

Kwansei Gakuin University
Social Sciences Review
Vol. 17, 2012
Nishinomiya, Japan

Demand for Captives and Domiciles: Why are Countries and States Rushing into Captives?

Yuji MAEDA*

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I. Introduction

Surrounded by the beautiful, transparent sea and blue sky and located in the center of the Atlantic Ocean is the small island of “Bermuda” said to be the home of captives. This island is currently the world No.1 domicile of captive insurance companies (hereafter “captives”). This paper attempt to explain why this small island managed to produce such a large insurance industry, especially in captives, a critical question for insurance professionals and jurisdictions planning to invite captives.

This paper discusses the impact of captives on their domicile economies and the importance of the domicile’s regulations and characteristics for the captives. In considering the US state of Vermont, Bermuda, and the Federated States of Micronesia as potential Japanese captive domiciles and YKK Incorporation as an example of a captive parent, we analyze how and to what extent regulators and characteristics attract captives by examining captives’ economic impact of captives on their domiciles economy based on rational assumptions. The study’s results outline what is required for Japan or a Japanese prefecture to be a successful captive domicile.

* Associate Professor of Finance, Doctor of Philosophy in Business Administration, Institute of Business and Accounting, Kwansai Gakuin University

A captive insurance company can be defined as a subsidiary of a non-insurance company formed primarily to insure and cover risks by financing funds of its parent company or those of its sister companies in the same industrial group. The places where captives are incorporated and regulated are called “captive domiciles” (hereafter “domiciles”) where captive insurance companies are incorporated and regulated.

Current captives include group or association captives, cell or rental captives, incorporated cell captives, agency captives, risk retention groups among other structured captives.

According to Strass (2011), captives were started by Youngstown Sheet and Tube Company, a US company in Youngstown, Ohio. Frederic Mylett Reiss, who had worked as an agent for the company, founded an insurance company to insure risks for Youngstown Sheet and Tube with the help of his colleague underwriters in Lloyd’s insurance market. Then, in 1962, Reiss moved to Bermuda to establish a captive management company, International Risk Management Limited, and start managing captives. The captive business has been flourishing in Bermuda ever since.

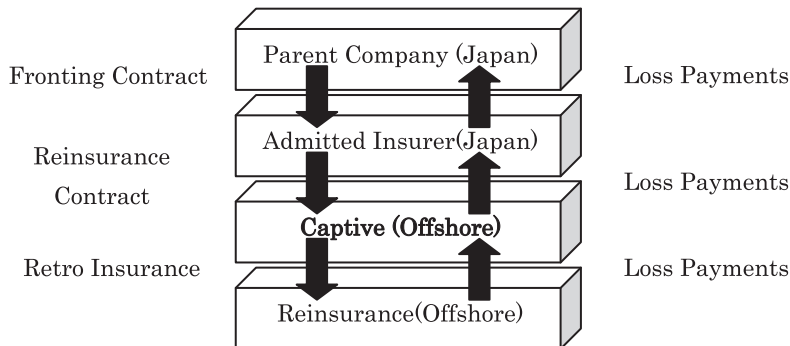


Fig. 1 Sample Structure of a Japanese Captive

II. Summary of the Related Literature and Objectives of Captive Formations

Research on captives’ relationship to local economies is scarce. Maeda (2007) examines captives’ potential impact of captives on local economy of Nago city, Okinawa, the Japan’s first captive domicile. A simulation indicated that one hundred captives and related firms operating over a ten-year period would add around 210 billion yen to the local economy, 233 billion yen to the prefectural tax revenue and 2,200 new jobs. No captives have yet been established, however.

Maeda (2007) also discusses whether and to what extent captives as corporate risk financing tools could benefit Japanese corporations and Nago City, the first

captive domicile. This paper demonstrates, first, that corporations set aside in their captives an accumulation of funds for emergencies. A reserve fund prepared for losses, insurance premiums, and surplus and paid-in capital would generate positive cash flows from investments for the period between premiums are received and loss payments are required. The longer the loss payments can be delayed, the more investment returns the captive will earn. Thus, using a captive is an effective way to cover casualty risks as casualty loss payments typically take a long time. The positive cash flows that would otherwise be retained by commercial insurance companies reduce total corporate cost of risks.

Second, captives allow corporations to profit from the difference in insurance prices when the premiums offered by the Japanese insurance market differ from those offered by foreign insurance markets for the same risk.

Third, having a captive creates a strong incentive to enhance loss controls. This is particularly effective for corporations with poor loss histories and that need to control losses to reduce the cost of their risks. Since captives eventually compensate for the losses, the corporation will recognize that it must effectively control both claims and losses. The negative results of losses and ineffective claims controls will be reflected in the captive's financial statements.

Fourth, to satisfy their insurance needs, Japanese corporations can structure their insurance programs by tailoring their captive insurance schemes. The necessary coverage can sometimes not be obtained from the conventional insurance market, and captives can provide new insurance products or extend the existing coverage. For example, Japanese corporations rarely obtain adequate coverage for such risks as earthquakes, typhoons, floods, and for product, environmental and professional liabilities; captives can provide alternative solutions.

Finally, Japanese corporations can take advantage of captives as alternative financial tools for new business opportunities. For example, a corporation can finance a new project cheaply with a fund the captive has accumulated. Borrowing money from a captive called "loan back" is an important financial technique. A matured captive can provide a reliable financial resource to its parent company in emergency when Japanese commercial banks are not accessible and financing alternatives such as equity financing and bond issues are considered too expensive.

Further research on captives includes studies on whether or not captives create value for the parent corporations. Diallo and Kim (1989) and Adams and Hillier (2000) use event study methods to examine whether establishing a captive insurer creates value for a corporation's shareholders. Event studies test the statistical significance of a stock's reaction to the news that a captive insurer has been formed. Diallo and Kim (1989) find that, while the share value of the captive's parent remains unchanged, a non-significant negative drift of the cumulative abnormal

return on the parent's stock may indicate an amount that is negligible to the stockholders but possibly significant to a handful of managers. They thus contend that the welfare gain derived from the creation of captives most likely flows to the managers of the parent firms rather than to the shareholders. This conclusion is similar to that of Scordis and Porat (1998), who find that firms with captives are more likely to have heightened manager-owner conflicts than those that do not have captives. According to Business Insurance, however, there are well over 5,000 captives worldwide.

III. Captive Domiciles: Case Studies of Vermont, Bermuda and Micronesia

This section discusses why captives have flourished in the US and describes the characteristics of captive domiciles in order to identify their essential features.

1. US Federal Tax Status

Our research suggests that the lack of insurance capacity, fluctuations in insurance premiums, and high deductible plans (actually resulting from catastrophic losses) prompted US firms to considering their own insurance companies.

Before discussing captive domiciles in detail, we will illustrate the tax treatment of the US federal government. The US federal tax status determines the definition of "captive insurance." The *US Revenue Rule 2002-90*, states that "insurance" shall have two elements: "risk shifting" and "risk distribution." According to Adkisson (2006), *risk shifting* occurs if a company facing the possibility of an economic loss transfers some or all of the financial consequences of the potential loss to an insurer, such that a loss by the insured will not affect the insured because the loss will be offset by the insurance payment. Our interviews with US companies and captive managers confirmed that US companies attempt to follow the above strategy by putting their subsidiaries' risks into captives.

Adkisson (2006) indicates that *risk distribution* incorporates the statistical phenomenon known as the "law of large numbers." Distributing risk allows an insurer to reduce the possibility that a single costly claim will exceed the amount obtained as a premium and set aside to pay the claim. To clarify risk shifting, we refer to "*Clougherty Packing Co. v. Commissioner, 811 F.2d 1297, 1300 (9th Cir.1987).*" Risk distribution entails a pooling of premiums so that a potential insured will not in significant part in the payment of its own risks. To clarify risk distribution, we refer to "*Humana Inc. v. Commissioner, 881 F.2d 247, 257 (6th Cir. 1989).*"

Captives' compliance with this insurance status is important for companies, especially when a company plans to set up its captive; captives lose their value if

they fail to comply with the way they are defined. If they are not considered insurance by the Internal Revenue Service, the premiums paid to them by parents and others are not tax deductible. The deductibility of insurance premiums, or the value created by paying the premiums as business expenses before losses occur, is an essential reason for having a captive. Without the insurance status, the value would be lost. According to John Prescott (2012) of Johnson Lambert LLP, the tax code does not clearly state how many subordinated companies are needed for risk shifting but a reasonable number of subsidiaries must be included in captive coverage.

For risk distribution, many US companies attempt to include third party risks such as employees' medical expense risk, employees' longevity (pension plan) risk, and subordinated companies' and suppliers' risks into their captives.

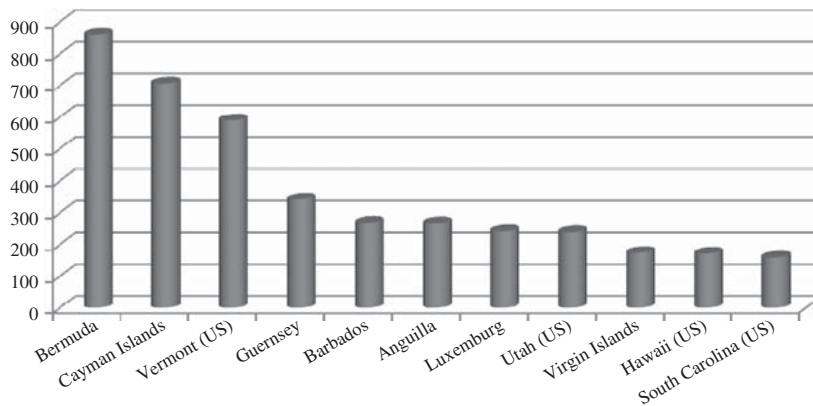


Fig. 2 Number of Captives in Each Domicile in 2011 (Source: Business Insurance, March 5, 2012)

2. Case Studies of Domiciles

(1) Vermont: The Largest Domicile in the US

Located in northeastern New England, the US state of Vermont is famous for the beauty of its colorful fall leaves and its fabulous winter ski resorts. Its 2012 population is only about 650,000, the second lowest among the 50 states. Woods and forest account for 76 percent of the state, which is economically dependent on tourism and wood and paper manufacturing. It also depends, however, on the insurance industry; it is the oldest captive domicile in the US, and not only has the highest number of captives in the US but ranks third in the world.

The state established its first captive law, the nation's oldest, in 1981 and then flourished as an option for domestic American companies seeking for offshore captive domiciles. The state currently has over active 600 captives according to Dan Towle, Director of Financial Services for the Vermont Department of Economic

Development. Towle indicates that the state's top ten employers are captive-related. The state considers captives one of its most important industries; it uses efficient captive registration and enjoys strong support from the state government. It employs there 3 directors and has 32 dedicated staff members, representing the US largest captive institution. According to him, this domicile is the largest in the world, with assets of approximately 135 billion dollars and premium revenue of 74 billion dollars coming from captives whose parents include 42 Fortune 100 companies and 18 Dow 30 corporations. To facilitate captive incorporations and management, the state has various service providers, such as attorneys, captive management companies, investment advisers, banks, accountants and actuaries. Towle (*Captive Review Magazine* (2012)) reports that applications are efficiently reviewed through a process that usually takes no more than 30 days from receipt of an application.

To attract captives to the state, the Vermont Captive Association holds an annual captive conference in Burlington, the state capital, which usually attracts well over 1,000 attendees. It also holds several educational seminars every year. The state appears committed to captive education and promotion in its efforts to inform people about the purpose of captives, their process of incorporation and their operations. Towle states that the key elements of success include understanding the captive industry, committing to "institutionalize" captive registrations by providing flexibility, responding immediately to changes in industry's demand, and having the state governor's strong support. Vermont reached its current stage gradually. Vermont is a small state, and an industry like captives is vital to its economy. Interestingly, Towle uses the words "clean money" to describe what captives are bringing to the state: they do not destroy the beautiful environment; rather, the industry enhances tourism by attracting many people from around the world who come to attend conferences on captives and annual meetings. We can see from the beautiful scenery around Burlington, why so many like to spend time relaxing in Vermont while at work.

Most importantly, captives have created employment because they need service providers such as managers, attorneys, accountants, actuaries, investment advisors among others. The *Captive Review Magazine' Vermont Report* (2012) states that the captive industry has created 1,400 full-time and part-time jobs as well as direct tax revenue, generating approximately 2 percent of the general fund budget. Captives' premium taxes and application fees are also considerable. These figures are significant for a small state such as Vermont.

To gain captive expertise, the state government has put significant energy into educating the local people to become industry experts, thus raising the state's overall educational level.

Table 1 Some Important Regulatory Features and Statistics for Captives in the Three Domiciles

	Vermont	Bermuda	FSM
Number of Captives(as of 2011)	590 active	862	9
Total Assets(US \$)	134.4 billion	118 billion	Not disclosed
Gross Premium Written(US \$)	73.8 billion	19.6 billion	Not disclosed
Federal tax rate(US) or corporate tax	35.0%	0%	21%
Premium taxes	0.38%	0%	0%
Fees(annual)	\$500	\$971	\$500

Fee in Bermuda is one time fee upon registration

(Sources: CICA 2012, *Captive Review Magazines* (2012), Ikeuchi et al. (2012))

(2) Bermuda: The Largest Domicile in the World

Bermuda is an island consisting of over 150 coral and shore reefs in the northwest of the Atlantic Ocean. It is said that the Spaniard “Juan de Bermudez” discovered this island in 1503. Since 1683, it has been occupied by Great Britain. Bermuda is a politically and economically independent member of the commonwealth and Queen Elizabeth is its head of state. There are frequent flights between New York and the island, about a two-hour trip. It has a one-hour time difference with the US. Its main industries are finance and tourism. In 2010, approximately 70,000 people lived on this island, 60% of whom were Africans and 40% English or Portuguese. As the island lacks skilled people, especially for the finance industry, the government allows immigrations from overseas.

Bermuda’s finance industry, which is almost entirely related to the captive and insurance industries, has attracted many immigrants and expatriates. Its average GDP was 97,000 US dollars in 2010, one of the world’s highest. Bermuda has become a global financial offshore center for US and UK corporations, most of which are almost located in Hamilton. The Bermudan dollar is pegged one-to-one to the US dollar.

Famous as a tax-haven (with zero percentage tax on corporate profits) and as the one of the captive industry, Bermuda is also the world’s largest captive domicile, with 862 captives in 2011, including those of many Fortune 500 corporations. In 2010, Bermuda had a gross premium volume of 19.6 billion US dollars and assets of 12 billion dollars, asset values second only to Vermont’s.

According to Kilian Whelan, CEO of JLT captive management company based in Bermuda, the rapid growth in Bermudan captives could be explained by the insurance industry’s inadequate risk coverage capacity, partially caused by payouts for catastrophic losses due to events such as 9/11 and Hurricane Katrina. Huge

payments created shortages, since the world's insurance industries are interconnected and inter-dependent through re-insurance.

Whelan also believes that Bermuda's success is due to its convenience as a "one-stop shopping" domicile, where captive owners benefit by receiving all the necessary services at this location. Bermuda has been "institutionalized" with a captive infrastructure and service providers such as experienced captive managers, actuaries, lawyers, accountants, banks, investment advisors, information technologies and branches of global reinsurance companies.

Bermuda offers many benefits. Its regulations are considered fair, rational and flexible. Incorporating captives is relatively easy and fast. Taxation is very favorable. Bermuda's law is derived from UK common law. The country is politically stable. Travelling to Bermuda is relatively easy with frequent flights from New York needing only a few hours' flight time. Almost any kinds of captive can be established on this island. Its beautiful natural environment and many hotels and restaurants are nicely matched with its clean insurance industry. Their positive experience of Bermuda over the last twenty years is important to captive owners.

Cummins (2008) offers an economic analysis of Bermuda's captive market and its advantages. He states that several advantages made Bermuda the world leader of the captive market, its political stability, sound monetary system, high sovereign debt rating, for example; he also notes its professional infrastructure and reinsurance market. His arguments are consistent with the opinions presented by Whelan and in our study.

(3) The Federated States of Micronesia: An Emerging Domicile

Located south of Guam and north of Papua New Guinea, the Federated States of Micronesia (hereafter "FSM") consists of four states and 607 scattered islands. These main states are Pohnpei, Truk, Yap and Cosrae. Its total area is 701 square meters, on which approximately 100,000 people live. The FSM is historically and economically tied to Japan, with which it has a one-hour time difference. There are frequent flights from Narita to Guam; it takes seven to eight hours to fly from Narita to Palikir with a transfer at Guam (a direct flight from Narita is planned for 2012). The frequent flights provide convenient travel for Japanese corporations.

The country is relatively new to the captive industry: its operation started in 2008. Since the captive industry is very competitive among both onshore and offshore domiciles, an emerging domicile such as the FSM will find very difficult to catch up with other domiciles with a long history and more experience. The FSM's strategy is thus to focus on Japanese corporations for their captive domicile, since they are closely tied to Japan's economy and businesses. Its captive regulations and registrations are tailored to (i.e. made "flexible" for) Japan's business customs, tax

system and regulations.

For example, accounting figures for assets, liabilities and equities, and tax payments can be expressed in Japanese yen (JPY). Captives can keep JPY-based assets in a Japanese bank, allowing Japanese captives and their parents to avoid the risk of exchange rate fluctuations. Moreover, the FSM promises to maintain 21 percent corporate tax on captives, keeping the FSM away from “tax haven” status as defined by the Japanese tax code¹⁾. This allows captives to pay tax locally; its profits are thus not consolidated back to its parent in Japan. The parents of domiciles in Bermuda and Singapore have to pay the same percentage of corporate tax as in Japan on the profits of off-shore captives. The FSM’s twenty-one percent corporate tax on captives indicates that their target is Japanese captives.

However, the FSM can be considered weak in their captive infrastructure because of its newness. Captive managers and other service providers are still located in Hawaii, Guam, Singapore, and Tokyo where the relevant services are provided. It is not necessary to locate service providers locally, but doing so allows the host to enjoy captives’ economic and educational benefits.

The FSM’s uniqueness is in its “Multiple Corporation Captives (MCC)”, similar to a group or association captive. Half of the captives have been re-domiciled from other domiciles, such as Singapore, Hawaii and Dublin, while others are new. By September of 2012, according to its Insurance Commissioner, the FSM has established nine captives, all of them pure or MCC established by Japanese corporations.

Table 1 presents some important statistics and regulatory features concerning those three domiciles, several of which are common.

IV. Case Study of a Captive: YKK Corporation

This section presents a case study on YKK Group, drawn from our interview with its risk manager, David G. Schwartz, conducted at the Vermont Captive Conference in August 2012.

According to the Company Profile (YKK 2012), the company was founded on January 1934 as the *San-es Sholai* by Tadao Yoshida and thereafter re-named as “YKK AP.” It has capital of 10,000 million yen, group sales of 322.9 billion yen, and 15,500 employees all over the world in 2012. The YKK Group is a global

1) If a country is determined to be a “tax haven” country (i.e. if its corporate tax rate is equal to, or below 20 %), the corporation must consolidate the net income from its subsidiary in the tax haven country with the parent’s income in Japan. The corporation thus pays tax according to the Japan tax code, under which a corporation cannot avoid tax by establishing a subsidiary company in a tax haven country.

corporation, but it has been remained privately owned. Its business is primarily in manufacturing and the sale of residential houses and other general architectural products. The company motto states that “YKK strives to offer employees and their facilities competitive, comprehensive benefits that meet both their health and financial needs and are affordable for both employees and the company.” The company appears to care for its employees and its brand name. Because it is a family business and small (compared to giants such as Toyota and Sony), its strategic projects are quickly executed once a decision is made.

YKK America (headquartered in New Jersey), who initiated the captive establishment, had to have a high deductible insurance program for the hard insurance market (this was in the 1980s and 1990s). The fluctuations in insurance prices and the high deductibility of loss payments are motivated the company to consider a captive. The company had to absorb significant payouts for each loss before the insurance kicked in and thus decided to put a payment fund into a captive. Like other US companies, YKK created its own captive for its group. YKK America had 2,000 employees and 400 employees in eight Latin American nations. The company decided to form its captive in Vermont in 2008.

The captive underwrites the risks of workers compensation and property and medical product liabilities, as well as risks of medical costs, dental costs, whole life, retirement and long-term employee disability. To make a captive an insurance company for tax purposes, the captive must accept the risks of the subsidiaries and employees. According to Schwartz, the IRS tests whether at least 30 percentage of the premiums consist of those of third parties, the standard for insurance.

Vermont was chosen as a captive domicile because of its location, travel convenience and low fiduciary risk. According to Schwartz, Vermont has a long experience of being a captive domicile, and its review finishes within 90 days after the application is submitted. He feels that Vermont knows the captive business well and that its regulations make it easier to do business there than in other domiciles. Vermont responds to the company’s needs by providing tax and legal experts, auditors, actuaries, brokers and third-party administrators. The YKK captive has been audited every five years. Burlington, the capital city, has frequent flights from New York. Thus, Vermont attracts captives in many ways.

The captive now has 6 million surplus and growing. The captive has been the object of risk control and management, being a source of profit. The purposes of the captive are to underwrite risks of its parent and third-party unrelated businesses and to provide a firmer control of risks. The captive began by underwriting property and casualty risks as well as financial products such as directors’ and officers’ liabilities and environmental risks; then, it started to cover human resources risks such as workers compensations, employees health and accidents and other human risks. It

was a difficult and tedious process because they had to break through the operational walls obstructing communications among the Risk Management and Human Resources departments and the other 18 parties involved before captive formation could occur. Nevertheless, the process made employees aware of risk and improved both communications and risk management within the organization.

The captive improved employee benefits, reduced the costs of risks, maintained controls over vendor selection, provided transparency, and defined the roles of Risk Management and Human Resources departments, among other benefits. Unfortunately, the YKK captive does not cover risks in Japan.

This case study illustrates the most important features of a captive domicile: institutionalization, convenience, and response to corporate needs. Vermont has clearly earned its captive success, as has Bermuda. The FSM has been trying to accommodate the needs of Japanese corporations by holding annual captive seminars for them in Tokyo. Nine captives over five years is remarkable given that about eighty Japanese captives exist around the world.

V. Monte Carlo Simulation: Simulation Methodology

This section analyzes the effect of domiciles on a hypothetical captive. We compare between Vermont and Bermuda because they are mature and experienced.

We assume that company A has experienced product liability losses following a Lognormal type compound Poisson process with the parameters below (see Table 2). Lognormal distribution ρ is given by the following:

$$\rho(B) = \frac{\alpha^\beta}{2\pi\nu} \int_B \frac{\exp[-(\log x - m)/2\nu]}{x} 1_{\{x>0\}} dx, \quad \nu > 0$$

$$\log(X) \sim N(m, \nu).$$

Therefore, the Lévy Process $\{Z_t\}$ follows the Lognormal type compound Poisson process whose Lévy measure is

$$\nu(dx) = \frac{c}{\sqrt{2\pi\nu x}} \exp\left[-\frac{(\log x - m)^2}{2\nu}\right] 1_{\{x>1\}} dx.$$

Table 2 Risk Model Parameters using the Lognormal type compound Poisson Process

	m	ν	c
Model Parameters	-0.0056	0.029082	0.002006

We then performed a pro-forma financial analysis for five years after captive formation and determined the end-year capital value. The objective of conducting

simulations on pro-forma financial statement (i.e. the balance sheet and income statement) is to look into the output distributions of the first, the second, the third, the fourth and the fifth year-end capital values to determine if its captive is sustainable. The captive is determined to be sustainable if its year-end capital values are positive.

The simulation assumes that the initial invested capital is one million dollars. The gross premium is 10 million dollars and its annual growth rate of the premium is 3 percent. No dividends are paid over the five years. The investment return follows a uniform distribution that randomly selects between 1–5 percent. The third-

Table 3 Product Liability Loss Payout Percentage for Each Year

	1st year	2nd year	3rd year	4th year	5th year
Product Liability Loss Payout %	20%	30%	25%	20%	5%

Table 4 Summary of Simulation Results

	Vermont	Bermuda
Probability of being negative (Bankruptcy)	3.5%	19.0%
Mean value	\$14,084,733	\$7,801,235
Standard deviation	\$7,479,917	\$12,170,061
Maximum Value	\$7,193,671	\$32,722,542

The Distribution of Asset Values in the 5th Year–End after Captive Formation.

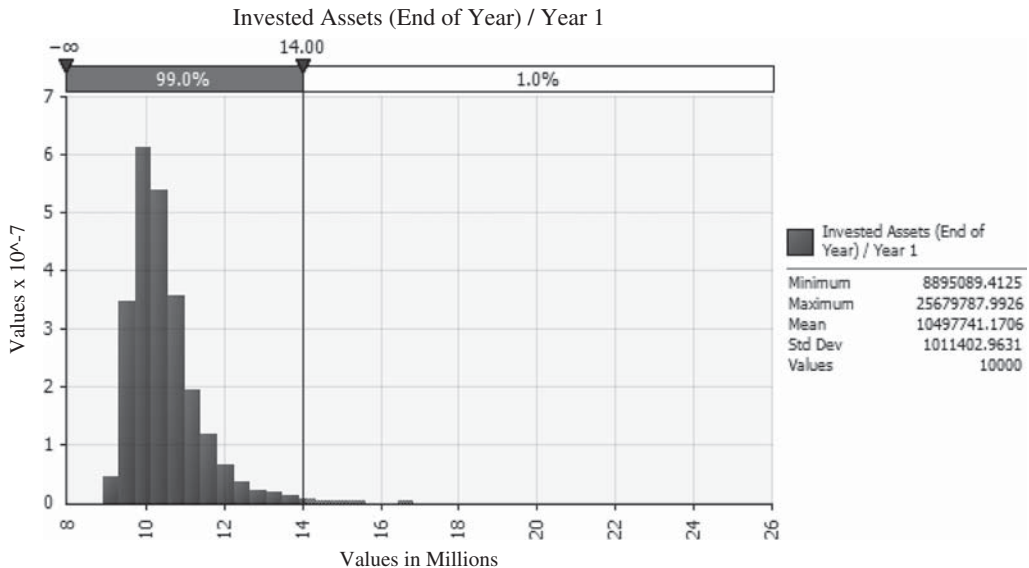


Fig. 3 A Sample Distribution of Asset Values in the First Year-End in Vermont

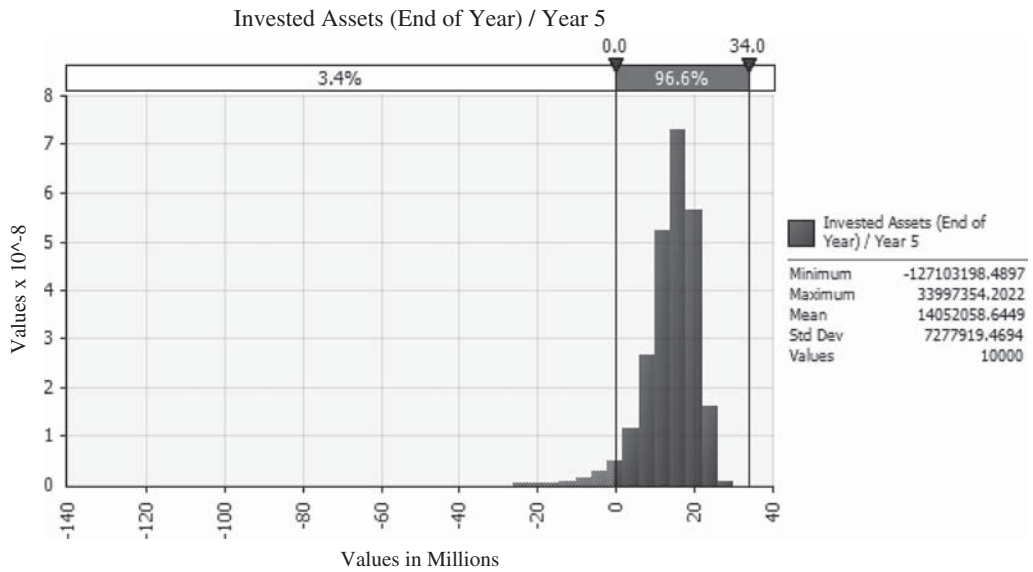


Fig. 4 A Sample Distribution of Asset Values in the 5th Year-End in Vermont

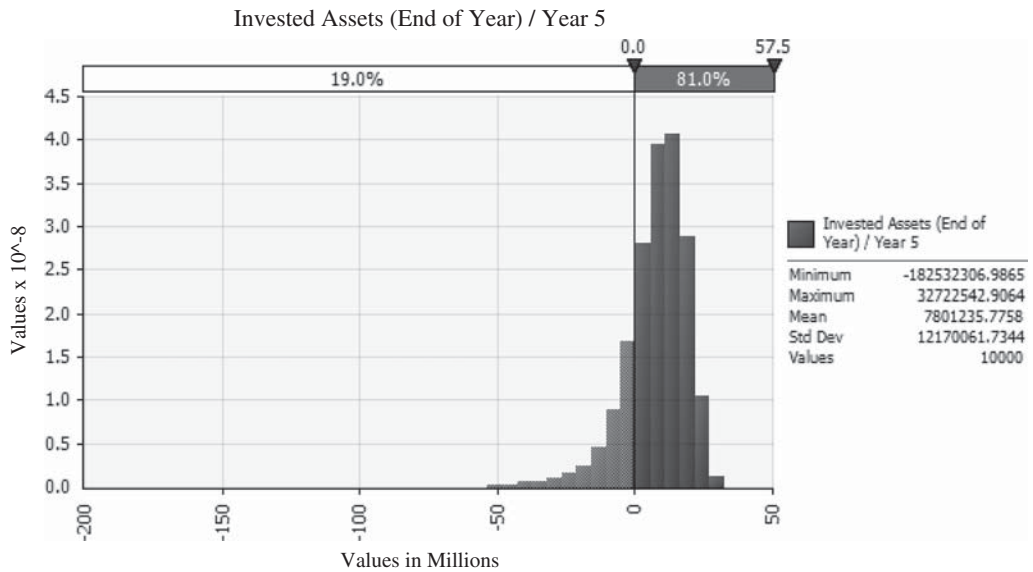


Fig. 5 A Sample Distribution of Asset Values in the 5th Year-End in Bermuda

party administration costs for using the management company, the actuarial services and other services are 30,000 dollars annually. Product liability losses follow the lognormal type compound Poisson process, as illustrated above. The loss payouts are assumed as in Table 3. No retro reinsurance coverage is purchased. The Vermont captive pays 1 percent of the premium income for internal administrative and operating costs, while the Bermuda captive pays 2 percent (assumed to be

reasonable) in local taxes on employee' salaries. We conducted an iteration of 10,000 using *@Risk (Palisade)* simulation tool pack.

VI. Results, Implications and Discussion

Table 4 and 5 and Fig. 3, 4 and 5 show the sample distributions of year-end asset values over the five years produced by our simulations of 10,000 iterations.

We observe that, at a 96.5% confidence level, the Vermont captive's year-end assets would be positive with a 3.5% probability of being negative (going bankrupt) in the 5th year-end.

On the other hand, it shows, at an 81.0% confidence level, that the Bermuda captive's year- end assets would be positive with a 19.0% probability of being negative (going bankrupt). The Bermuda captive shows a higher upside potential, with the simulation output providing a maximum value of approximately 33 billion dollars, higher than the Vermont captive's seven billion dollar maximum. We found that the variation from the mean is higher in the Bermuda captive as illustrated by its higher standard deviation. The Vermont captive is, therefore, more financially stable one.

Table 5 illustrates the Vermont captive's annual probability of bankruptcy and its asset value at the 99 percent confidence level. In the first and second years, the captive has virtually zero bankruptcy probability; this becomes positive later. Appendix A shows the output's simulated progress in the third and fourth years. We found that the outputs' variance becomes wider at each year end, a interesting results whose reasons should be explored. For examples, we should determine the domicile features of domicile that contribute to it.

The results provide other important findings. They imply that fee structures, taxes, and premium taxes, among other regulatory costs, impact the captives' financial stability significantly. This finding constitutes a unique contribution as it demonstrates the application of a Lévy process as a hypothetical loss estimation, through a compound Poisson process using a Lognormal Lévy measure. We have demonstrated how modeling can be applied to determine the feasibility of a captive through a pro-forma financial analysis.

This study has also examined in details the local characteristics of three domiciles: Vermont, Bermuda, and the FSM. We have found that institutionalizing captive regulations, providing convenience, and being responsiveness to corporate needs are the important factors in domicile success. Interestingly, Vermont's "low fiduciary risk" pointed out as an advantage by Mr. Schwartz is identical to Bermuda's sound monetary system, political stability and high sovereign debt rating (Cummins (2008)).

Nevertheless, this study may have room for improvement that would enhance its robustness. For example, we should investigate whether corporate tax rate on profits has the greatest impacts on a captive. We also acknowledge that our findings are based on certain assumptions, for example, a Lognormal type compound Poisson process model (a Lognormal Lévy measure) is an appropriate product liability loss model, and the uniform distribution for investment returns. We have assumed that the future follows the pattern of past data. Furthermore, we admit that our base case scenario has a very limited. These areas remain open for further research.

Table 5 Trend of Asset Value at Year End in the Vermont Captive

	Asset Value at Year End	
	Probability of being negative (being bankrupt)	Value at 99% confidence level (US \$)
1st year	0%	14 million
2nd	0%	19 million
3rd	0.30%	22 million
4th	1.40%	23.5 million
5th	3.40%	34 million

Acknowledgements

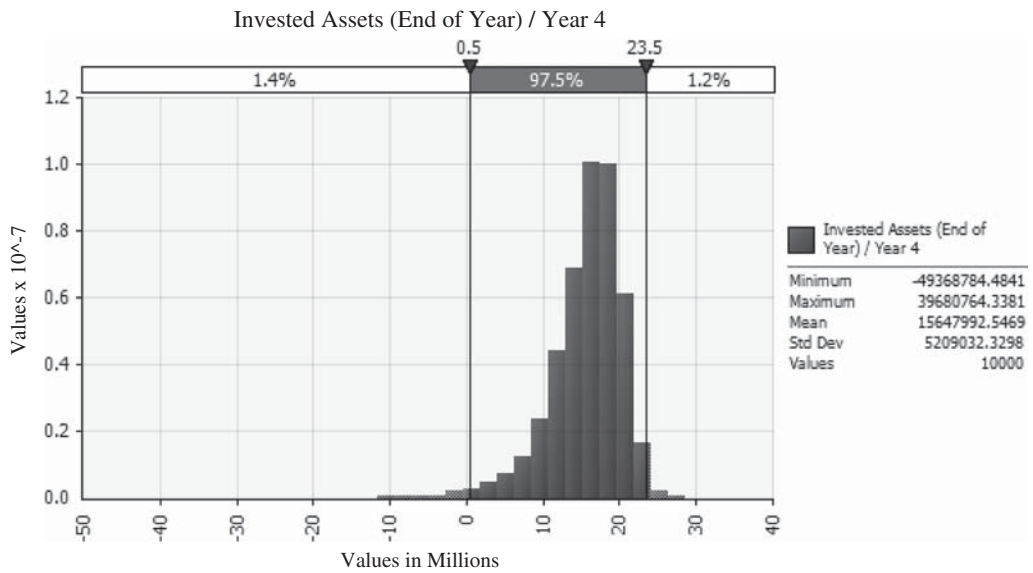
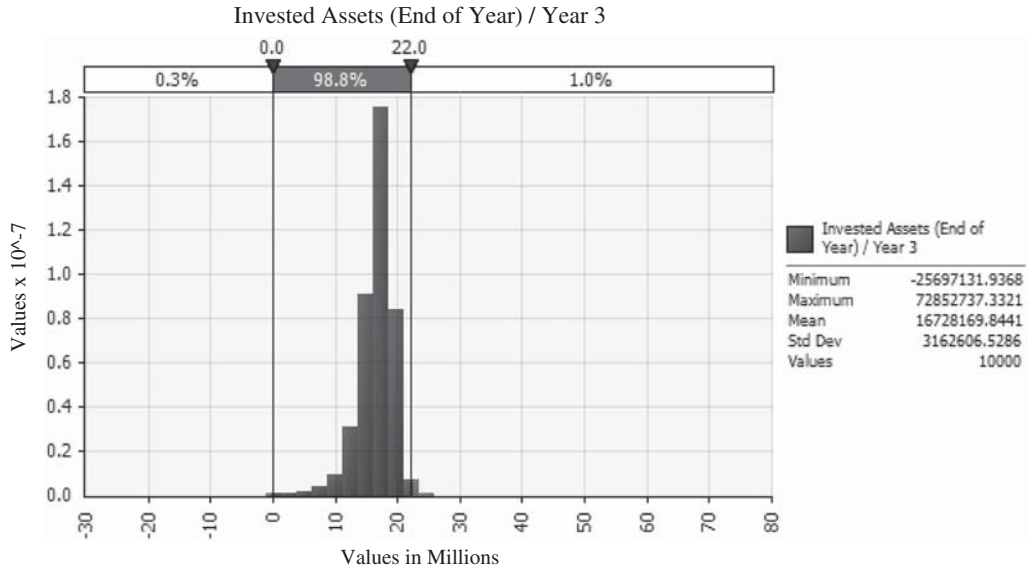
This study and related activities were financially supported by a Kaken Grant (C) for 2012–2015 (its theme number is No.24530510 for which Yuji Maeda is a representative) administered by the Japan Society for the Promotion of Science. This study could not have been completed without this financial support, for which we are very grateful.

References

- Adams, M. and D. Hillier, “The Effect of Captive Formation on Stock Returns: An Empirical Test from the UK,” *Journal of Banking and Finance*, 24(11), 2000, pp.1787–1807.
- Adkisson Jay D., “*Captive Insurance Companies- Introduction of Captives, Closely-Held Insurance Companies and Risk Retention Groups*,” iUniverse, 2006.
- Captive Insurance Companies Association, “*CICA: 40 years of captive leadership*,” A Newton Media Publication, 2012.
- Captive Review, “*Bermuda Report 2012*”, “*Vermont Report 2012*,” The Manson Group, 2012
- Cummins J. D. “*The Bermuda Insurance Market: An Economic Analysis*,” May 6, 2008. www.bermuda-insurance.org, Web accessed Sept. 29, 2012 14:00 PM
- Diallo, A. and S. Kim, “Asymmetric Information Captive Insurers’ Formation, and Managers’ Welfare Gain,” *Journal of Risk and Insurance*, 56(2), 1989, pp.233–251.

- Ikeuchi M., Y. Maeda and F. Sugino, “*Japanese Corporations and Captives: Theory and Practice of Risk Financing (in Japanese)*” Hoken Mainichi Shimbun, March to August 2012.
- International Risk Management Institute Inc. “*Risk Financing: Insurance Cash flow and Alternative Funding Vol.I and II,*” IRMI, 2008.
- Maeda, Y. “Risk Financing through Captive Insurance-Global Captives and Japanese Ones (in Japanese),” *Journal of Insurance Science*, Number 590, September 2005, pp 72–89.
- Maeda, Y., N. Moriwaki, and Y. Miyahara, “On Modeling U.S. Product Liability Risk – An Empirical Analysis,” *CRR Working Paper Series No.B–5*, Center for Risk Research, Faculty of Economics, Shiga University, 2005, pp 1–20.
- Maeda, Y. and Y. Sakai “Risk Financing Through Captive Insurer: Economic Influences of Captives on Corporations and the First Domicile in Japan,” *Journal of Risk Research*, Vol.10, Issue 6, 2007, pp 793–803.
- Maeda, Y., Y. Suzawa and N. Scordis, “Shareholder Value: The Case of Japanese Captive Insurers, *Asia-Pacific Journal of Risk and Insurance*, Volume 5 Issue 1 Article 3, 2010
- Mayers, D. and Smith, Jr, C. W. “On the Corporate Demand for Insurance,” *Journal of Business*, Vol 55, No.2, 1982.
- Metropolis, N. and S. Ulam “The Monte Carlo Method,” *Journal of the American Statistical Association*, Vol.44, No.247, 1949, pp 335–341.
- Miyahara, Y. “*Stock Price Model and Lévy Process (in Japanese)*”, Financial Engineering – Basics No.1, Asakura Bookstore Co, 2003.
- Prescott, John, Johnson Lambert LLP, “Captives 101: Making a Right Play.” Presentation, Vermont Captive Insurance Association Conference at Burlington, 2012.
- Riser Adkisson LLP, http://www.captiveinsurancecompanies.com/tax_rev-rul-2002-90.html, Web accessed Sept. 27, 2012 PM 3:54.
- Scordis, N. and J. Barrese and M. Yokoyama (2007), “Conditions for Captive Insurer Value: A Monte Carlo Simulation,” *Journal of Insurance Issues*, 30(2), 2007, pp.79–101.
- Schoutens, W., “*Lévy Process in Finance*”, WILEY, 2003.
- Sierk R. W. III “*Taken Captive,*” RMA Press, 2008
- Skipper Jr., H. D. and J. W. Kwon, editors, “*Risk Management and Insurance: Perspectives in a Global Economy,*” Blackwell Publishing, 2007.
- Tymon, O. and M. Lane as an editor, “*Alternative Risk Strategies*”, Risk Books, 2002.
- YKK AP Corporation, “*Company Profile,*” “history” <http://www.ykkap.co.jp/company/english/outline/index.asp>, Web accessed Sept 29, 2012 10:45 AM.

Appendix



Sample Outputs from a Simulation at the Vermont Captive