash Flow	1.000	0.049	-0.029	-0.011
Volatility of Free Cash Flow		1.000	-0.038	0.389
Investment Opportunities			1.000	0.182
Corporate Size				1.000

Size of Free Cash Flow is represented by undistributed cash flow scaled by market value of equity (Footnote 5 describes how undistributed cash flow is measured).

Volatility of Free Cash Flow is represented by the absolute change of undistributed cash flow over time (Footnote 6 describes how the absolute change of undistributed cash flow is measured).

Investment Opportunities is represented by the ratio of market value to book value (Footnote 7 describes how market value and book value is measured).

Corporate Size is represented by the market value of equity.

Table 2

Model Coefficient Estimates for the Sample of 234 Corporations for the Years 1977
through 1994 using the Random Effects Generalized Least Squares (Regression)
Estimator

Variable	Coefficient	t-statistic	p-value
Size of Free Cash Flow	0.089	2.398	0.016
Volatility of Free Cash Flow	0.028	15.301	0.000
Size x Volatility	0.007	2.478	0.013
Investment Opportunities	0.016	-1.167	0.094
Corporate Size	0.116×10^{-4}	11.750	80.000

The adjusted R^2 for this estimation is 22.89 percent, and the F ratio of 55.40 is statistically significant.

The hypothesis that corporations with heightened manager-owner conflicts of interest are more likely to operate single-parent captive insurers is also supported by the model's marginal effects coefficient estimates using the random effects maximum likelihood (probit) procedure.[8] Table 3 shows these marginal effects.

Table 3

Model Marginal Effects Estimates for the Sample of 234 Corporations for the Years 1977
through 1994 using the Random Effects Maximum Likelihood (Probit) Estimator

Variable	Coefficient	t-statistic	p-value
Size of Free Cash Flow	0.101	2.780	0.005
Volatility of Free Cash Flow	0.013	12.401	0.000
Size x Volatility	0.397	9.312	0.000
Investment Opportunities	-0.002	-3.831	0.000
Corporate Size	0.239×10^{-4}	8.642	0.000

There is not a well-accepted goodness-of-fit measure for the probit model. A common measure is the likelihood ratio index (i.e., one minus the ratio of the likelihood function to the maximized likelihood function, assuming all explanatory variables are equal to zero). Another common measure is the percentage of observations correctly predicted by the model. The likelihood ratio index for this estimation is 0.56, and the percentage of correct predictions is 61.92.

In Table 3 the estimated marginal effects of the variables that represent the size of free cash flow, the volatility of free cash flow and their interaction are again all positive and significantly different from zero. When these variables are jointly considered a 1 percent increase in the size of free cash flow or a 1 percent change in the volatility of free cash flow increases the probability of operating a single-parent captive insurer by 10.6 percent and 5.3 percent, respectively. The estimated coefficient of the variable investment opportunities set is negative and significantly different from zero. The estimated effect of corporate size on the probability of operating a single-parent captive insurer is statistically significant, but its economic impact is weak.

The hypothesis that corporations with heightened manager-owner conflicts of interest are more likely to operate single-parent captive insurers is also supported

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[8] The marginal effects are $E(y|\mathbf{x})/x) = (\beta'\mathbf{x})\beta$, and are computed at the means of the data.

when the model in this study is estimated using a fixed effects estimator. The model is estimated using a fixed effects estimator in order to obtain estimated coefficients for each of the years and industry groups included in the sample. The fixed effects estimated coefficients of the variables size of free cash flow, volatility of cash flow, and investment opportunities set are statistically significant and of the same sign as those reported for the random effects estimators. Thus they are not reported again. Coefficient estimates for year and industry group are reported instead. Table 4 shows the estimated coefficients of each year and the combined ratio of the property-liability insurance industry that corresponds to each year.

Table 4
Coefficient Estimates of Each Year for the Sample of 234 Corporations for the Years 1977 through 1994 using the Fixed Effects Generalized Least Squares (Regression) Estimator

Year	Coefficient	p-value	Insurance Industry Combined Ratio
1997	-0.174	0.000	97.2
1978	-0.132	0.000	97.5
1979	-0.082	0.003	100.6
1980	-0.059	0.033	103.1
1981	-0.027	0.048	106.0
1982	-0.009	0.778	109.6
1983	-0.011	0.691	112.0
1984	0.008	0.406	118.0
1985	0.023	0.407	116.3
1986	0.024	0.367	108.0
1987	0.023	0.386	104.6
1988	0.045	0.104	105.4
1989	0.079	0.004	109.2
1990	0.080	0.004	109.6
1991	0.062	0.025	108.8
1992	0.052	0.062	115.7
1993	0.051	0.061	106.9
1994	0.045	0.061	108.4

In Table 4, the likelihood of operating a single-parent captive, as measured by the estimated coefficients of each year, is not correlated with the commercial insurance market cycle.[9] The commercial insurance market cycle is represented by the combined ratio of the property-liability insurance industry.   Indeed, anecdotal evidence suggests that the current soft market has not removed the motivation to form captive insurers. The estimated coefficient for years 1977 through 1981 are negative and significantly different from zero, while the

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[9]The variance of the sum of the estimated coefficient and the combined ratio is statistically equal to the variance of the estimated coefficients plus the variance of the combined ratio.

estimated coefficient for years 1989 through 1994 are positive and significantly different from zero. The estimated coefficient for years 1982 through 1988 is not significantly different from zero. This suggests that the external environment during the years 1977 through 1981 discouraged the operation of single-parent captive insurers, while the environment during the years 1989 through 1994 encouraged the operation of single-parent captive insurers. The external environment during the years 1982 through 1988 was irrelevant to the operation of single-parent captive insurers. The negative estimated coefficients coincide with years of uncertainty on whether the courts would uphold Revenue Ruling 77-316 which prohibited the tax deductibility of premiums paid to single-parent captives. This prohibition was upheld in 1978 and on appeal in 1981. The non-statistically significant estimated coefficients coincide with years corporations were prohibited, without ubiquity, from deducting from their federal income tax the premiums they paid to their single-parent captives. Perhaps, the reason the estimated coefficients for years 1982 through 1988 are not statistically different from zero is that tax deductibility of premiums merely provides a justification for the operation of single-parent captives. When tax deductibility was prohibited managers stopped using the tax status of captives to argue in favor of operating single-parent captives. The positive estimated coefficients coincide with years this prohibition was relaxed. In 1989 there was the first of a series of court decisions granting tax relief to owners of single-parent captive insurers that write substantial unrelated third-party insurance. Regardless of year, however, corporations with heightened manager-owner conflicts of interest are more likely to operate single-parent captive insurers.

Table 5

Coefficient Estimates of Each Industry Group for the Sample of 234 Corporations for the Years 1977 through 1994 using the Fixed Effects Generalized Least Squares (Regression) Estimator

Industry Group	Estimator Coefficient	p-value	1994 Cost of Risk
Transportation Services	0.101	0.002	27.01
Real Estate and Security Brokers	0.125	0.086	19.15
Health Care	0.061	0.547	21.71
Personal and Business Services	-0.379	0.000	11.99
Utility	-0.316	0.000	5.59
Retail Trade	-0.259	0.000	6.67
Telecommunications	-0.231	0.000	6.52
Wholesale Trade	-0.041	0.243	3.22
Food and Beverage	-0.011	0.807	6.57
Construction	0.166	0.000	7.21
Mining and Energy	0.071	0.087	13.86
Metal Products	-0.056	0.272	8.51
Machinery	-0.149	0.000	7.33
Primary Metals, Leather and Stone	0.139	0.000	8.83
Transportation Equipment	0.212	0.000	7.91
Lumber, Furniture and Packing	0.266	0.000	7.91
Printing and Publishing	-0.366	0.000	3.17
Miscellaneous Manufacturing	0.181	0.000	6.39
Petroleum, Chemicals and Plastic	0.196	0.000	5.20
Agriculture, Tobacco and Textiles	0.193	0.000	6.57
Electronic and Electrical Equipment	-0.088	0.000	3.23

The Cost of Risk is expressed as dollars per $1000 of revenue.

Table 5 shows the estimated coefficients of each industry group and the 1994 cost of risk that correspond to each industry group. In Table 5 the estimated coefficients of four industry groups (health care, wholesale trade, food and beverage, metal products) are not significantly different from zero. The remaining 17 industry groups influence the likelihood of operating a single-parent captive insurer, either positively or negatively. An industry by industry investigation of why corporations in some industries are more or less likely to operate captive insurers is beyond the scope of this study, but regardless of industry group, corporations with heightened manager-owner conflicts of interest are more likely to operate single-parent captive insurers. No pattern between the 1994 cost of risk of the industry group and the likelihood the group will operate a single-parent captive appears to exist.[10]

CONCLUSION

Data are not available to measure directly the benefits and the costs of operating a single-parent captive insurer, and to whom such benefits and costs accrue. The

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[10]Costs of risk figures are not available for the entire period covered by the sample.

study hypothesizes that managers operate single-parent captive insurers because having a captive enhances the status of corporate managers. The hypothesis is consistent with an environment where manager-owner conflicts of interest exist. The study, therefore, tests whether corporations with heightened manager-owner conflicts of interest are more likely to operate a captive insurer. The study controls for the size of the corporate parent, the year and the industry affiliation of the corporate parent. The study uses a sample of 234 corporations for each of the years 1977 through 1994. The majority of the corporations in the sample, however, are large. The mean market value of the corporations in the sample is $3.1 billion while the median market value is $0.7 billion. Thus, the results of this study cannot be extended to small corporations.

For the sample, the estimated effect of corporate size on the probability of operating a single-parent captive insurer is positive and statistically significant, but its economic impact is weak. The likelihood of operating a single-parent captive is not correlated with the commercial insurance market cycle, but the estimated coefficients of each year suggest that the operation of single-parent captive insurers may be motivated, at least partly, by tax advantages available under favorable tax regimes. Managers, however, may also use a favorable tax regime to justify the operation of captive insurers. The findings of Cross, Davidson and Thornton (1987, 1988) and Wood, Glascock and Bigbee (1988) suggest that the operation of single-parent captive insurers is motivated by tax considerations while Diallo and Kim (1990, 240) conclude that "the welfare gain derived from the creation of captives most likely goes to the managers of parent firms". The business group of a corporation influences the likelihood of operating a single-parent captive insurer, either positively or negatively.

For the sample, however, regardless of corporate size, year or business group the variables size of free cash flow and volatility of free cash flow are positively related to the likelihood of operating single-parent captive insurers, while the variable investment opportunities set is inversely related to the likelihood of operating single-parent captive insurers. The estimated coefficients of these three variables are evidence in support of the hypothesis that corporations with heightened manager-owner conflicts of interest are more likely to operate single-parent captive insurers. As explained by Jensen (1986) and Stulz (1990), large volatile cash flow and few investment opportunities are consistent with an environment where manager-owner conflicts of interest exist. When manager-owner conflicts of interest exist, managers spend corporate cash without creating value for the stockholders. For example, managers may overpay for a corporate acquisition, they may fund projects that entrench themselves, or they may attend a conference for sponsors of captive insurers at a location where "... the ratio of three staff members to each luxurious guest room results in exceptional service and complete indulgence".[11]

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[11]The quotation refers to the Turnbery Isle Resort and Club, where the Sixth World Captive Forum was held. The advertisement for the Sixth World Captive Forum appeared as a multi-page insert in the September 2, 1996 issue of *Business Insurance*.

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