Capital Requirements for Financial Holding Companies in Taiwan

by Tsai-Ching Lai and Min-Teh Yu*

1. Introduction

The emergence of financial holding companies (FHCs), which provide a wide range of financial services and incorporating at least two of banking, securities, and insurance firms, has created an additional dimension for solo supervisors of subsidiaries within the holding companies. Supervisory concerns have been explored from the perspective of each of the three supervisory disciplines and also from a broader perspective by the three groups of supervisors working together.

A Joint Forum (1999) survey of FHCs demonstrated an important recent development that some FHCs monitor risk across subsidiaries, while most of the FHCs surveyed monitor risk only at the subsidiary level. A central issue in the development is to ensure that the objectives of individual supervisors as they relate to the subsidiaries for which they have regulatory responsibility are not impaired owing to the existence of FHCs. Supervisors collectively recognize the need for individual supervisors of businesses within a FHC to

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satisfy themselves that there is sufficient capital available to the individual regulated subsidiaries to ensure their viability and to provide banking, securities and insurance supervisors with principles and measurement techniques that can facilitate the assessment of capital adequacy on a group-wide basis for the FHCs.

The Taiwan Financial Holding Company Act of 2001 promulgated the capital adequacy regulation of FHCs based on each subsidiary, but rather using the integrated risk approach and on a combined basis. This design, which can result in misstatement of group capital and can have a material adverse effect on the regulated financial subsidiaries, also occurs in other developed countries.

The capital requirements of each of the banking, securities and insurance sectors are different with varying definitions of the elements of capital, and varying approaches to asset and liability valuations. The capital requirements of each sector reflect the nature of the different businesses undertaken by each sector, the differing risks to which they are exposed, and the different ways in which risk is managed by the firms and assessed by supervisors.

Combining business lines allows FHCs to provide the potential for broad diversification. However, new risk concentrations may occur at the group level. Particularly, different subsidiaries within the FHC could be exposed to the same or similar risk factors, or to apparently unrelated risk factors that may interact under unusually stressful circumstances.

Facing the ongoing major changes of the financial services industry, a major challenge for managers of financial institutions, and for regulators, is to

determine an appropriate amount of risk capital for a FHC and allocate this capital efficiently among component financial institutions. On the efficiency front, capital requirement should be minimized to reduce capital costs and increase operating efficiency for the stockholders (see Edwards (1999)). However, for consumer protection, the competent authority demands that capital requirements should be as maximized to maintain an acceptable solvency margin.

This study intends to present a feasible top-down solution, not the same as the traditional bottom up methodology, for the market risk capital adequacy of the FHCs in Taiwan. Our method borrows from the idea of risk budget. The total risk capital is assigned to each subsidiary based on the level of assumed risk. Two different dimensions exist for assigning risk capital: the pure risk dimension and the risk and return dimensions. We will compare and contrast the capital requirements for FHCs in Taiwan under alternative regulatory frameworks and requirements. Hopefully our results can help to determine a more efficient capital allocation among FHC subsidiaries and avoid regulatory arbitrages resulting from inefficient different sectoral capital regulations.

The following section provides a brief introduction of regulatory framework and convergence of financial services in Taiwan. Section 3 presents the model. Data and estimates are in Section 4. Section 5 reports the results of our analysis. A conclusion is Section 6.

2. Financial Services Convergence in Taiwan

As laid out in a report by the Organization for Economic Cooperation and Development (1998), three approaches exist for describing financial services and regulatory convergence: pillars approach, conglomerate approach and coordinated approach.

Financial markets and financial regulatory systems in Taiwan are in a state of transition from a high degree of fragmentation and state protection to become more integrated, both in terms of the financial sector and regulatory agencies. Before 2000, financial sectors and regulatory agencies in Taiwan all belonged to the "pillars approach," in which each pillar, the banking, securities, and insurance sectors, regulated by its own regulator enforcing its own laws. This approach also involves lines-of-business and ownership restrictions to prevent competition in each other's markets.

To cope with the global trend towards financial convergence, the Taiwan government promulgated the law governing mergers of financial institutions to capture potential economies of scale and operating efficiency. Not until 2001, the Financial Holding Company Act was passed and enacted to create an environment favorable to financial mergers to help achieve potential economies of scale and scope and synergies across complementary financial services business lines. Fourteen FHCs were formed and the financial landscape has evolved into the conglomerate approach, in which separate and distinct regulatory regimes for the three sectors still exist, but liberalization and deregulation of lines-of-business and ownership restrictions enable the formation of financial conglomerates. However, conglomerate formation has

challenged traditional demarcations between regulatory agencies, and rendered industry-specific supervision inadequate.

After July 1, 2004, a new committee, termed the Financial Service Commission (FSC), is established as a Cabinet-level financial supervision authority that integrates the various supervisory bodies that monitor the operations of the banking sector, equity markets, and insurance industry.[*] Taiwanese financial services convergence will enter into the third approach, the coordinated approach, the separate and distinct regulatory regimes for the different parts of the conglomerate still exist, but are augmented using regulatory and supervisory practices that explicitly consider the conglomerate nature of the regulated institution. For example, separate sectoral oversight is combined with inter-sectoral coordination and cooperation.

3. Model

No FHCs defined as operating holding companies are allowed in Taiwan. A parent FHC must be a "pure" holding company, which only manages its holdings in financial groups, or a regulated financial institution, and may thus not conduct other commercial activities. According to Article 36 of the Financial Holding Company Act, the business of a FHC should be limited to investment in, and management of, its invested enterprises. Thus, a Taiwan FHC is a pure holding company, also termed an investment-holding company. Under this Act, a FHC may invest in and own 100 percent of all banks,

[*] To help finance this new committee, the Ministry of Finance (MOF) made it mandatory for all related financial institutions, including FHCs, to make an annual contribution of 0.03% of the business income to the FSC for covering their operating costs.

securities firms, and insurance companies. Accordingly, in the proposed model, FHCs invest all of their financial resources in and hold 100 percent of their subsidiaries, including banking, securities, non-life insurance, and life insurance subsidiaries.

Determining the risk capital requires first constructing a loss model. The weights of the banking (B), securities (S), non-life insurance (N), and life insurance (L) subsidiaries are allowed to be $w_I, I = B,S,N,L$. Once set, the portfolio is held constant throughout the entire term. The rate of return of the FHC comprises a linear sectoral combination of that of its subsidiaries:

$$r_p = \sum_{I=B,S,N,L} w_I r_I$$

where $r_I, I = B,S,N,L$ represents the rate return of the banking, securities, non-life insurance, and life insurance subsidiaries.

3.1 Mean-Variance Approach

Under the assumption of risk aversion, a mean-variance efficient frontier means minimizing the variance of the portfolio return for all portfolios with the same expected return or maximizing the expected return of the portfolio return for all portfolios with the same variance. Thus, the model of the mean-variance efficient frontier is as follows:

$$Min \frac{1}{2} \cdot \sum_{I,J=B,S,N,L} w_I w_J \sigma_{IJ}$$

$$Subject \quad to \quad \sum_{I=B,S,N,L} w_I \bar{r}_I = \bar{r} \quad , \quad \sum_{I=B,S,N,L} w_I = 1 \quad , \quad 0 \le w_I \le 1, I = B,S,N,L$$

where $\bar{r}_I$ denotes the expected returns of the subsidiaries, σ_{IJ} represents the covariance of the loss distributions of the subsidiaries, and w_I is portfolio

weights of the subsidiaries.

3.2 Value-at-Risk Approach

The concept of VaR has become the standard risk measure used to evaluate exposure to risk. Generally, the VaR is the quantity of capital required to ensure, with a high degree of certainty, that the enterprise does not become technically insolvent. The degree of certainty chosen is arbitrary. In practice, it can be a high number such as 99% for the entire enterprise, or it can be much lower, such as 95%, for a single unit within the enterprise.

Substituting value-at-risk for variance as a risk measurement, the efficient frontier of the portfolio means minimizing the value-at-risk of the portfolio return for all portfolios with the same expected return or maximizing the expected return of the portfolio return for all portfolios with the same value-at-risk. Thus the model of mean-value-at-risk efficient frontier is as follows:

$$Min \quad VaR_p$$

$$Subject \quad to \quad \sum_{I=B,S,N,L} w_I \bar{r}_I = \bar{r} \quad , \quad \sum_{I=B,S,N,L} w_I = 1 \quad , \quad 0 \le w_I \le 1, I = B, S, N, L$$

where VaR_p denotes the value-at-risk of the portfolio's returns.

4. Data and Estimates

This study uses data from the beginning of 1997 to the end of 2001, including data for a total of 1,337 days over these five years, which is the comparatively larger period from the suggestion of Penza & Bansal (2001) of

using three to five years of daily data to conduct the historical simulation.

The average returns of the outstanding shares weighted average returns of the listed banking, securities, non-life insurance, and life insurance companies are the proxies of the FHC subsidiaries. The basic data of four FHC subsidiaries are shown on Table 1.

Table 1
Data and Estimates

FHC Subsidiaries	*Mean of equity return(%)*	*StdDev of equity return(%)*	*Mean of equity value (billion NT$)*	*StdDev of equity value (billion NT$)*
Banking	0.8325	0.0594	473,502	151,305
Securities	0.5387	0.0838	194,898	36,566
Non-life	0.4372	0.0608	65,997	11,541
Life	0.3289	0.0553	402,786	69,244

The market risk of the FHCs comprises the loss/return distributions of its subsidiaries and the coefficients of the loss distributions. The coefficients of the subsidiaries are shown on Table 2.

Table 2
Correlation Matrix for 4 FHC Subsidiaries

FHC Subsidiaries	*Banking*	*Securities*	*Non-life*	*Life*

Banking	1.0000	-0.0213	0.0261	-0.0165
Securities	-0.0213	1.0000	0.0165	0.0018
Non-life	0.0261	0.0165	1.0000	0.0137
Life	-0.0165	0.0018	0.0137	1.0000

5. Risk Capital among Taiwanese Financial Holding Company Subsidiaries

Skipper (2000) notes that management of financial conglomerates faces the challenge of: first, understanding the risk profile of the group as a whole rather than merely understanding that of certain parts in isolation; second, developing risk management policies and techniques appropriate for the entire group.

Edwards (1999) accurately noted that a non-operating holding company structure offers certain advantages, especially for regulators and credit rating agencies. This type of structure isolates business streams and enables each company to be assessed as a stand-alone business, unaffected by the activities of the other subsidiaries. The holding company is solely responsible for raising and allocating capital to each operating entity, and the adequacy of that capital can be assessed against the risks associated with the business being undertaken in each entity. Theoretically, the structure can also provide various firewalls that prevent financial difficulties in one part of the group operations from spreading to other parts of the group.

Pearson (2002) observed that risk budget can help measure, decompose,

and monitor risk by using the measurement of asset allocations, assigning portfolio managers risk budgets defined using these measures, and using these risk budgets to monitor asset allocation and portfolio management.

Thus this study borrows the idea of risk budget. First, the risk capital of the FHC is decomposed by its subsidiaries. The total risk capital then is assigned to each subsidiary based on the level of assumed risk. Two different dimensions exist for assigning risk capital: the pure risk dimension and the risk and return dimensions.

5.1 The Pure Risk Analysis

Various criteria exist relating to assign the above-mentioned FHC risk capital to its subsidiaries. This study focuses on four different criteria: naïve allocation, regulatory allocation, mean-variance allocation, and mean-value-at-risk allocation. The former two allocations will be discussed in this subsection; the latter two in the next subsection.

Table 3
Pure Risk Analysis

（Unit: Standard Unit）

FHC Subsidiaries	Naïve Allocation	Regulatory Allocation
(1) Banking	5.3554	13.8461
(2) Securities	6.8143	1.6734
(3) Non-life	6.5996	3.3156

(4) Life	5.9154	2.7512
(5) Risk Capital of Subsidiaries (1)+(2)+ (3)+ (4)= (5)= (6)+ (7)	24.6847	21.5863
(6) Diversified Risk Capital	12.845	5.8259
(7) Risk Capital of the FHC	11.8397	15.7604
(8) Index of Diversification Effect=(6)/(5)(%)	52.04	26.99
(9) Expected Return of the FHC(%)	0.5343	0.6931
(10) Index of Allocation Effect=(9)/(7)(%)	4.51	4.40

Using the above-mentioned value-at-risk definition and empirical data from Taiwan, and assuming a 99% confidence interval and that the FHC has 100 NT$ to allocate, the market risk capital in the Taiwanese banking, securities, non-life insurance, and life insurance subsidiaries is presented in fig. 1. The diagram indicates that the risk capital for the banking, securities, non-life insurance, and life insurance subsidiaries is 5.3554, 6.8143, 6.5996, and 5.9154 standard units, respectively.

<< Insert fig. 1 about here>>

The results of fig. 1 can be summarized in the first four rows, from top to bottom, of table 3 naïve allocation. Row 5, the summation of the first four rows, reads 24.6847 standard units, indicating the total risk capital for the FHC without considering the diversification effect of the risk capital of the subsidiaries.

When considering the diversification effect of the subsidiaries, the risk capital of the FHC is 11.8397 standard units, as illustrated above in fig. 1. Again, this number is listed on row 7 of table 3 naïve allocation.

Deducting row 7 of the risk capital of the FHC, 11.8397 standards units, from row 5 of the risk capital of the subsidiaries, 24.6847 standard units can yield the “diversified risk capital” of row 6, which is 12.845 standard units. The term “diversified risk capital” describes the difference between the total subsidiary risk capital without considering the diversification effect and the FHC’s risk capital with consideration of the diversification effect.

Row 8 of “the index of diversification effect”, which reads 52.04%, is taken from row 6 of the diversified risk capital, 12.845 standard units, and divided by row 5 of the risk capital of the subsidiaries, 24.6847 standard units. The term “index of diversification effect” describes the fact that the diversification effect can reduce the percentage of risk capital for the FHC.

In this study, the Taiwanese FHC can reduce the risk capital from 24.6847 standard units to 11.8397 standard units and displays a 52.04% [=(24.6847 – 11.8397)/ 24.6847] diversification effect; a similar Canadian study conducted by Panjer (2002) displays a 56.08% diversification effect.

5.2 The Risk and Return Analysis

Table 4
Risk and Return Analysis

（Unit: Standard Unit）

FHC Subsidiaries	Mean-variance Allocation	Mean-value-at-risk Allocation
(1) Banking	6.7823	8.4371
(2) Securities	6.8972	7.4893
(3) Non-life	6.2518	6.8943
(4) Life	6.4621	6.6736

(5) Risk Capital of Subsidiaries (1)+(2)+ (3)+ (4)= (5)= (6)+ (7)	26.3934	29.4943
(6) Diversified Risk Capital	13.8195	17.6517
(7) Risk Capital of the FHC	12.5739	11.8426
(8) Index of Diversification Effect=(6)/(5)(%)	52.36	59.85
(9) Expected Return of the FHC(%)	0.6931	0.6931
(10) Index of Allocation Effect=(9)/(7)(%)	5.51	5.85

The above analysis does not consider the return dimension. This subsection considers both the risk and the return dimensions simultaneously and compares them with the pure risk analysis.

The expected returns of the FHC, illustrated in row 9 of table 4, for the mean-variance allocation and the mean-value-at-risk allocation is fixed at 0.6931%, the expected return of the regulatory allocation, illustrated in row 9 of table 3, while the expected return for the naïve allocation in table 3 is 0.5343%, and is obtained by calculating the simple weighting of the expected return of the four subsidiaries.

The index of allocation effect, displayed in row 10 of table 3 and 4, is obtained by dividing row 9, the expected return of the FHC, by row 7, the risk capital of the subsidiaries. This index indicates that more units of expected return will be obtained whenever more units of risk are undertaken.

5.3 Capital Allocations for Financial Holding Companies

Table 5
Capital Allocations

FHC	Naïve	Regulatory	Mean-variance	Mean-value-at-

Subsidiaries	Allocation	Allocation	Allocation	risk Allocation
Banking	25%	66.67%	35.46%	37.57%
Securities	25%	6.67%	26.67%	35.48%
Non-life	25%	13.33%	19.44%	14.02%
Life	25%	13.33%	18.43%	12.93%

On table 5 the naïve allocation indicates an equal weighted allocation among four subsidiaries and the regulatory allocation describes minimum capital requirement ratios for the banking, securities, non-life insurance, and life insurance industries. Since the current minimum capital requirements for the banking, securities, non-life insurance, and life insurance industries in Taiwan are 10 billion NT dollars, 1 billion NT dollars, 2 billion NT dollars, and 2 billion NT dollars, respectively, the regulatory allocation is 66.67%, 6.67%, 13.33%, and 13.33%, respectively. Under this regulatory allocation, row 7 of table 3, the risk capital of the FHC, is 16.6257 standard units; row 8 of table 3, the index of diversification effect, is 26.39%; and row 9 of table 3, the expected return of the FHC, is 0.6931%.

The mean-variance allocation describes the traditional Markowitz model using standard deviation as a risk measure and assigns the FHC risk capital to its subsidiaries. Under the same expected return, 0.6931%, of the regulatory allocation, the mean-variance optimization allocation of the banking, securities, non-life insurance, and life insurance subsidiaries is 35.46%, 26.67%, 19.44%, and 18.43%, respectively. Under this mean-variance allocation, row 7 of table 4, the risk capital of the FHC, is 12.5739 standard units, and row 8 of table 4, the index of diversification effect, is 52.36%.

The mean-value-at-risk allocation describes the use of value-at-risk as a measure of risk, and assigns the risk capital of the FHC to its subsidiaries. Under the same expected return, 0.6931%, of the regulatory allocation, the mean-value-at-risk optimization allocation of the banking, securities, non-life insurance, and life insurance subsidiaries is 37.57%, 35.48%, 14.02%, and 12.93%, respectively. Under this mean-value-at-risk allocation, row 7 of table 4, the risk capital of the FHC, is 11.8426 standard units, and column 8 of table 4, the index of diversification effect, is 59.85%.

The above facts indicate that the rankings of the risk capital diversification effect of the FHC are as follows: mean-value-at-risk allocation, 59.85%, mean-variance allocation, 52.36%, naïve allocation, 52.04%, and finally regulatory allocation, 26.99%.

Consistent with the above-mentioned index of allocation effect, the least efficient allocation is the regulatory allocation, which reads 4.4%, followed by the naïve allocation, which reads 4.51%, the mean-variance allocation, which reads 5.51%, while the mean-value-at-risk allocation is the most efficient, reading 5.85%.

In both, the pure risk analysis and the risk and return analysis, the regulatory allocation is lower than the mean-value-at-risk and mean-variance allocations, and even lower than the naïve allocation. Therefore, it is reasonable to suggest that the current Taiwan solo-based minimum capital requirements for the banking, securities, non-life insurance, and life insurance sectors, 10 billion NT dollars, 1 billion NT dollars, 2 billion NT dollars, and 2 billion dollars, respectively, should be revised according to the most efficient

mean-value-at-risk allocation, which is 37.57%, 35.48%, 14.02%, and 12.93%, respectively.

Marrison (2002) noted that risk capital is the actual amount of capital required for a financial institution to operate, while regulatory capital is merely a rough number. Current solo-based minimum capital requirements thus should be amended to increase efficiency of capital use, and also to reduce the possibility that Edwards (1999) and Marrison (2002) mentioned regulatory arbitrage, increasing total financial institution risk to pursue higher returns pursued under the same regulatory capital.

6. Conclusion

For several years, regulators in the financial services industries and chief financial officers of FNCs have been endeavoring with the creation of a risk capital that permits cross industry comparisons. While it is not easy to create a more cohesive and comprehensive regulatory framework, many believe significant improvements are possible.

The search for a more effective means of supervising risk capital is at the heart of efforts among banking, securities, and insurance firms to improve financial systems. This study presented a feasible solution for managing market risk capital and regulating FHCs. The result demonstrated that Taiwanese FHC can reduce risk capital from 24.6847 standard units to 11.8397 standard units and achieve a 52.04% diversification effect. Additionally, the result demonstrated that the mean-variance and the mean-value-at-risk capital allocations differ from the currently regulated allocation for Taiwan.

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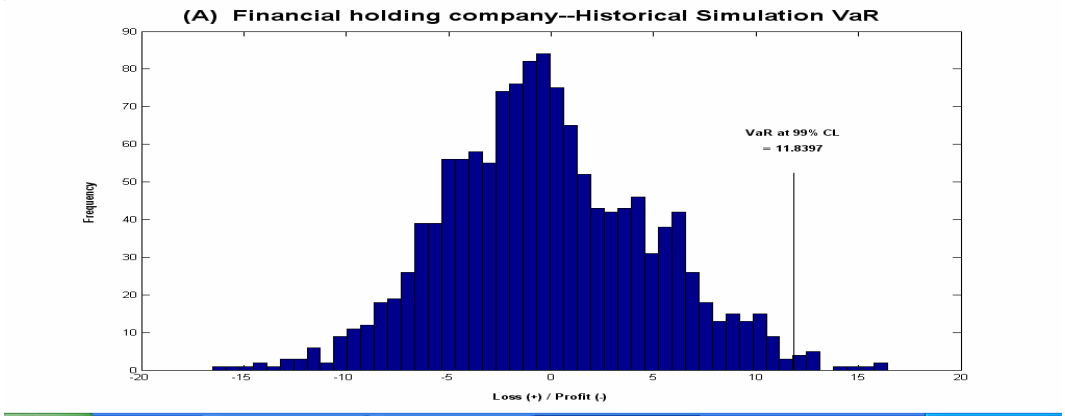
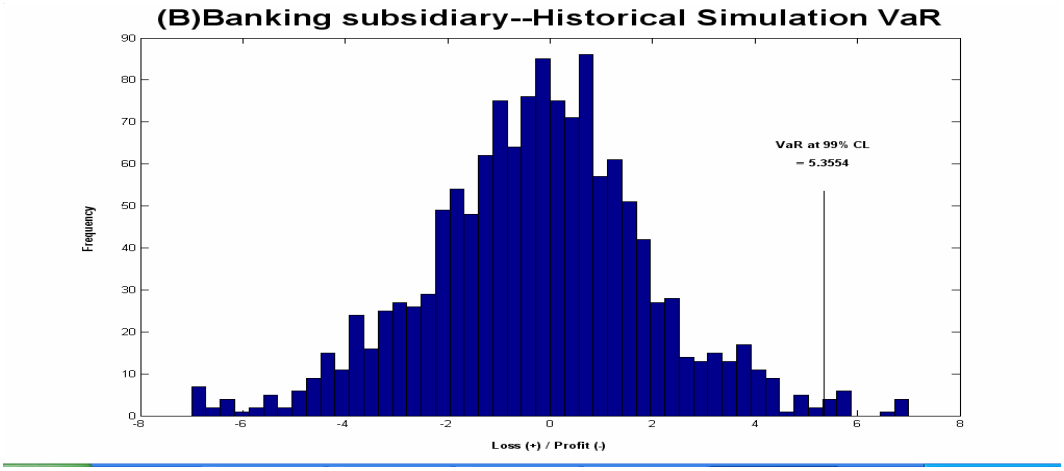
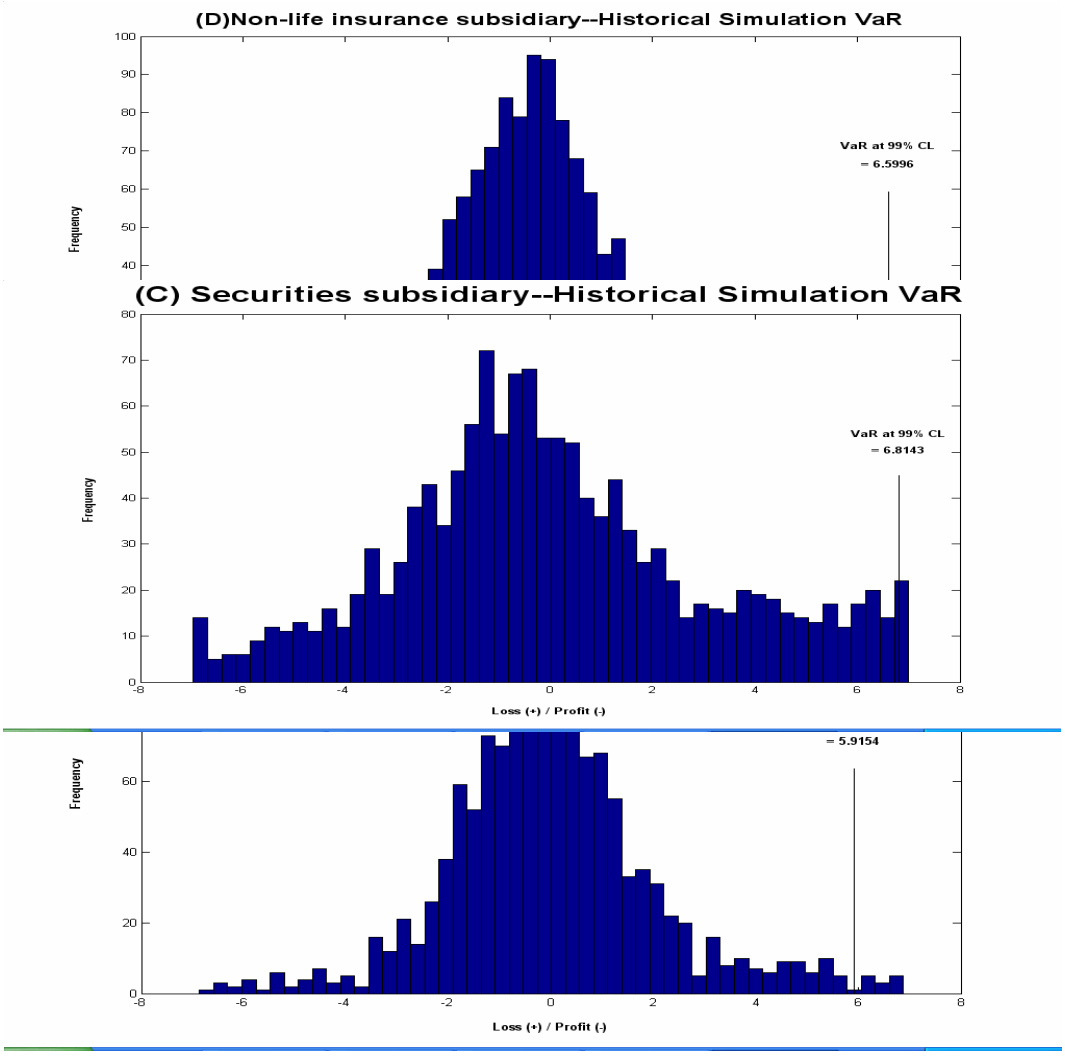
Fig.1: The market risk capital of a financial holding company and its subsidiaries






(D)Non-life insurance subsidiary--Historical Simulation VaR
Frequency
VaR at 99% CL
= 6.5996
(C) Securities subsidiary--Historical Simulation VaR
Frequency
VaR at 99% CL
= 6.8143
Loss (+) / Profit (-)
= 5.9154
Frequency
Loss (+) / Profit (-)