Consolidated Filing Regime or Separate Accounting Regime? The Comparative Analysis of Tax Regimes for Group Holding Company

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Abstract

This research analyzes the difference between the separate accounting regime (SAR) and consolidated filing regime (CFR) selected by a group holding company (GHC). The result indicates that the difference between the SAR and CFR is mainly from the net benefit of profit shifting between subsidiaries and the connection of changes in every subsidiary's profit. Furthermore, both of them are affected by factors such as variable-profit shifting regulations and income tax rates under these regimes. In the aspect of extended application, we first assume that the GHC has the specific target to manipulate subsidiaries' profits based on the purposes of operation and management. In this target function, the variance expresses not only the risk but also the difference between the actual and target profits. Second, if the government imposes progressive taxes on companies' profits, the comparison between the two tax regimes is mainly from the variance of tax burden, the covariance of individual subsidiary's earnings after tax, and the covariance of difference between earnings before tax and the tax burden under two tax regimes.

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1   Introduction

In 1917, the US compulsively demanded that associated enterprises must file the income tax consolidatedly to prevent associated enterprises from making use of the income shifting and avoiding the tax burden and appropriately calculate the investment capital and net income of the entire group. In 1921, the Internal Revenue Code (IRC) introduced the concept of selective consolidated filing; however, the "consolidated filing regime (CFR)" seriously affected tax revenues collected by the treasury because the loss can be offset between companies. As a result, the CFR was abolished in 1934 but was recovered again in 1940. The CFR was considerably amended last in 1995 and is still used till date.

The legislative spirit of the US IRC imposing taxes on the affiliated group is the same as that on the controlled group. As the enforcement of the CFR starts, the legislative spirit has changed from avoiding the loss of the country's tax revenues into giving the tax payer a tax option. When the US IRC establishes the taxation regulations of the controlled group, the main emphasis is to prevent the controlled group from making use of abnormal transactions, avoiding the tax burden, setting up multiple companies, spreading the operating income, and applying the lower tax brackets of the progressive tax rates. Obviously, the legislative point is to prevent the controlled group from avoiding taxes and damaging the country's tax revenues. However, once the intercompany stockholding reaches a certain percentage and form an affiliated group, because every company of the affiliated group is equivalent to an entity in the economic sense and is undoubtedly the internal department of the company, the legislative purpose of consolidated filing changes into a potential tax opportunity given to the affiliated group: The affiliated group can decide whether to select the consolidated filing or not. If the consolidated filing is beneficial to the affiliated group, it is selected; if the consolidated filing is adverse to the affiliated group, the individual filing is selected. Among the existing member states of OECD, 20 countries such as the US, Japan, Australia, New Zealand, Britain, France, Germany, and Netherlands follow the CFR filing mechanism.

The CFR means that the group holding company (GHC) can file the income tax by consolidating the profit and loss of every subsidiary. Given that subsidiaries do not need to calculate tax rates individually, if there is a loss in certain subsidiary's operation that conforms to the withholding tax standard of the CFR, even though another subsidiary needs to pay taxes due to earnings, the tax burden of tax amount that the GHC has to pay will be reduced because of the profit and loss offset of subsidiaries. The generation of the CFR mainly considers that the GHC and its subsidiaries are legally different individuals; however, in the economic sense, subsidiaries are just like branches or internal operation departments of the GHC when the stockholding ratio of the GHC to its subsidiaries achieves a certain percentage, such as more than 90%. From this perspective, the CFR stabilizes the tax burden of the GHC.[3]

The 2002 tax reform of Japan introduced an optional CFR for the national corporate income tax, this policy change is relatively recent and provides an opportunity to examine

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[3]The ownership thresholds above which a group consolidate incomes (or transfer losses) vary, ranging from 50 percent in Germany to 100 percent in Japan and Australia. Ting (2010) argues that the repealing of loss transfer system is responsible for a GHC adoption rate of tax consolidated in Australia. The Japanese adoption rate remains low. By the 2008 tax year, only 0.028 percent of all corporate tax filers had adopted consolidated filing in Japan.

the reaction to the newly available option to participate in CFR. Onji and Vera (2010) indicated that corporate groups engaged in within-jurisdiction profit shifting to offset losses. Onji (2011,2013) empirically analysed decisions to participate in a single-jurisdiction consolidated tax filing and found higher likelihood of participation among groups characterised by low correlation in returns among group members, high variance in returns, large number of subsidiaries, and losses accumulated in parents. The significant influence of variance and covariance of returns suggests that a consolidation scheme improves the efficiency of corporate income tax through reducing profit shifting. And the key tax disadvantage of the Japanese CFR had been the treatment of previous losses until the 2010 amendment to the tax law. Japanese policy at the time of designing consolidated filing were evidently concerned with the fact that roughly half of joint-stock companies in Japan reported tax losses, and the anti-avoidance consideration led to this strict policy choice (Hirakawa, 2002).

Under the government's established tax environment, from a manager's perspective, the GHC will determine the capital amount invested in every subsidiary and the capital stock that is required for the subsidiary's operation to attain maximization of profit after tax of the GHC. When the government proposes the CFR option, the GHC must consider converting the separate accounting regime (SAR) to the CFR only when the new regulation is beneficial to the goal it pursues. This research aims to clarify the difference between two tax regimes for the GHC and the factors that affect the selection of tax regime of the GHC.

With the theoretic model, this research derives the degree of difficulty of profit shifting of stakeholders' transactions which the GHC must consider when it selects the SAR or CFR to file the income tax of the GHC: If the government does not prevent stakeholders' transactions or the profit-shifting cost of the parent company is zero, there is no significant difference between the SAR and CFR for the GHC. Moreover, if the company's income tax is progressive, under the circumstances that the parent company can shift profits, the SAR will be able to adjust every subsidiary's profit appropriately to reduce the degree of progressiveness of the subsidiaries' income tax. Lastly, as for the degree of industry connection between the GHC and individual subsidiary, this research derives that when the covariance of subsidiaries' profits after tax is positive, the CFR must be superior to the SAR. Furthermore, it also demonstrates that if the covariance of subsidiaries' profits after tax is negative, it is necessary to compare which is higher or lower for the covariance or profit-shifting cost.

This study is divided into four sections. Based on the profit-variance function, in Section 2, we discusses how the GHC selects to adopt the SAR or CFR for filing the company's income tax under the circumstances that profit after tax and risks are considered simultaneously; in Section 3, we extend the assumption of the basic model and further derive the effect of the specific target of operation management existing in the GHC and the progressive rates that the GHC faces on the selection of tax regime of the GHC; and Section 4 provides a conclusion.

2 Theoretical Analysis

Under the government established tax environment, the GHC will determine, based on the manager's perspective, the capital quota invested in every subsidiary and the capital stock that the subsidiary needs to operate to seek a stable profit after tax. When the government

proposes the CFR option, the GHC must consider converting the SAR to the CFR only when the new regulation is beneficial to the goal it pursues.

In this section, we will make the basic assumption, analyze the factors that affect the optimal investment behavior of the GHC investing in subsidiaries of every country and compare the difference between the SAR and CFR for the GHC's expected profit after tax.

2.1 Basic Assumption

Assuming that the GHC in the economic system invests in n subsidiaries[4] in the same or different industries, in phase j the ratio of every subsidiary's stockholding held by the GHC to the subsidiary's capital is $(k_{1j},...,k_{nj})$, $k_i \in (0,1]$, $i = 1,...,n$, $j = 1,...,\infty$.

In phase j, the real profit before tax of every subsidiary is $(\pi_{1j},...,\pi_{nj})$, and π_{ij} is a random profit before tax of a parent or a subsidiary with mean μ_i and variance σ_i. The GHC can conduct abnormal transactions to adjust the book profit before tax of every subsidiary by controlling transaction prices between subsidiaries, which lets the filing profit be $(y_{1j},...,y_{nj})$. According to the assumption, the filing profit of the individual subsidiary i in phase j can be expressed as

$$y_{ij} = \pi_{ij} + \theta_{ij}, \tag{1}$$

where, θ_i is the profit change caused by the transactions between the GHC-controlled subsidiaries, and this value can be positive or negative. The profit shifting between subsidiaries will not generate new income, thus the total profit of all subsidiaries is fixed, namely $\sum_{i=1}^{n} \theta_{ij} = 0$. Furthermore, we assume that these profits shift between member subsidiaries, the shifting cost that the GHC has to bear is $c(\theta_{ij}, \delta)$, $\frac{\partial c}{\partial \theta_{ij}} > 0$ represents that the profit-shifting cost will increase with the amount of profit shifting. In addition to the effect of the shifting amount on the profit-shifting cost, the cost δ in the regime which may arise from profit shifting also exists, for example, the government's transaction restrictions on the controlled group are all included. If there is no particular regime restrictions on the abnormal transactions between enterprises, then $\delta = 0$, enterprises will be able to shift profits unrestrictedly, and there will be no additional cost regardless of the amount, namely, under any θ_{ij}, $c(\theta_{ij}, 0) = 0$.

Because the tax burden is paid according to its filing income, according to the said content that has been set, we know that the tax burden that is required to be paid by the subsidiary i after profit shifting in phase j is $T(y_{ij})$, $T' > 0$.

Due to the different market conditions of the industry that each subsidiary is in, the GHC

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[4]To keep the premise of generalization, we assume that the GHC also belongs to this group.

must not only aim to seek the maximization of total profit after tax but also consider the risks associated with it. Based on the need for analysis and comparison, we will separately introduce the optimization issue that the GHC faces under the SAR and CFR below.

2.2 The GHC's Decision under Different Accounting Systems

According to the above assumption, we separately handle the target function that is under the SAR and CFR selected by the GHC, and thereby compare the difference between the two regimes for the goal the GHC seeks: to analyze the parent company's decision.

2.2.1 The optimization issue of SAR adopted by the GHC

Because there are risks in business operation, the GHC has to face the uncertainties of these profits in addition to the pursuit of the expected profits. According to the said assumption, under the SAR, we set the target function of the GHC as

$$\Pi_{SA} = E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}k_{ij}(\pi_{ij} - T_{SA}(y_{ij}))\right] - \frac{1}{2}\phi\sum_{i=1}^{n}Var\left[k_{ij}(\pi_{ij} - T_{SA}(y_{ij}))\right], \qquad (2)$$

Equation (2) contains two parts: The first part is the expected value of profit after tax, i.e., the expected value of profit after deducting income tax. The total tax burden that the individual subsidiary pays under the SAR is the total tax burden of the GHC, namely, the tax burden of the entire group in phase j is

$$T_{SA} = T(y_1) + ... + T(y_n), \qquad (3)$$

Second, the second item of equation (2) is the variance of every subsidiary's profit after tax. The larger the variance of profit after tax, the lesser stable the profit after tax distribution of the subsidiary for the duration of each distribution, and the higher operational risk will have a negative effect on the GHC. In contrast, if the variance of profit after tax is smaller, the operational risk is lower. Among them, ϕ represents the degree of risk aversion of the parent company, $\phi \geq 0$, the higher ϕ represents that the sense of aversion of the GHC against risks is greater, $\phi = 0$ means that the GHC stays risk neutral to the distribution of profit after tax. The setting of equation (2) is the part that is more different from other documentation, the operational risk expressed in this thesis is to aggregate the variance of every subsidiary's return after tax rather than the variance of aggregation of every subsidiary's profit after tax. This setting mainly considers that for the GHC. The operational status of single company is not enough to affect the performance of the entire group; however, if from a subsidiary's perspective, continuous bad operation will cause the loss or closedown of the individual subsidiary. The setting of equation (2) is to express that the operational risk that the GHC has to take equals the aggregation of every subsidiary's variance.

If we further assume that the company's income tax is imposed according to the proportional tax, the tax rate is fixed to t. Furthermore, the tax burden of the individual subsidiary is $T(y_{ij}) = ty_{ij}$. Consider equations (1) and (3) into equation (2), the target

function of the GHC can be expressed as

$$\Pi_{SA} = E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}k_{ij}(1-t)\pi_{ij}\right] - \frac{1}{2}\phi\sum_{i=1}^{n}Var\left[k_{ij}((1-t)\pi_{ij}-t\theta_{ij})\right] - c(\theta_{ij},\delta), \qquad (2\text{-}1)$$

Because $\sum_{i=1}^{n}t\theta_{ij} = t\sum_{i=1}^{n}\theta_{ij} = 0$, we know that for the GHC to shift profit by adjusting transaction prices will not affect the expected benefit of the entire group.[5] Under the proportional regime of the company's income tax, that the GHC shifts the subsidiary's profit can reduce the variance of every subsidiary's profit. If there are no regulations of the government's decrees, namely $c(\theta_{ij},0) = 0$, then the GHC will try to do its best to adjust every subsidiary's profit until the profit is equal, namely $y_{1j} = y_{2j} = ... = y_{nj}$.

For example, if there are only two companies in the group, $n = 2$, without the government's regulations, the individual subsidiary's profit will be adjusted through the operation of transaction prices until the profits after tax of both companies are equal, namely $k_{1j}((1-t)\pi_{1j}-t\theta_{1j}) = k_{2j}((1-t)\pi_{2j}-t\theta_{2j})$. Now, the income of both subsidiaries shifted by the GHC is, respectively, $\theta_{1j} = -\theta_{2j} = \frac{1}{2}(1-t)(k_{1j}\pi_{1j}-k_{2j}\pi_{2j})$.

If the government regulates the transactions between stakeholders, then, under $\delta \neq 0$, the GHC will consider the importance of the marginal benefit (to reduce the total variance of every company's profit after tax) or marginal cost (accounting cost and penalty of violation) of profit shifting to decide if it shifts profit and the degree of profit shifting.

2.2.2 The optimization issue of CFR adopted by the GHC

If the GHC adopts the CFR, which incorporates the profit or loss of every subsidiary into the filing income of the GHC, the GHC and all subsidiaries will be combined to form an entity, similar to a single company. The target function can be expressed as

$$\Pi_{CF} = E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}k_{ij}(\pi_{ij}-T_{CF}(y_{ij}))\right] - \frac{1}{2}\phi Var\left[\sum_{i=1}^{n}k_{ij}(\pi_{ij}-T_{CF}(y_{ij}))\right], \qquad (4)$$

Equations (4) and (2) as such contain the expected profit after tax of every subsidiary and the variance of profit after tax. However, under the CFR, the income tax base of the GHC is the aggregate of every subsidiary's earnings before tax, namely, the tax burden of the entire group in phase j is

$$T_{CF} = T(y_{1j} + ... + y_{nj}), \qquad (5)$$

Moreover, because all profits of the GHC are aggregated for consolidated filing, in terms of the entire group, the risk is represented by the level of the overall profit rather than a

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[5]If the company's income tax adopts the progressive tax rates, the profit shifting between subsidiaries will have tax benefits.

single company's operational status; thus, the variance of the aggregation of the overall benefit represents the risk.

As such, under the proportional tax regime, if the company's income tax is imposed according to the proportional tax, taking equations (1) and (5) into equation (4), the target function of the GHC can be expressed as

$$\Pi_{CF} = E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}k_{ij}((1-t)\pi_{ij}-t\theta_{ij})\right] - \frac{1}{2}\phi Var\left[\sum_{i=1}^{n}k_{ij}((1-t)\pi_{ij}-t\theta_{ij})\right] - c(\theta_{ij},\delta), (4\text{-}1)$$

In the premise of $\sum_{i=1}^{n}\theta_{ij}=0$, for the GHC, equation (4-1) indicates that the practice of profit shifting cannot generate any tax or non-tax benefits under the CFR. That is, irrespective of the government regulations regarding stakeholders' transactions, the expected profit after tax of the group or the variance of profit after tax will not change because of profit shifting. Consequently, equation (4-1) can be re-summarized as

$$\Pi_{CF} = E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}k_{ij}(1-t)\pi_{ij}\right] - \frac{1}{2}\phi Var\left[\sum_{i=1}^{n}k_{ij}(1-t)\pi_{ij}\right], \tag{4-2}$$

2.2.3 Comparison between the SAR and CFR

Solving the subtraction calculation of the target function of equation (2-1), under the SAR from 3.2.1, and the target function of equation (4-2), under the CFR of the GHC, the following can be derived:

$$\Pi_{CF} - \Pi_{SA}$$
$$= \frac{1}{2}\phi t^2 \sum_{i=1}^{n}Var(\theta_{ij}) - \phi\sum_{i=1}^{n}\left\{Cov\left[k_{ij}((1-t)\pi_{ij},k_{ij}((1-t)\pi_{ij})+t\theta_{ij}\right]\right\} + c(\theta_{ij},\delta), \tag{6}$$

The symbols of equation (6) are uncertain, and the result depends on the relative sizes of the covariance of every subsidiary's profit after tax and the profit-shifting cost. We can derive Lemma 1 from the said result.

Lemma 1.

If $\quad \phi t^2 \sum_{i=1}^{n}Var(\theta_{ij}) + 2c(\theta_{ij},\delta) > 2\phi\sum_{i=1}^{n}\left\{Cov\left[k_{ij}((1-t)\pi_{ij},t\theta_{ij}-k_{ij}((1-t)\pi_{ij})\right]\right\}, \quad$ then

$\Pi_{CF} > \Pi_{SA}$.

From Lemma 1, we can see that the main consideration that the GHC selects the SAR or CFR to file the group's income tax is that the GHC consolidates to file every subsidiary's income tax under the CFR that can save the original profit-shifting activities conducted under the SAR. However, in the meantime, the GHC also has to face the profit volatility that may arise from the prosperity connection between every subsidiary after

consolidating to calculate every subsidiary's profit. For example, if every subsidiary's industrial prosperity represents positive correlation, the consolidated filing of the CFR will make the profit volatility higher. Conversely, if every subsidiary's industrial prosperity represents negative correlation, the CFR will reduce the volatility of profit after tax.

In the comparative static analysis, according to the said analysis, we know that the selection of tax regime is mainly affected by the profit-shifting cost and the income tax rates. First, when equation (6) is differentiated with respect to the profit-shifting cost δ, the following can be derived:

$$\frac{\partial(\Pi_{CF} > \Pi_{SA})}{\partial\delta} = \frac{\partial c}{\partial\delta} > 0, \tag{7}$$

The GHC will shift subsidiaries' profits through stakeholders' transactions under the original SAR to reduce the variance degree of every subsidiary's profit after tax but will consolidate profits for filing under the CFR. Consequently, it is not necessary for the GHC to shift profits. In the event the original profit-shifting cost is very low, for example, if the government does not prevent stakeholders' transactions or if the profit-shifting cost of the parent company is zero, there is no significant difference between the SAR and CFR for the group.[6] Second, we differentiate equation (6) with respect to the company's income tax rates of subsidiaries and derive the following:

$$\frac{\partial(\Pi_{CF} - \Pi_{SA})}{\partial t} = \phi t \sum_{i=1}^{n} Var(\theta_{ij}) - \phi \sum_{i=1}^{n} \left\{ \frac{\partial Cov\left[k_{ij}((1-t)\pi_{ij}, k_{ij}((1-t)\pi_{ij}) + t\theta_{ij}\right]}{\partial t} \right\}, \tag{8}$$

The result of equation (8) indicates that there are two levels for the selection of tax regime of the income tax rates. On one hand is the first item on the right hand side of equation (8), which demonstrates that higher the variance of the internal profit shifting of the GHC, higher is the income tax saved in the SAR, which represents that the GHC is willing to bear higher shifting costs to obtain greater benefits of profit shifting between subsidiaries. The same benefit can be obtained by changing the SAR to the CFR; however, the profit-shifting cost can be saved, which also means that the benefit is greater by changing the SAR to the CFR. On the other hand, the second item on the right hand side of equation (8) is the effect of income tax rates on the difference between subsidiaries' real profits after tax and filing profits after tax. In the basic assumption, we adopt the expected profit-variance model. The profit shifting of subsidiaries aims to enhance the stability of every subsidiary's annual profit. If the industrial prosperity connection of subsidiaries is closer, in comparison to the SAR, the change range of profit after tax under the CFR will be larger and the higher income tax rates will relieve the covariance degree of each profit after tax. Overall, if higher income tax rates can reduce the profit after tax difference between before and after profit shifting, higher income tax rates will be much more

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[6]Under the selection of the two tax regimes, in addition to the profit-shifting cost, the model of Onji (2013) assumes that the main reason why the CFR is superior to the SAR is that the CFR may have the cost of tax filing.

beneficial to the CFR. In contrast, if higher income tax rates exaggerate the profit after tax difference between before and after profit shifting, then the effect of income tax rates on the selection of tax regimes is uncertain.

3 Application of the Basic Model

3.1 Consideration for the Target of Operation Management

In the previous section, the setting of target function of the GHC mainly considers two items, the expected benefit and expected benefit variance. In the premise of the same profit, the smaller variance is positive to the group or a single company. In this section, we will extend the basic model. Assuming that the GHC has the specific planning for a single company's profit based on the target of operation management, for example, to make a subsidiary to be listed or traded smoothly for fund raising, the GHC may shift other subsidiaries' profits to the subsidiary's one through ways such as stakeholders' transactions.

According to the assumption in the previous section, every subsidiary's real profit and the filing profit in phase j is $(\pi_{1j},...,\pi_{nj})$ and $(y_{1j},...,y_{nj})$, respectively; in consideration of management and operation, every subsidiary's profit target is set to $(z_{1j},...,z_{nj})$. For the GHC, the real profit represents the result of actual operation of every subsidiary while the target profit is the profit level which is required to be achieved to reach the operational target. Both of these profits are not always identical. Consequently, the GHC will conduct abnormal transactions by controlling each other's transaction prices of subsidiaries to adjust the book profit before tax of every subsidiary. As for the setting of target function, both of the expected profit after tax and the profit variance are included. The difference between this section and the previous one is that the expected profit after tax is constructed by the tax amounts that the real profit deducts from the filing profit; whereas, the profit variance is adjusted to the variable state that measures the difference between the filing profit and target profit. To simplify the content of inference, we further assume that the stockholding ratio of the GHC to all subsidiaries is 100%, namely $k_1 = k_2 = ... = k_n = 1$.

According to the above assumption, we can express the target function of the GHC under the SAR and CFR as

$$\Pi_{SA}' = E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}(1-t)\pi_{ij}\right] - \frac{1}{2}\phi\sum_{i=1}^{n}Var\left[(1-t)\pi_{ij} - t\theta_{ij} - z_{ij}\right] - c(\theta_{ij}, \delta), \tag{9}$$

$$\Pi_{CF}' = E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}(1-t)\pi_{ij}\right] - \frac{1}{2}\phi Var\left[\sum_{i=1}^{n}((1-t)\pi_{ij} - t\theta_{ij} - z_{ij})\right]$$

$$= E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}(1-t)\pi_{ij}\right] - \frac{1}{2}\phi Var\left[\sum_{i=1}^{n}((1-t)\pi_{ij} - z_{ij})\right], \tag{10}$$

Just like the previous section, we subtract equations (9) and (10), and the following can be

derived after summarizing:

$$\Pi_{CF}{}' - \Pi_{SA}{}'$$
$$= \frac{1}{2}\phi t^2 \sum_{i=1}^{n} Var(\theta_{ij}) + \phi \sum_{i=1}^{n} \left\{ Cov\left[(1-t)\pi_{ij} - z_{ij}, (1-t)\pi_{ij} - z_{ij} + t\theta_{ij} \right] \right\} + c(\theta_{ij}, \delta), \tag{11}$$

Using equation (11), we derive Lemma 2.

Lemma 2.
Based on the target of operation management, the GHC has the specific planning for a single company's profit, if

$$\frac{1}{2}\phi t^2 \sum_{i=1}^{n} Var(\theta_{ij}) + \phi \sum_{i=1}^{n} \left\{ Cov\left[(1-t)\pi_{ij} - z_{ij}, (1-t)\pi_{ij} - z_{ij} + t\theta_{ij} \right] \right\} + c(\theta_{ij}, \delta) > 0,$$

then $\Pi_{CF} > \Pi_{SA}$, namely the CFR will be superior to the SAR.

The content of Lemma 2 is similar to that of Lemma 1. As such, we compare whether the cost benefit of profit shifting of the GHC under the SAR is superior to the risk offset benefits of subsidiaries under the CFR. The main difference is that the GHC, in this section, has the established planning for subsidiaries' profits; what the variance expresses in the target function is not only the risk but also the degree at which the actual profit shifts.

3.2 Comparison under the Progressive Tax Regime

In the basic model, we always assume that the income tax that is imposed on the company's profit is the proportional tax. In this section, we will further derive the economic effect that will be produced if the government imposes the progressive tax on the company's profit. Assuming that the income tax imposed by the government on the company's profit is $T(y), \frac{dT(y)}{dy} > 0, \frac{dT^2(y)}{dy^2} > 0$. The CFR intends to impose taxes on the total profits which aggregate every subsidiary's profit; thus, the GHC adopts the CFR under the regime of progressive tax. The company's total tax burden will be greater than that of the SAR adopted by the group, namely $T_{CF}(y_{ij}) > T_{SA}(y_{ij})$. In consideration of simplification, in this section, we continue the assumption in the previous section, let $k_1 = k_2 = ... = k_n = 1$.

According to the said assumption, we subtract equations (2) and (4) and derive the target difference between the CFR and SAR, which will be expressed as

$$\Pi_{CF} - \Pi_{SA} = E\left[\sum_{j=1}^{\infty} \sum_{i=1}^{n} (\pi_{ij} - T_{CF}(y_{ij})) \right] - E\left[\sum_{j=1}^{\infty} \sum_{i=1}^{n} (\pi_{ij} - T_{SA}(y_{ij})) \right]$$
$$- \frac{1}{2}\phi Var\left[\sum_{i=1}^{n} (\pi_{ij} - T_{CF}(y_{ij})) \right] + \frac{1}{2}\phi \sum_{i=1}^{n} Var\left[\pi_{ij} - T_{SA}(y_{ij}) \right], \tag{12}$$

The first two items of equation (12) are the expected profit after tax difference between the two tax regimes, whereas the latter two items are the profit after tax variance difference between the two tax regimes. Because the total tax burden of the CFR is greater than that of the SAR, $E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}(\pi_{ij}-T_{CF}(y_{ij}))\right]<E\left[\sum_{j=1}^{\infty}\sum_{i=1}^{n}(\pi_{ij}-T_{SA}(y_{ij}))\right]$ represents the result of subtraction of the first two items on the right hand side of equation (13), which is negative. After summarizing, the latter two items on the right hand side of equation (13) can be expressed as

$$\frac{\phi}{2}\left\{\sum_{i=1}^{n}Var(T_{SA}(y_{ij}))-\sum_{i=1}^{n}Var(T_{CF}(y_{ij}))\right\}-\phi\sum_{i=1}^{n}Cov\left[\pi_{ij}-T_{CF}(y_{ij}),\pi_{ij}-T_{CF}(y_{ij})\right]$$
$$-\phi\sum_{i=1}^{n}Cov(\pi_{ij},T_{CF}(y_{ij})-T_{SA}(y_{ij})),\tag{13}$$

Equation (13) contains three parts. The first part is the variance spread of tax burden under the two tax regimes. The smaller variance of tax burden of the tax regime will have more advantages. This inference is rather intuitive. The second part is that under the CFR, if the covariance of the individual subsidiary's earnings after tax is larger, the CFR will be more adverse to the group. The last part is the covariance of difference between earnings before tax and the tax burden of the two tax regimes. If the profit before tax is raised and the distribution of the tax burden between the two tax regimes is wider, that represents that the degree of progressiveness of the income tax regime is higher. This will make the tax burden under the CFR heavier and it is more adverse to the adoption of the CFR. In contrast, if the degree of progressiveness is not higher, the difference between the two tax regimes is also smaller.

4　Conclusions

With the profit-variance model, this thesis analyzes the direction and content of decision by the GHC when facing the government-proposed SAR and CFR. We consider the possibility of every subsidiary's profit shifted by the GHC under the SAR. According to the results of the basic model, we find that the difference between the SAR and CFR for the GHC is mainly from the net benefit of profit shifting between subsidiaries—conducted by the GHC—and the connection of changes in every subsidiary's profit under the SAR. Furthermore, both of them are affected by factors such as variable-profit shifting regulations and tax rates under the regime.

This thesis will then extend the basic model to two directions of application. First, assuming that the GHC has the specific target to manipulate subsidiaries' profits based on the purposes of operation and management. After comparing the SAR and CFR, the main difference between the two tax regimes and the basic model is that the GHC, in this section, has the established planning for subsidiaries' profits. The variance of target function simultaneously covers the risks and the degree at which the actual profit shifts in the previous section. Second, if the government imposes the progressive tax on the company's profit, the comparison between the two tax regimes is mainly from the

variance of tax burden, the covariance of individual subsidiary's earnings after tax and the covariance of difference between the profit before tax and the tax burden of the two tax regimes.

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