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行政院國家科學委員會專題研究計畫成果報告*

兩稅合一對投資與股利決策之影響 — 理論與實驗證據

The Effects of the Integration of Individual and Corporate Tax Policy on Shareholders' Investment and Firm's Dividend Decisions - Theory and Experimental Evidence

計 畫 類 別： ☑ 個別型計畫 ☐ 整合型計畫

計 畫 編 號： NSC 87 – 2416 – H – 004 - 036

執 行 期 間 ： 86 年 8 月 1 日至 87 年 7 月 31 日

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處 理 方 式： ☐ 可立即對外提供參考

☑ 一年後可對外提供參考

☐ 兩年後可對外提供參考

執 行 單 位：國 立 政 治 大 學 會 計 學 系

中 華 民 國 87 年 7 月 31 日

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ABSTRACT

In light of the 1997 tax reform in Taiwan, this study examines the effects of the integration of individual and corporate tax (adopting the full imputation method) on shareholders' investment and firm's dividend decisions. These issues were addressed using a three-period game model. Eight experiments were also conducted to test the predictions of the model. The model and the experimental results generally support the government's arguments that the new tax system can encourage firm's new investments, motivate more equity financing, and discourage firm's retaining of earnings to avoid taxes.

Key Words: Classical System, Full imputation system, Integration of Individual and Corporate Taxes, Experimental economics, Investment, Dividend.

1. THE MODEL

Assume that a firm has two independent investment opportunities. Each investment requires I amount of money ($I^1 = I^2 = I$) and will generate either a high return IR_h or a low return IR_l with equal probability of 0.5. The action sequence of each player is presented in Figure 1.

[Insert Figure 1 here]

To fully demonstrate the potential effects of the new *IICT system with ϕ retained earnings tax* (IICT-ϕ) on manager's reporting and financing decisions and shareholders' dividend decision, two other tax systems are also considered: the *Old Tax (OT)* System in which the firm's earnings will be taxed twice at both the individual and corporate levels and *IICT system without ϕ retained earnings Tax* (IICT-N). Table 1 summaries the definitions of all variables and parameters used in the paper. The settings and key features of each tax system in each period are discussed in details below.

[Insert Table 1 here]

2.1 Settings in The First Period:

To facilitate our discussions and highlight the effects of a specific tax system on manager's reporting and financing decisions and shareholders' dividend decision, we assume that the first period is the first year in which a tax system becomes effective. Therefore, the settings and features in the first period are the same for all three tax systems. Let $\Phi^1_{2\times1} \rightarrow \Pi^1_{2\times1}$ denote manager's reporting strategy in the first period, where $\Phi^1_{2\times1} \equiv \{(IR^1_h, IR^1_l), (\rho IR^2_h, (1-\rho)IR^2_l)$ is manager's private information about the first period's true investment return and expectation about the second period return, $\Pi^1_{2\times1} \equiv \{\hat{h}^1, \hat{l}^1$ is manager's feasible reporting set ($\hat{h}$ and $\hat{l}$ means the manager's reporting high and low return, respectively), and ρ is the prior probability that the second period investment return is high (i.e., IR^2_h). It should be noted that, in the beginning of the first period, both the manager and shareholders have common knowledge about ρ. However, the manager will know the exact investment return at the beginning of the second

period. To simplify the model, it is assumed that IR^1 and IR^2 are independent.

Also define $\Pi^1_{2\times1} \rightarrow \Omega^1_{2\times1}$ to be the shareholders' dividend strategy, where $\Omega^1_{2\times1} \equiv \{d^1_h, d^1_l$ is shareholders' feasible dividend choice set (d^1_h and d^1_l denote high and low dividend payout ratio, respectively). Therefore, the manager has $(1-d^1_i)R_0$ retained earnings left for the new investment (i = h or l). If the manager decides to carry out the investment, he has to finance the required fund $I - (1-d^1_i)R_0$ either from debts (which leads to interest expenses of $[I - (1-d^1_i)R_0]r_D$ and imputed cost of capital of $[1-d^1_i]R_0r_E$) or from equity (which leads to zero interest expense and imputed cost of capital of Ir_E). The manager's salary structure is defined as a mapping from his reporting action (either $\hat{h}$ and $\hat{l}$) to a salary function set $\{S_h, S_l\}$, where S_i is a linear function of company's after-tax residual income with a fixed salary level α_i and an incentive slope β_i. To induce the manager to report truthfully, we assume that $\alpha_h \leq \alpha_l$ and $\beta_h \geq \beta_l$. Finally, we define AI^{lr}_{ijk} as the company's accounting net income at the end of the first period, given the realized investment return *r* (can be IR^1_h or IR^1_l), the shareholders' dividend policy *i* (can be h or l), the manager's financing decision *j* (can be D or E), and the manager's reporting action *k* (can be h or l). Similarly, R^{lr}_{ijk} denotes the corresponding retained earnings *before* dividend distributions.

To better explain the notations in the first period, assume that the true investment return in the first period is IR^1_h (i.e., $r = h$) and the manager reports high (i.e., $k = h$). If the shareholders require a high dividend payout ratio (i.e., $i = h$) and the manager decides to finance the investment through debts (i.e., j = D), we have:

$$AI^{1h}_{hDh} = \left\{IR^1_h - I - \left[I - (1-d^1_h)R_0\right]\cdot r_D - S^{1h}_{hDh}\right\}\cdot(1-t_f), \qquad (1\text{-}1A)$$

$$S^{1h}_{hDh} = \alpha_h + \beta_h \cdot \left\{AI^{1h}_{hDh} - (1-d^1_h)\cdot R_0 \cdot r_E\right\}\cdot(1-t_f), \qquad (1\text{-}2A)$$

$$R_{hDh}^{1h} = (1 - d_h^1) \cdot R_0 + AI_{hDh}^{1h}. \quad (1\text{-}3A)$$

If the manager prefers financing the investment through equity (i.e., $j = E$), then:

$$AI_{hEh}^{1h} = \left\{ IR_h^1 - I - S_{hEh}^{1h} \right\} \cdot (1 - t_f), \quad (1\text{-}1B)$$

$$S_{hEh}^{1h} = \alpha_h + \beta_h \cdot \left\{ AI_{hEh}^{1h} - I \cdot r_E \right\} \cdot (1 - t_f), \quad (1\text{-}2B)$$

$$R_{hEh}^{1h} = (1 - d_h^1) \cdot R_0 + AI_{hEh}^{1h}. \quad (1\text{-}3B)$$

It should be noted that the key difference between equations (1-1A) and (1-1B) is the interest expenses incurred. In equation (1-1A), where the manager finances the investment through debts, the accounting income is calculated by subtracting interest expenses $[I-(1-d_h^1)R_0]r_D$. In equation (1-1B), where the investment is financed by equity, the interest expense is zero. The manager's financing decision is also reflected in the calculation of his own salaries. As depicted in equations (1-2A) and (1-2B), the imputed costs of capital are $[1-d_h^1]R_0 r_E$ and Ir_E if the investment is financed by debts or equity, respectively.

If the manager reports low (i.e., $k = l$) and finances the investment through debts (i.e., $j = D$), then equations (1-1A), (1-2A), and (1-3A) become:

$$AI_{hDl}^{1h} = \left\{ IR_h^1 - I - \left[I - (1 - d_h^1) R_0 \right] \cdot r_D - S_{hDl}^{1h} \right\} \cdot (1 - t_f), \quad (1\text{-}1C)$$

$$S_{hDl}^{1h} = \alpha_l + \beta_l \cdot \left\{ AI_{hDl}^{1h} - (1 - d_h^1) \cdot R_0 \cdot r_E \right\} \cdot (1 - t_f), \quad (1\text{-}2C)$$

$$R_{hDl}^{1h} = (1 - d_h^1) \cdot R_0 + AI_{hDl}^{1h}. \quad (1\text{-}3C)$$

It is clear that the key difference between equations (1-2A) and (1-2C) lies in the fixed salary level α_i and the incentive slope β_i. As mentioned earlier, we assume $\alpha_h \le \alpha_l$ and $\beta_h \ge \beta_l$ to induce the manager to report truthfully.

2.2 Settings in The Second and Third Periods:

In the beginning of the second period, the firm has R_{ijk}^{1r} retained earnings before dividend

distribution and the shareholders have to pay individual taxes $d_i^1 R_0 t_p$ for the dividends received in the first period. The manager's reporting strategy in the second period is defined as $\Phi_{2\times1}^2 \rightarrow \Pi_{2\times1}^2$, where $\Phi_{2\times1}^2 \equiv \{IR_h^2, IR_l^2$ is manager's private information about the second period true return and $\Pi_{2\times1}^2 \equiv \{\hat{h}^2, \hat{l}^2$ is manager's feasible reporting set. Let $\Pi_{2\times1}^2 \rightarrow \Omega_{2\times1}^2$ denote the shareholders' second period dividend strategy, where $\Omega_{2\times1}^2 \equiv \{d_{h'}^2, d_{l'}^2$ is shareholders' feasible dividend choice set ($d_{h'}^2$ and $d_{l'}^2$ denotes high and low dividend payout ratio, respectively). Therefore, the shareholders will receive $d_{i'}^2 \, AI_{ijk}^{1r}$ dividends (i' = h or l), resulting in a total of $R_{ijk}^{1r} - d_{i'}^2 \cdot AI_{ijk}^{1r}$ available for the new investment. If the manager decides to carry out the investment, he has to finance the required fund $I - (R_{ijk}^{1r} - d_{i'}^2 \cdot AI_{ijk}^{1r})$ either from debts (with interest rate r_D) or from equity (with imputed cost of capital Ir_E). The manager's second period salary structure is the same as that in the first period. Finally, we define $\left(AI_{i'j'k'}^{2r} \mid AI_{ijk}^{1r}\right)$ as the company's accounting net income at the end of the second period, given the realized first period AI_{ijk}^{1r}, the realized investment return *r* (can be IR_h^2 or IR_l^2), the shareholders' dividend policy *i'* (can be h or l), the manager's financing decision *j'* (can be D or E), and the manager's reporting action *k'* (can be h or l). To simplify the presentation of the model, we will simply use $AI_{i'j'k'}^{2r}$ to represent $\left(AI_{i'j'k'}^{2r} \mid AI_{ijk}^{1r}\right)$.

2.2.1 The OT System:

Assume that the true investment return in the second period is IR_h^2 (i.e., *r* = *h*) and the manager reports high (i.e., *k'* = *h*). If the shareholders require a high dividend payout ratio (i.e., *i'* = *h*) and the manager decides to finance the investment through debts (i.e., *j'* = D), we have:

$$AI_{hDh}^{2h} = \left\{IR_h^2 - I - \left[I - (R_{ijk}^{1r} - d_h^2 \cdot AI_{ijk}^{1r}\right] \cdot r_D - S_{hDh}^{2h}\right\} \cdot (1 - t_f), \qquad (2\text{-}1A)$$

$$S_{hDh}^{2h} = \alpha_h + \beta_h \cdot \left\{ AI_{hDh}^{2h} - (R_{ijk}^{1r} - d_h^2 \cdot AI_{ijk}^{1r}) \cdot r_E \right\} \cdot (1 - t_f), \qquad (2\text{-}2A)$$

$$R_{hDh}^{2h} = R_{ijk}^{1h} + AI_{hDh}^{2h} - d_h^2 \cdot AI_{ijk}^{1r}. \qquad (2\text{-}3A)$$

If the manager finances the investment through equity (i.e., $j' = E$), then:

$$AI_{hEh}^{2h} = \left\{ IR_h^2 - I - S_{hEh}^{2h} \right\} \cdot (1 - t_f), \qquad (2\text{-}1B)$$

$$S_{hEh}^{2h} = \alpha_h + \beta_h \cdot \left\{ AI_{hEh}^{2h} - I \cdot r_E \right\} \cdot (1 - t_f), \qquad (2\text{-}2B)$$

$$R_{hEh}^{2h} = R_{ijk}^{1h} + AI_{hEh}^{2h} - d_h^2 \cdot AI_{ijk}^{1r}. \qquad (2\text{-}3B)$$

If the manager reports low (i.e., $k' = l$) and finances the investment through debts (i.e., $j' = D$), then equations (2-1A), (2-2A), and (2-3A) become:

$$AI_{hDl}^{2h} = \left\{ IR_h^2 - I - \left[I - (R_{ijk}^{1r} - d_h^2 \cdot AI_{ijk}^{1r} \right] \cdot r_D - S_{hDl}^{2h} \right\} \cdot (1 - t_f), \qquad (2\text{-}1C)$$

$$S_{hDl}^{2h} = \alpha_l + \beta_l \cdot \left\{ AI_{hDl}^{2h} - (R_{ijk}^{1r} - d_h^2 \cdot AI_{ijk}^{1r}) \cdot r_E \right\} \cdot (1 - t_f), \qquad (2\text{-}2C)$$

$$R_{hDl}^{2h} = R_{ijk}^{1h} + AI_{hDl}^{2h} - d_h^2 \cdot AI_{ijk}^{1r}. \qquad (2\text{-}3C)$$

At the end of the second period, the shareholders have to pay individual taxes $d_{i'}^2 \cdot AI_{ijk}^{1r} \cdot t_p$ for the dividends received in the second period and the manager receives salary $S_{i'j'k'}^{2r}$. The firm is then liquidated and all retained earnings $R_{i'j'k'}^{2r}$ will be distributed back to the shareholders. In the third period, all shareholders have to pay an extra individual income tax $t_p \cdot R_{i'j'k'}^{2r}$ for the return of retained earnings $R_{i'j'k'}^{2r}$.

2.2.2 The IICT-N System:

Because ....., the settings for the *IICT-N* system in the second period are the same as those for the *OT* system. At the end of the second period, however, the shareholders may receive tax refunds or pay individual taxes $d_{i'}^2 \cdot AI_{ijk}^{1r} \cdot \left(\frac{t_f - t_p}{1 - t_f} \right)$ for the dividends received in the second

period, depending on shareholders' individual income tax rate t_p. The manager receives salary $S^{2r}_{i'j'k'}$ and the firm is liquidated. All retained earnings $R^{2r}_{i'j'k'}$ are distributed back to the shareholders. It should be noted that $R^{2r}_{i'j'k'}$ is composed of three parts: (a) retained earnings not distributed as dividends in the first period $(1-d^1_i)\cdot R_0$, (b) retained earnings not distributed as dividends in the second period $(1-d^2_{i'})\cdot AI^{1r}_{ijk}$, and (c) total accounting income earned in the second period $AI^{2r}_{i'j'k'}$. According to the fundamental concepts of IICT, part (a) should be subjected to the *OT* system because we assume that the first period is the first year in which a tax system becomes effective. Therefore, in the third period, all shareholders have to pay an extra individual income tax $(1-d^1_i)\cdot R_0\cdot t_p$ for the return of $(1-d^1_i)\cdot R_0$. On the contrary, shareholders may receive tax refunds or pay individual income taxes $(1-d^2_{i'})\cdot AI^{1r}_{ijk}\cdot\left(\frac{t_f-t_p}{1-t_f}\right)+AI^{2r}_{i'j'k'}\cdot\left(\frac{t_f-t_p}{1-t_f}\right)$ for parts (b) and (c), depending on shareholders' individual income tax rate t_p. In other words, the new *IICT-N* system will affect shareholders' tax payments for all earnings earned from the second period.

2.2.3 The IICT-ϕ System:

Under the *IICT-ϕ* system, because the government will charge a ϕ retained earnings tax, the total "self" fund available for the new investment amounts to $R^{1r}_{ijk}-d^2_{i'}\cdot AI^{1r}_{ijk}-\phi\cdot(1-d^2_{i'})\cdot AI^{1r}_{ijk}$. If the manager decides to carry out the investment, he has to finance the required fund $I-[R^{1r}_{ijk}-d^2_{i'}\cdot AI^{1r}_{ijk}-\phi\cdot(1-d^2_{i'})\cdot AI^{1r}_{ijk}]$ either from debts or from equity. Therefore, equations (2-1A), (2-2A), and (2-3A) can be rewritten as:

$$AI^{2h}_{hDh}=\left\{R^2_h-I-\left[I-(R^{1r}_{ijk}-(d^2_h+\phi\cdot(1-d^2_h))\cdot AI^{1r}_{ijk}\right]\cdot r_D-S^{2h}_{hDh}\right\}\cdot(1-t_f),\ (3\text{-}1A)$$

$$S^{2h}_{hDh} = \alpha_h + \beta_h \cdot \left\{AI^{2h}_{hDh} - (R^{1r}_{ijk} - (d^2_h + \phi \cdot (1 - d^2_h)) \cdot AI^{1r}_{ijk}) \cdot r_E\right\} \cdot (1 - t_f), \quad (3\text{-}2A)$$

$$R^{2h}_{hDh} = R^{1h}_{ijk} + AI^{2h}_{hDh} - (1 - d^2_h) \cdot AI^{1r}_{ijk} - \phi(1 - d^2_h) \cdot AI^{1r}_{ijk}. \quad (3\text{-}3A)$$

If the manager finances the investment through equity (i.e., $j' = E$), then:

$$AI^{2h}_{hEh} = \left\{IR^2_h - I - S^{2h}_{hEh}\right\} \cdot (1 - t_f), \quad (3\text{-}1B)$$

$$S^{2h}_{hEh} = \alpha_h + \beta_h \cdot \left\{AI^{2h}_{hEh} - I \cdot r_E\right\} \cdot (1 - t_f), \quad (3\text{-}2B)$$

$$R^{2h}_{hEh} = R^{1h}_{ijk} + AI^{2h}_{hEh} - (1 - d^2_h) \cdot AI^{1r}_{ijk} - \phi \cdot (1 - d^2_h) \cdot AI^{1r}_{ijk}. \quad (3\text{-}3B)$$

If the manager reports low (i.e., $k' = l$) and finances the investment through debts (i.e., $j' = D$), then equations (3-1A), (3-2A), and (3-3A) become:

$$AI^{2h}_{hDl} = \left\{IR^2_h - I - \left[I - (R^{1r}_{ijk} - (d^2_h + \phi \cdot (1 - d^2_h)) \cdot AI^{1r}_{ijk}\right] \cdot r_D - S^{2h}_{hDl}\right\} \cdot (1 - t_f), \quad (3\text{-}1C)$$

$$S^{2h}_{hDl} = \alpha_l + \beta_l \cdot \left\{AI^{2h}_{hDl} - (R^{1r}_{ijk} - (d^2_h + \phi \cdot (1 - d^2_h)) \cdot AI^{1r}_{ijk}) \cdot r_E\right\} \cdot (1 - t_f), \quad (3\text{-}2C)$$

$$R^{2h}_{hDl} = R^{1h}_{ijk} + AI^{2h}_{hDl} - (1 - d^2_h) \cdot AI^{1r}_{ijk} - \phi(1 - d^2_h) \cdot AI^{1r}_{ijk}. \quad (3\text{-}3C)$$

Similar to the features under the *IICT-N* system, at the end of the second period, the shareholders may receive tax refunds or pay individual taxes $d^2_{i'} \cdot AI^{1r}_{ijk} \cdot \left(\frac{t_f - t_p}{1 - t_f}\right)$ for the dividends received in the second period, depending on shareholders' individual income tax rate t_p. The manager receives salary $S^{2r}_{i'j'k'}$ and the firm is liquidated. All retained earnings $R^{2r}_{i'j'k'}$ are distributed back to the shareholders. The key difference between *IICT-ϕ* and *IICT-N* system affect part (b) of $R^{2r}_{i'j'k'}$. Since the undistributed retained earnings will be charged a ϕ retained earnings tax under the *IICT-ϕ* system, the retained earnings not distributed as dividends and not taxed in the second period becomes $(1 - \phi) \cdot (1 - d^2_{i'}) \cdot AI^{1r}_{ijk}$. Therefore, in the third period, all shareholders have to pay an extra individual income tax $(1 - d^1_i) \cdot R_0 \cdot t_p$ for the return of

$(1-d_i^1)\cdot R_0$ and may receive tax refunds or pay individual income taxes $(1-\phi)\cdot(1-d_{i'}^2)\cdot AI_{ijk}^{1r}\cdot\begin{pmatrix} t_f+\phi(1-t_f)-t_p \\ 1-(t_f+\phi(1-t_f)) \end{pmatrix}+AI_{i'j'k'}^{2r}\cdot\begin{pmatrix} t_f-t_p \\ 1-t_f \end{pmatrix}$, depending on shareholders' individual income tax rate t_p. Table 1 summarizes shareholders' returns received during each period and their tax effects.

[Insert Table 2 here]

2. EXPERIMENTAL DESIGN

Three independent variables were employed in the experiments – *tax system,* which was manipulated at two levels: IICT-ϕ system and OT system, *individual shareholder's tax rate*, which was manipulated at two levels: 6% and 40%, and *the cost of equity*, which was manipulated at two levels: 7% and 10%. This leads to a 2 × 2 × 2 between-subject design. Table 3 summaries the experimental design and sample size in each cell.

[Insert Table 3 here]

The dependent variables are manager's reporting, investment, and financing decisions and shareholder's dividend decision. A notional currency called *Experimental Dollars* (EDs) was used in the experiments. Each experimental market consisted of 20 periods and all market communications and exchanges were handled by a system of networked personal computers. Two pilot tests were conducted before the formal experiments. In the formal experiments, a total of 80 senior student subjects were recruited from two major universities in Taiwan, with five human managers and five human shareholders in each market. Students participated in two sessions. At the one-hour *training* session, subjects received written instructions (see appendix, in Chinese) that were read aloud by the experimenter. After clarifying questions were answered, a quiz (consists of 10 true-false questions) was given to ensure that all subjects had understood the instructions and how their decisions might affect their cash payments. This quiz was graded

by the assistants and all players were paid NT $3 for each question they got right (the average cash paid to the subjects was $28.79, with the range from $24 to $30). The cash each subject received in the quiz was *in addition to* his or her cash earnings in the formal experiments.

Immediately following the training session was the two-hour *experiment* session. All subjects drew to see what role they would play in the experiment and the market periods were conducted. Upon completion of all market periods, subjects were asked to complete a post-experiment questionnaire, paid privately their earnings in cash, and dismissed. The main purposes of this questionnaire were to: (a) obtain subjects' background information, (b) understand whether participants were adequately compensated, and (3) understand how participants made their decisions in the experiments. All eight experiments took about two and half hours to finish.

3. EXPERIMENTAL RESULTS

The experimental results generally support the model predictions.

FIGURE 1
Timeline of the Tax System Game