

The Tax Deductibility of Premiums Paid to Captive Insurers: A Risk Reduction Approach

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ABSTRACT

This article analyzes the tax deductibility of the insurance premiums paid to a captive insurer by its parent company. A risk reduction approach is used and differs substantially from those proposed in the previous literature and from what has been upheld by the government. Some of the results of this study are consistent with the government's position on this issue or the results of the previous literature and some are not. The analysis suggests that the degree of tax deductibility be determined by the relative contribution of the parent's own risks to the parent's total risks, including the parent's own risks and the outside risks underwritten by the captive. It is shown that the higher the relative contribution by the parent's own risks, the lower the degree of tax deductibility.

About one-third of the largest 500 companies in the nation have formed captive insurers. While some of the corporations established captive insurers to secure liability coverages that were not provided by conventional insurers, many did so to save premium costs or to help stabilize the parents' earnings. As a result, the captive insurance industry experienced substantial growth in the 1970s. This growth, however, was halted at the beginning of the 1980s. One of the factors contributing to the setback was the Internal Revenue Service's (IRS) and the Tax Court's tough rulings against deductibility of premiums paid to captives by parent companies.

Premiums paid to unaffiliated insurers are tax deductible, but those to captives are often questioned. In general, the Tax Court and the IRS have taken the same position with regard to the non-deductibility of premiums paid to captives which do not write unrelated business. However, the IRS's recent ruling 88-72, on premiums paid to captives writing substantial outside risks, conflicts with the Tax Court's decisions (the Gulf Oil case of 1987) and even the IRS's own General Counsel memorandums (GCMs 35483 and 38136). In

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Revenue Ruling 88-72, the IRS held that no level of outside risk will result in risk shifting, therefore premiums paid to captives writing outside risks are not tax deductible.¹ On the other hand, the IRS in GCM 35483 and the Tax Court in the Gulf Oil case ruled that premiums paid to the captive could be deductible, if the captive underwrote substantial external risks, indicating that the parent could thus pass its risk to unrelated policyholders insured with the captive.

Smith (1986) investigates the issue of risk shifting and provides a quantitative analysis utilizing a portfolio approach. He maintains that the effect of risk shifting due to the captive underwriting outside risks should be gauged by the ratio of the parent's total risk with and without outside risks. Following this rationale, he concludes that the parent's total risk could increase by underwriting outside business which "has a much larger variance than parent's risk." He therefore supports the IRS's comments that writing outside risks does not constitute a risk shifting from the parent to outside policyholders.

Hofflander and Nye (1984) examine the taxation of self-insurance and premiums paid to captives. They propose that if a firm's expected net income and the variance of the net income do not vary under different risk management strategies, then the IRS should hold the same position with regard to tax deductibility. They show, among other cases, that the following two arrangements satisfy their criterion: (1) a firm self-insures; and (2) the firm insures its own risk with a conventional insurer and its captive insures outside risks with the same loss distribution as itself. They conclude that if the IRS allows deductibility of premiums paid to a conventional insurer in arrangement (2), then the firm's self-insurance fund should also be deductible.

Unfortunately, the IRS has missed the essence of insurance in its rulings. Premiums paid to conventional insurers are tax deductible, in the authors' view, because the IRS considers as ordinary any operating expenses incurred for eliminating insured risks. And, the tax deductibility of premiums paid to captives should be considered with the same rationale, i.e., the focus should be on whether insurance transactions between the parent and the captive lead to an elimination or reduction of the parent's insured risks rather than whether the parent's risk can be shifted to outside insureds.

Moreover, the risk shifting theory used in the two cited GCMs and in the Tax Court's opinion in the Gulf Oil case is incorrect in that a parent company is considered as being able to shift its risks to outside policyholders through the captive. It is impossible for that to happen when one looks closely at the definition of risk shifting.²

The two cited studies follow a similar approach: using the parent's total risk as a criterion to compare various risk management strategies such as insurance

¹ All risks discussed in this paper are limited to insurable risks unless otherwise noted.

² It is assumed that the bankruptcy risk of the parent firm will not be shifted to outside policyholders. The commonly accepted concept of risk shifting is presented in the Risk Reduction or Risk Shifting section of this article.

through a conventional insurer, insurance through a captive and self-insurance, and draw conclusions therefrom. In a section on Proportionate Contribution to Total Risk, the current authors demonstrate that the proportionate contribution of the parent's own risks to the parent's total risk (including the outside risks underwritten by the captive) is the relevant measure in determining the tax deductibility of premiums paid to the captive.

It should be emphasized that the effect of the captive underwriting outside risks to the parent's total risk is an important concern as well, as discussed in Hofflander and Nye (1984) and Smith (1986). However, its importance is viewed here as mainly relating to the assessment of the capital adequacy of the captive and as having nothing to do with the tax deductibility of the premiums paid to the captive by the parent. After all, a parent who insures with an unrelated insurance company will enjoy the tax deductibility of the premiums without question, regardless of whether its total risk is increased or decreased by the outside risks underwritten by its captive. A more rigorous justification is presented later.

The purposes of this article are (1) to clarify the concept of risk shifting; (2) to establish the concept of the proportionate contribution of the parent's specific risk to the parent's total risk as a relevant measure for tax deductibility of premiums paid to the captive; (3) to develop a theory to resolve the different opinions among the Tax Court, the IRS, and the companies involved in the tax deductibility issue; and (4) to develop a method to determine the degree of tax deductibility of premiums paid to captives.

The rest of this article is organized as follows. Various risks used to facilitate analyses are defined. A new and more general approach, the risk reduction approach, to examine the tax deductibility issue is proposed. The concept of the proportionate contribution of the parent's specific risk to the parent's total risk is established and a method to determine the degree of tax deductibility of premiums paid to captives is developed. Conclusions are made at the end.

Risks

Two quantitative risk measures, the variance and standard deviation, are utilized in the determination of the degree of tax deductibility of insurance premiums. Although mean and variance alone are not good representations of a long-tailed distribution, variance and standard deviation have been accepted as appropriate risk measures in court cases regarding captives. To facilitate the comparison among results derived in other studies, they are utilized in this study as well. The analysis involves risks from different sources. Firm-specific risk is the risk associated with the firm's own business. When the firm is the parent of a captive, then firm-specific risk will be called parent-specific risk. The risk of a captive is called captive risk. A captive draws risks from both its parent and the underwritten unrelated firms. That is, the captive-total risk equals the parent-specific risk plus outside risks.

In our context, parent-total risk equals the captive-total risk, if the captive is wholly-owned by the parent. Parent-total risk represents the proportion of

the captive-total risk corresponding to the parent's ownership of the captive, if the parent only has a partial ownership of the captive. Thus, it is necessary to make a distinction between parent-total risk and captive-total risk when the parent does not have 100 percent ownership of the captive. This terminology will prevent confusion and facilitate analyses. Figure 1 illustrates the relationship among the various risks defined above for a wholly-owned captive that underwrites outside risks.

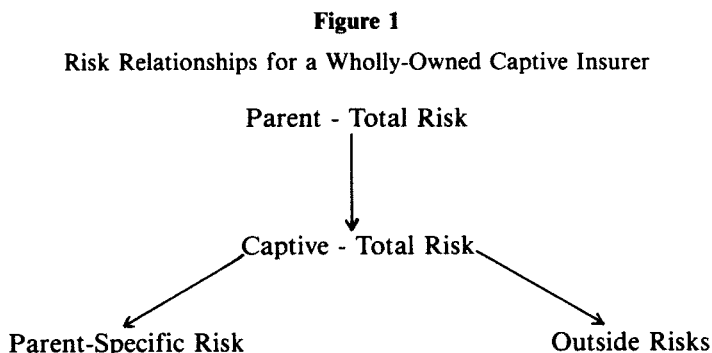


Figure 1. The relationship of the parent-total risk, captive-total risk and parent-specific risk of a wholly-owned captive insurer.

Risk Reduction or Risk Shifting

In the past, the IRS and the Tax Court were in agreement in rejecting the tax deductibility of premiums paid to captives writing no outside risks. The IRS has denied the deduction of premiums paid to wholly-owned and inactive captives based on the economic family doctrine.³ Basically, the IRS argued that there is no risk shifting, i.e., risks remained in the economic family after the insurance transaction. In the 1977 *Carnation* case, the Tax Court rejected the economic family theory, and instead, denied the deduction on the basis of a "substance over form" criterion. However, according to Wright and Webber (1986), some have argued that the Tax Court ruled the *Carnation* case based on the risk shifting theory. Regardless of which theory was applied, it seems that risk shifting is an important factor in assessing the tax deductibility issue. The importance of risk shifting can further be seen in the case of an active captive⁴. The IRS's current ruling differs from its own GCMs 35483 and 38136 and the Tax Court opinion in the *Gulf Oil* case. In Revenue Ruling 88-72, the IRS argued that the parent's potential loss exposure would increase as additional outside risks were shifted to the parent. Thus, the IRS denied the deduction of premiums paid to captives writing substantial outside business.⁵ However, in footnote 14 of the *Gulf* case, the Tax Court States:

³ Inactive captives are wholly-owned captives that are not writing any outside risks.

⁴ An active captive is a captive which writes unrelated or outside business.

⁵ For more details see Duer (1989).

Without expert testimony, we decline to determine what proportion of unrelated premiums would be sufficient for the affiliated group's premiums to be considered payments for insurance. However, if at least 50 percent are unrelated, we cannot believe that sufficient risk transfer would not be present.

Furthermore, the risk shifting theory can be found in the GCM 35483, which states:

Had, in the instant case, taxpayer's wholly-owned foreign insurance company solicited and accepted substantial risks outside its affiliated group, then we would have been inclined to agree . . . that the instant contract is taxable under Code 4371 as an insurance contract.

Also, in the summary of GCM 38136, it states that:

Therefore, we believe that when as in the instant case, risks have been distributed to other policyholders, then it necessarily follows that the risk has also been shifted to those other policyholders. Thus, because in this case the other policyholders are not members of the affiliated group, there has been a shifting and distribution of risks outside the group, through the medium of the "captive" insurance company which, although largely owned by the parent, receives (at least in the latter two years) approximately half of the money from which it will pay claims from unrelated parties.

The Tax Court and the two GCMs seem to be inclined to grant tax deductibility if there has been a shift and distribution of risks outside the group. The current authors argue that it is impossible for an insurer or a parent company to shift any risk to other policyholders unless the insurer goes bankrupt. Risk shifting and risk transfer are used interchangeably in the insurance literature. Most risk management and insurance textbooks such as Rejda (1986) define risk shifting as: "risk shifting means that a pure risk is transferred from the insured to the insurer, which is typically in a stronger financial position." Applying this definition, it is clear that the policyholders of the captive shift their risks to the captive and eventually to the parent. Therefore, contrary to what is revealed in the cited government documents and Smith (1986), the parent bears the risks of the captive's policyholders in proportion to its ownership of the captive in exchange for the insurance premiums (through the captive.) This transaction is no different from independent insurers assuming underwritten risks for insurance premiums. Therefore, it is argued that the risk shifting theory used in the above context is incorrect. In fact, the IRS correctly pointed out in Revenue Ruling 88-72 that writing additional outside risks does not result in a transfer of risk, while the Tax Court misused the concept.

Witt (1982) showed that "the insurer's total underwriting risks increases as the number of insured exposure units increases, but it increases at a decreasing rate due to the impact of the law of large numbers."⁶ Applying the above result, it is clear that the total risk of a captive increases as the underwritten outside risks increase, measured in terms of both the variance and the standard deviation of losses in dollar amounts.

⁶The risk is measured with the standard deviation.

A question immediately arises as to whether there are grounds for the tax deductibility of premiums paid by the parent to its active captive. The answer rests upon whether and by how much the parent-specific risk is reduced due to the diversification effect as a result of the captive writing outside risks. The current authors propose that the risk reduction approach should be used regarding the tax deductibility issue. The concept of risk reduction is more general than that of risk shifting. A firm can reduce its specific risk by 100 percent through insurance transactions which shift the firm's specific risk to a conventional insurer.⁷ A firm may retain all its risk through self-insurance, i.e., zero risk reduction. A firm may alternatively choose to adopt creative risk management strategies to partially reduce its risk, i.e., a partial risk reduction. Thus, risk shifting can be viewed as a special case of risk reduction.

Premiums paid to a conventional insurer are deductible, because the insured risk does not contribute to the parent-total risk. Premiums paid to the captive should thus be partially deductible, if the insured parent-specific risk represents only a portion of the parent-total risk. The degree of deductibility should be inversely related to the proportionate contribution of the parent-specific risk.

If the risk reduction concept is employed, it can be shown that the parent is able to reduce the proportionate contribution of the parent-specific risk to the parent-total risk through its active captive as a result of diversification, or the law of large numbers, even though the parent cannot shift its risks to the captive's policyholders. Analysis appears later.

In summary, the authors disagree with the IRS's position on the non-deductibility of premiums paid to active captives. Although the risk shifting theory is used correctly in its ruling, the IRS failed to recognize that as the captive-total risk increases with the number of outside risks written, the premium revenue increases as well. This study employs a relative measure, loss per dollar of premium, to capture the overall effect of the increasing exposure units of outside risks.

Proportionate Contribution to Total Risk

One important question should be addressed before discussion continues. Which risk is relevant to the issue of tax deductibility, parent-total risk or parent-specific risk? In this article it is proposed that there are two aspects to be considered in this parent-captive relationship. They are the captive-total risk and the parent's proportionate contribution to parent-total risk. The captive-total risk represents the parent-total risk when the parent has the sole ownership of the captive.⁸ Otherwise, the parent shares only the captive-total risk in proportion to its ownership of the captive. The captive-total risk is no doubt a major concern when it comes to pricing insurance coverages and the

⁷Firms usually do not reduce their insurable risks entirely with conventional insurance. It is common that the insurance policy contains a deductible, coinsurance, and limits of coverages. Thus firms do bear some insurable risks.

⁸The parent is protected by limited liability in the event of bankruptcy of the captive.

capital adequacy of the captive. Witt (1974) showed the positive relationship between an insurer's risk and the underwriting risk charge that comprises part of insurance premiums. He further demonstrated that the larger the insurer's capital and surplus, the smaller the probability of insolvency for a given net rate. Since the net rate is the pure premium adjusted for the insurer's underwriting risk, it in turn relates to the insurer's insolvency risk. Hence although the captive-total risk has a direct impact on the captive's insolvency risk, it should not be the basis for comparison, as in previous studies, in the tax issue. The current authors believe that the solvency issue is important, and proper capital and surplus are needed to protect outside policyholders as Hofflander and Nye (1984) and Smith (1986) claimed. However, the capital adequacy of a captive should be regulated or monitored by state insurance departments rather than the IRS. In other words, the increase of parent-total risk due to outside business should be irrelevant to the tax deductibility of premiums paid to the captive. The risk of a firm has never been a factor in determining the tax deductibility of premiums paid to an unrelated insurer. The IRS has never questioned the tax deductibility of the premiums paid by a very risky firm to a conventional insurer. Why does the riskiness of the parent have to become an issue when it comes to the premiums it pays to its captive?

The relevancy of this concept can further be demonstrated with an extreme case in which a parent firm owns a captive insurer but insures its own risks with an unrelated insurer. Current tax law allows the deduction of premiums paid to an unrelated insurer, regardless of the size of its total risk being increased or decreased by the outside risks underwritten by its captive. The rationale for this deduction is that the insured parent-specific risk is entirely reduced or shifted as a result of the coverage by an unrelated insurer. This rationale is intuitive and appealing. A more general interpretation of this intuition is that the parent-specific risk contributes nothing towards its total risk after the insurance transaction. Thus the premiums paid to conventional insurers are tax deductible.

It is well-established in portfolio theory that the contribution of a security to the risk of a portfolio is measured by the product of its proportionate composition in the portfolio and the covariance between the security and the portfolio. The proportion of the risk contributed by the security is measured by the proportionate contribution. As an analogy, the proportionate contribution of the parent-specific risk to the parent-total risk is the appropriate measure of the parent-specific risk. Therefore, this study contends that if the proportionate contribution of the parent-specific risk to the parent-total risk is reduced as a result of diversification, then the parent should be rewarded for the diversification. That is, the premium paid to the captive should be partially tax deductible.

The above discussion leads to the belief that it is the size of the proportionate contribution of a parent's specific risk to its total risk rather than the size of the parent-total risk itself that should be used in determining the tax deductibility. The degree of tax deductibility should relate positively to

the degree of risk reduction. Hence, it should be inversely related to the parent's proportionate contribution to the parent-total risk. Smith concluded that parent-total risk could increase by underwriting sufficiently risky outside risks, thus premiums should not be tax deductible. The above discussion suggests that if a risk measure, such as the proportionate contribution of the parent-specific risk to the parent-total risk rather than the parent-total risk, is employed, the result will be different. In other words, while the parent-total risk may increase, the proportionate contribution of the parent-specific risk to its total risk will decrease as more outside risks are written, thus premiums should be partially tax deductible. In case 4, Hofflander and Nye (1984) show that the parent-total risk could be increased by third-party business. Again, the current authors claim the parent-total risk has no bearing in the determination of tax deductibility.

Degree of Tax Deductibility

In this section, the authors concentrate on the subject of whether risk reduction exists in an economic family under various situations. Since premiums paid to an unrelated insurer are 100 percent deductible, any discussion of tax deductibility must start with this case. When a firm insures its specific risk with a conventional insurer, the firm shifts risk to the insurer. In other words, if a firm can reduce its risk by 100 percent, then the premium is 100 percent deductible based on the current tax law. Therefore, it is reasonable to argue that if a firm can reduce part of its risk by methods other than a conventional insurance transaction with an unrelated insurer, then the premiums paid should be at least partially deductible.⁹ A systematic approach to determine the degree of tax deductibility of premiums under various situations will be presented.

For simplicity, insurable risks are assumed to be homogenous and are identically and independently distributed (IID). Let $X_1, \dots, X_m, \dots, X_n$ be such IID loss distributions in terms of dollar amount. $X_1, \dots, X_m$ are risks pertaining to the parent company, while the rest of the $(n-m)$ risks are outside risks underwritten by its captive insurer. The variances of the captive's loss distribution in terms of dollar amount with and without outside risks are

$$\text{Var}_c = m\text{Var}_d \text{ without outside risks}$$

$$\text{Var}_c = n\text{Var}_d \text{ with outside risks}$$

where Var_d is the variance of one unit of exposure in terms of dollars. Since n is greater than m , it is obvious that the risk of the captive increases as it underwrites outside risks, as opposed to Smith's study. In his study, the captive total risk is written as¹⁰

⁹ It should be noted that while partial deductibility of insurance premiums is a new idea, partial deductibility itself is not. One good example would be entertainment expenses. A movement in the direction of partial deductibility for insurance premiums would be natural.

¹⁰ The following equation and notations are taken directly from Smith (1986).

$$\sigma_c^2 = p^2\sigma_p^2 + (1-p)^2\sigma_o^2$$

where σ_c^2 : variance of the captive loss distribution,

σ_p^2 : variance of the parent loss distribution written by the captive,

σ_o^2 : variance of the loss distribution of the outside risks written by the captive,

p : proportion of premiums written by the captive represented by the risks of the parent.

As indicated by Smith (1986), the captive-total risk can be smaller than the parent-specific risk in some situations. There are two issues that need to be addressed here. First, this result is incorrect if the variance is measured in terms of dollar amounts. As pointed out above, the variance of the total loss measured in dollar amounts always increases with additional outside risks. For that equation to hold, the variance must be measured in terms of a relative unit rather than in a dollar amount. This appears to be what Smith implicitly assumed. Second, although the above equation itself is correct if the variance is measured by a relative unit, the variance so derived represents captive total risk. As discussed in the previous section, it is maintained here that the proportionate contribution to total risk instead of captive total risk should be the relevant risk measure regarding the issue of tax deductibility.

A relative measure called loss per dollar of premium is defined to recognize the additional premiums received by the captive when the captive writes outside risks. Let P be the insurance premium and Z , a random variable, be the loss per dollar of premium. Then, random variables, loss per dollar of premium, $Z_i = \frac{X_i}{P}$ for $i = 1, \dots, m, \dots, n$ are derived.¹¹ Y_n is the loss per dollar of premium for a pool of n risks. Then,

$$Y_n = \frac{\sum_{i=1}^n Z_i}{n}$$

For generality, assume now the Z_i s are not independently distributed and thus, non-zero covariances exist. Although most insurable risks are considered IID, one can find circumstances in which they are not. For example, the captive of a company such as Gulf Oil insures its parent's oil tankers along with other oil companies' oil tankers. A natural disaster occurring in the Alaska area may damage some of the oil tankers operating in that area concurrently. The loss distributions of these oil tankers (risks) are not entirely independent of one another. Recall that the first m units are parent-specific risks and the rest $(n-m)$ units are outside risks. Taking account of the covariances, the variance of Y_n is thus

¹¹ The variance of Z_i measures the variability of the loss per dollar of premium, assuming the investment income is certain.

$$\sigma^2(Y_n) = \frac{1}{n^2} [n\sigma^2 + \sum_{i=1}^n \sum_{\substack{j=1 \\ i \neq j}}^n \sigma_{ij}] \quad (1)$$

where σ_{ij} is the covariance between Z_i and Z_j and σ^2 is the variance of Z_i . Hence, by the law of large numbers, an insurer's underwriting risk decreases as n increases.¹² A major concern is the proportionate contribution of the parent-specific risk to the captive- or the parent-total risks. As an analogy to Fama (1976, pp. 58-60), equation (1) can be rewritten as:

$$\sigma(Y_n) = \sum_{i=1}^n \left(\sum_{j=1}^n \frac{1}{n} \sigma_{ij} \right)$$

The above result can be interpreted as the sum of n terms, each term representing the contribution of one unit of risk to the parent-total risk. Since the first m terms are associated with the parent-specific risk, the sum of the first m terms is the contribution of the parent-specific risk to the parent-total risk. Therefore, the contribution of the parent-specific risk can be expressed as follows:¹³

$$\begin{aligned} \sum_{i=1}^m \frac{1}{n} \left(\sum_{j=1}^n \frac{1}{n} \sigma_{ij} \right) &= \frac{1}{n^2} \sum_{i=1}^m \sum_{j=1}^n \sigma_{ij} \\ &= \frac{1}{n^2} [m\sigma^2 + \sum_{i=1}^m \sum_{\substack{j=1 \\ i \neq j}}^n \sigma_{ij}] \end{aligned} \quad (2)$$

The parent proportionate contribution relative to the parent-total risk is obtained by dividing equation (2) by equation (1), and is expressed as follows:

Parent proportionate contribution =

$$\frac{m\sigma^2 + \sum_{i=1}^m \sum_{\substack{j=1 \\ i \neq j}}^n \sigma_{ij}}{n\sigma^2 + \sum_{i=1}^n \sum_{\substack{j=1 \\ i \neq j}}^n \sigma_{ij}} \quad (3)$$

Obviously, for a given number of units of parent-specific risk, the parent's percentage contribution decreases as more outside risks are written. It is important to note that the covariance terms play an increasingly significant

¹²Note that the reduction of risk is not a result of risk shifting as claimed by the Tax Court.

¹³Equation (2) can also be written as $(m/n)\text{Cov}(Y_m, Y_n)$. To see this, rearrange the first equality of (2) as:

$$\frac{1}{n^2} \text{Cov} \left(\sum_{i=1}^m Z_i, \sum_{j=1}^n Z_j \right) = \frac{m}{n} \text{Cov}(Y_m, Y_n)$$

where $Y_m = \sum_{i=1}^m Z_i/m$ and $Y_n = \sum_{i=1}^n Z_i/n$. m/n is the parent proportionate contribution to the captive's premium revenue, and $\text{Cov}(Y_m, Y_n)$ is the marginal contribution of the m units of parent-specific risk to the parent-total risk. This formula will be used for analyzing Case V in this section.

role in the determination of the tax deductibility, as more outside risks are written.¹⁴

The percentage of the tax deductibility of the insurance premiums paid to the captive hinges upon the reduction of the parent proportionate contribution, i.e., the more the reduction of the parent proportionate contribution, the higher the tax deductibility of the premium. Let π denote the degree of tax deductibility. Then,

$$\pi = 1 - \text{parent proportionate contribution} \quad (4)$$

Before the addition of $n-m$ outside risks, the proportionate contribution of parent-specific risk to the parent-total risk is one, because the parent-specific risk is the same as parent-total risk. After the addition of $n-m$ outside risk, the contribution of parent-specific risk may be reduced and the degree of reduction depends on the situations.

Two special assumptions about covariances are considered in the application of equation (3):

IID Risks

The assumption of IID risks is widely accepted in the insurance literature. In this case, equation (3) yields m/n as covariance terms diminish. Variance as the risk measure gives:

$$\pi = 1 - \frac{m}{n} \quad (5)$$

Using the standard deviation as the risk measure gives:

$$\pi = 1 - \frac{\sqrt{m}}{\sqrt{n}} \quad (6)$$

Because the square root is a concave function, using the variance as the risk measure always leads to higher tax deductibility than using the standard deviation.

Equal Covariances Across Pairs of Risks

Suppose covariances across pairs of risks are identical. Then, equation (3) is reduced to:

$$\frac{m\sigma^2 + [m(n-1)\bar{\sigma}_{ij}]}{n\sigma^2 + [n(n-1)\bar{\sigma}_{ij}]} = \frac{m}{n}$$

where $\bar{\sigma}_{ij}$ is the common covariance. It follows that the degree of tax deductibility can be determined by equations (5) and (6) even under this assumption.

¹⁴ This result is consistent with portfolio theory, which states that as more securities are held in a portfolio, the variance of the return on the portfolio depends mainly on the sum of covariance terms.

Although non-zero covariances may be found among insurable risks, it is still widely accepted that most insurable risks are IID. To illustrate the risk reduction approach, equations (5) and (6), the results under the IID assumption and the equal-covariance assumption, are applied to several situations:

Case I—Conventional Insurance

Assume that Firm A does not own a captive and insures its specific risk through an unrelated insurer. The proportionate contribution of Firm A's insured specific risk to its total risk after insurance is reduced to zero through the conventional insurance transaction.¹⁵ Therefore the insurance premiums are fully deductible in this case.

Case II—Self Insurance

Assume that instead of insuring its risk through an unrelated insurer, Firm B, which does not own a captive, self-insures. The proportionate risk before and after the decision stays the same because the firm neither shifts its risk to an insurer nor reduces its risk. The result can be obtained by substituting m for n in equation (5) or (6), i.e., $\pi = 0$. Thus, the cashflow paid to the self-insurance fund is not tax deductible. This result is consistent with the rulings of the IRS and the Tax Court, but inconsistent with the result of Hofflander and Nye. Their argument was discussed previously in the introduction.

The current study maintains that the total risk of the firm after "insurance arrangements" is irrelevant. Rather, the reduction of the firm's contribution to its total risk, is proposed as a gauge of whether the arrangement provides insurance.

Case III—Single-Parent Captive with No Outside Risks

Now, assume Firm C insures through its wholly-owned captive which does not write outside business. If the firm insures its specific risk through the captive, the proportionate contribution of the parent-specific risk constitutes the captive's total risk and thus the parent's total risk. Our analysis suggests tax benefits should not be granted because the proportionate contribution of risk is not reduced. This result is also consistent with the Tax Court and the IRS's position.

Case IV—Single-Parent Captive with Outside Risks

Next, assume a captive wholly owned by parent, Firm D. Further, assume the captive writes outside risks. Table 1 illustrates the degree of tax-

¹⁵ It is assumed that risks are not entirely insured due to deductible, coinsurance, and other factors.

deductibility by substituting various figures for m in equations (5) and (6), given n equals 100.

Table 1

An illustration of the degrees of tax deductibility using the variance and standard deviation as risk measures, respectively. Assume a total of 100 risks, and m stands for the number of the parent risks.

	m	0	10	20	30	40	50	60	70	80	90	100
VAR*	π	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.0
SD	π	1.0	0.68	0.55	0.45	0.37	0.29	0.23	0.16	0.11	0.05	0.0

* VAR and SD identifies that the degrees of tax deductibility are obtained by using the variance and standard deviation as risk measures, respectively.

One extreme situation in which m equals zero is analogous to a parent which owns a captive but insures its own risks with an unrelated insurer. The captive writes n units of outside risks, none of which is contributed by the parent. The proposed approach suggests that the insurance premium paid to the unrelated insurer should be tax deductible, i.e., substituting 0 for m , $\pi = 1$. The other extreme in which m equals 100 can be considered an analogy of full self-insurance or a wholly-owned captive underwriting no outside risks. The analysis suggests no tax advantage should be granted, which supports the government's position on this issue. For situations between the two extremes, some deductions should be granted. This result is, however, inconsistent with the IRS's ruling of the Gulf Oil case. Apparently the IRS disregarded the unrelated business written by Gulf Oil. Gulf Oil formed its captive in 1972. The captive only wrote related risks in 1972-1974. Outside risks increased from 2 percent in 1975 to 62 percent in 1983. (See Table 2.)

Table 2
Gulf Oil: Captive Risk Breakdown

Year	% of Unrelated risk
1975	2
1976	7
1977	16
1978	51
1979	54
1980	53
1981	54
1982	48
1983	62

The data are quoted from Duer (1989).

The Tax Court disallowed the deduction for premiums paid to the captive because the captive had no or little unrelated risks in 1974 and 1975. However,

if footnote 14 of the Gulf Oil case is applied, the Tax Court would allow the deduction after 1978 because the captive's outside risks are greater than 50 percent, with the exception of 1982.

The risk reduction approach proposed in this study provides a method of dealing with partial deductions, which the Tax Court is inclined to grant but is puzzled as to how. It should be noted that using variance as the risk measure would result in a more lenient tax policy. We favor variance since it is the risk measure used in portfolio analysis. However, the government should have discretion as to how lenient it will be on this tax issue.

Case V—Group Captive with Outside Risks

The assumption of case V is the same as that of case IV except the captive is partially-owned by the parent, Firm E.

Sometimes a number of firms in the same industry form a captive jointly to underwrite their own risks. This type of captive is called a group captive. It usually underwrites its parents' risks only. Under this joint-ownership arrangement, the parent which owns part of the captive assumes the captive-total risk in proportion to its ownership of the captive in return for the proportionate insurance premiums. Let α be the parent's proportional ownership of the captive. Then, α of the captive-total risk would account for the parent-total risk. At the same time, $(1 - \alpha)$ of the parent-specific risk is transferred to its co-owners of the captive and α is retained. As before, let n be the total number of exposure units of risk and m be the units of the parent-specific risk. Then, the parent-total risk becomes $\text{Var}(\alpha Y_n)$. The proportionate contribution of the retained parent-specific risk to the parent-total risk is $\frac{\alpha m}{\alpha n} \text{Cov}(\alpha Y_m, \alpha Y_n)$. Following the same analysis presented previously, the degree of tax deductibility of the insurance premium paid by a parent to its co-owned captive can be determined exactly by equations (5) and (6) using variance and standard deviation as risk measures, respectively.

Obviously, a partial ownership of the captive does not affect the degree of tax deductibility of premiums paid by a parent. With partial ownership of the captive there is partial retention of captive-total risk as well as the parent-specific risk. Therefore, their effects offset each other. A parent of the group captive usually would enjoy less of the tax advantage than the parent of a captive which underwrites a substantial portion of outside risks, unless a large group of firms form the captive jointly.

Case VI—Carnation Case (Reinsurance)

Carnation, the parent, purchased coverage from a commercial insurer. This insurer reinsured 90 percent of its risks with Three Flowers, a wholly-owned captive of Carnation. Furthermore, the captive did not underwrite outside risks.

For analytical convenience, suppose Carnation has 100 units of insurable risk. After the reinsurance transaction, Three Flowers' total risk is 90 units.

Since Three Flowers did not underwrite outside risks and was wholly owned by Carnation, Carnation's total risk after the reinsurance becomes 90 units with 100 percent of the risk contributed by Carnation. That is, there is zero risk reduction in this chain insurance arrangement. Therefore, the premium for those 90 units of risk should not be tax deductible. The rest of 10 units were eliminated by being shifted to the unrelated insurer. The premium for these 10 units of risk should be tax deductible. In short, analysis suggests that 10 percent of the premium paid to the unrelated insurer should be tax deductible. The Tax Court's ruling against the deduction, though based on a "substance over form" criterion, is rather close to the result obtained here.

Although only six cases are analyzed above, more complicated cases can be analyzed with systematic framework proposed here.

Conclusions

In summary, this article clarifies the concept of risk shifting and provides a method to determine the degree of tax deductibility by a risk reduction approach. The method proposed is sufficiently general that different issues such as a self-insured parent owning an active captive, group captives, and reinsurance can be analyzed systematically within the same frame-work. Some of the results presented in this study differ from those obtained in previous studies, such as Smith (1986) and Hofflander and Nye (1984), and also from some of the IRS's positions as a result of using a more appropriate risk measure, the proportionate contribution of the parent-specific risk.

The number of captive insurers grew rapidly in the 1970s. The most appealing motivation for firms to set up captive insurers was to take advantage of the tax deductibility of insurance premiums paid to their captives. However, the government's tough policy in this respect has slowed down the growth of captive insurers. The Tax Court's rulings in the Gulf Oil case and the related GCMs seem to indicate that the tax advantage would be granted if there were risk shifting from the parent to underwritten external policyholders after the transaction. The current authors indicate that there will never be such risk shifting if the captive is solely-owned by the parent. Furthermore, it is argued that captive-total risk is relevant to the problem of capital adequacy but irrelevant to the tax deductibility issue. Rather, the relative significance of the parent-specific risk to the parent-total risk is relevant to the tax issue. Following this line of argument, the proportionate contribution of the parent-specific risk to the parent-total risk should be the concern of the IRS. Mean-variance portfolio analysis is applied to determine the degree of tax deductibility of premiums paid to the captive. As expected, the more outside risks the captive underwrites, the higher the degree of tax deductibility of the premiums. However, using variance as the risk measure always leads to a higher degree of tax deductibility than using the standard deviation, other things being equal. The choice between the two should be at the discretion of the government.

The analysis in this article has another interesting implication. It suggests that the retention fund for self-insurance, up to the amount equivalent to the insurance premium covering otherwise conventionally insured risks, should be considered in the same way as discussed previously with regard to tax deductibility, if the parent has a captive that underwrites outside risks. In other words, the insurance transaction is irrelevant. What is important is whether the proportionate contribution of the parent-specific risk to the parent-total risk is reduced with the establishment of a captive insurer.

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