

行政院國家科學委員會專題研究計畫 成果報告

主管酬勞、內部持股與公司價值：以聯立模型分析台灣與美  
國的資料

計畫類別：個別型計畫

計畫編號：NSC90-2416-H-004-021-

執行期間：90年08月01日至91年07月31日

執行單位：國立政治大學會計學系

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報告類型：精簡報告

處理方式：本計畫可公開查詢

中 華 民 國 92 年 5 月 21 日

摘要

本文同時利用台灣以及美國 1997-1999 的資料，探討比較高階主管酬勞、內部持股與公司價值三者間的內生性關係。美國資料顯示，無論是最小平方法或者三階段最小平方法(three-stage least squares)，主管酬勞與內部持股，皆互為負向的函數關係。台灣資料則顯示，在最小平方法下，雖然不顯著，但兩者仍互為負向函數關係；在三階段最小平方法下則兩者互為顯著的負向函數關係。綜合而言，在三階段最小平方法下，無論台灣或美國的資料均顯示，主管酬勞與內部持股，顯著地互為負向的函數關係。

在內部持股與公司價值的關係方面，台灣資料顯示，在最小平方法下，內部持股與公司價值互不具有內生的關係；只有在三階段最小平方法下，內部持股顯著地為公司價值的正向函數。美國的資料則顯示，無論用最小平方法或三階段最小平方法，內部持股與公司價值兩者顯著地互為正向的內生關係。

至於主管酬勞與公司價值間是否互相具有內生性，台灣與美國的實證結果迥異。台灣資料顯示，最小平方法下，兩者間無顯著的關係；但在三階段最小平方法下，兩者則顯著地互為內生關係。主管酬勞是公司價值的正向函數，而公司價值則為前一期主管酬勞的正向函數，但為當期主管酬勞的負向函數。美國資料則顯示兩者間並無顯著之關係。

關鍵字：主管酬勞、內部持股、公司價值、聯立模型

# Simultaneous Equations Analysis of Executive Compensation, Insider Ownership, and Firm Value: Evidence from Taiwan and the USA

## Abstract

This study examines if executive compensation, insider ownership, and corporate value are endogenously determined. Simultaneous system can cure the inconsistent estimation problem induced by ordinary least squares in the case that the variables are endogenously determined. This study compares the empirical results of Taiwan and the USA for the endogeneity among executive compensation, insider ownership, and corporate value.

The USA evidence shows that under both OLS and three-stage least squares (3SLS), executive compensation is a negative function of insider ownership, and vice versa. Taiwan evidence under OLS shows that the executive compensation is a negative but insignificant function of insider ownership, and vice versa. However, under 3SLS, Taiwan evidence shows the same results as those of the USA evidence. Putting together, under 3SLS, Taiwan and the USA evidences show the same results that executive compensation is a negative function of insider ownership and vice versa.

Taiwan evidence shows that under OLS the insider ownership and corporate value are not significantly correlated. But under 3SLS, insider ownership is a positive function of corporate value. However, the USA evidence shows that under both methods of OLS and 3SLS, insider ownership and corporate value are positively endogenously determined.

As for the relation between executive compensation and corporate value, Taiwan evidence is dramatically different from that of the USA. Taiwan evidence shows that they are not significantly related under OLS method. However, under 3SLS method, they are endogenously determined. On the other hand, corporate value is a positive function of 1-period lagged executive compensation but a negative function of current executive compensation. However, the USA evidence shows no relation between executive compensation and corporate value under both methods.

**Key Words:** Executive Compensation, Insider Ownership, Corporate Value, Simultaneous Equations

## 1. Introduction

Morck et al. (1988) and McConnell and Servaes (1990) find that the ownership structure affects corporate value while Mconnell and Servaes (1990) also find that investment affects corporate value. Based on these prior studies, Cho (1998) further show that ownership structure affects investment which, then, affects corporate value and that ownership structure, investment, and corporate value are endogenously determined. As with Demsetz and Lehn (1985), Cho (1998) contends that if ownership structure is endogenously determined, the estimates from OLS should be inconsistent leading to misinterpretation of the results. Chung and Pruitt (1996) find the simultaneous relation among executive ownership, corporate value, and executive compensation. Following this line of research, this study investigates endogeneity among executive compensation, insider ownership, and corporate value for the evidences from Taiwan and the USA.

Chung and Pruitt (1996) analyze the relation among CEO stockholding, CEO compensation and corporate value while controlling for CEO's personal characteristics such as years as the CEO, age, and founder status for the year 1987 and find that a firm's market value, executive stock ownership, and executive compensation are jointly determined. However, their executive compensation includes merely the cash compensation, i.e., salary and bonus. The executive compensation contains a large set of components including cash compensation, stock options, long-term performance plans, etc. More importantly, the compensation other than the cash compensation takes very large portion of the executive compensation. In addition, they primarily control for CEO's personal characteristics while examining the relation among the executive ownership, corporate value, and executive compensation, though firm characteristics may play important role in the determination of their relation.

This study provides updated evidence concerning the simultaneous relation among executive compensation, insider ownership, and corporate value by using the mean value during 1997-1999 with executive compensation defined as executive total compensation while controlling for a variety of firm characteristics such as firm performance, growth, capital expenditure, size, leverage, capitalization, R&D expenditure, etc. This study compares the results from ordinary least squares and simultaneous systems for the evidences of Taiwan and the USA and also makes comparison of the results from three-stage least squares between Taiwan and the USA.

Chung and Pruitt (1996) primarily find the relation between compensation and corporate value and that between ownership and corporate value while we find the

mutual endogeneity of executive compensation and insider ownership and that between insider ownership and corporate value.

In modern agency theory, the executive compensation plays an important role in mitigating the agency problem so that the executive compensation is a function of firm performance. The incentive of compensation contract further motivates executive to perform in the interest of shareholders. In such a way, the executive compensation and firm performance are both endogenous in the principal-agent framework. In addition to firm performance, the determinants of executive compensation, among others, include firm value, insider ownership, and other firm characteristics. Are some of these determinants of executive compensation such as insider ownership and firm value also determined by the executive compensation?

Recent empirical studies find that investment affects firm value which, in turn, affects insider ownership. Based on data from Taiwan and the USA, this study applies simultaneous model to investigating the mutual endogeneity of executive compensation, insider ownership and firm value. With firm characteristics as predetermined variables, do executive compensation, insider ownership and firm value affect each other?

Consistent with earlier research results of the US data, the findings of Taiwan's research show that the insider ownership affects firm value. However, a recent US study using simultaneous equations analysis finds the reverse result that the insider ownership increases with the increase in firm value. The specification of OLS does not control for endogeneity. The misspecification of OLS without controlling for endogeneity will yield inconsistent coefficients. This study investigates the endogeneity among executive compensation, insider ownership, and firm value. Furthermore, the evidence from two economies, Taiwan and the US, will enrich the study findings.

## 2. Hypotheses

In this section, we discuss how the executive compensation, insider ownership, and corporate value are mutually related and how the firm characteristics may affect each of these variables.

### 2.1 Executive compensation and insider ownership

Executive compensation is a composite of salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black-Scholes method), long-term incentive payouts, and all other total. In economic booming

period, a large portion of executive compensation comes from stock-based compensation which increases insider ownership. The insider ownership is an accumulated amount while the stock-based compensation is an increase in the insider ownership. Suppose the executives are risk averse, they tend to reduce the holdings and therefore diversify risk if they could receive large amount of stock-based compensation from their companies every year. On the other hand, if the executive has held large amount of shares then the firm may provide the executive alternative compensation with higher utility than stock-based compensation provides. This inference leads to the following two hypotheses:

H1: Executive compensation is a negative function of insider ownership.

H2: Insider ownership is a negative function of executive compensation.

## 2.2 Insider ownership and corporate value

The greater the executive's shareholding of the firm, the stronger the incentive s/he may have to put effort toward the shareholders' wealth. This is the basic goal of the long-term incentive compensation plan which is designed to align the interests of managers and shareholders. The reduction in agency problem would lead to the increase of corporate value. Jensen and Meckling (1976) and Stulz (1988) find the insider ownership affects corporate value. We measure the corporate value as the Tobin's q and have the third hypothesis.

H3: Corporate value is a positive function of insider ownership.

On the other hand, the higher the corporate value the stronger the executive's incentive to hold the firm's outstanding shares. In modern compensation scheme, the firm tends to pay large amount of stock-based compensation. The executive is willing to hold large shares when the firm performs well and has high corporate value.

H4: Insider ownership is a positive function of corporate value.

## 2.3 Executive compensation and corporate value

According to agency theory, executive compensation is designed to increase in firm performance which may be measured with a variety of proxies including corporate value. Therefore the higher the corporate value the more the executive

compensation. Corporate value is measured as Tobin's q in this study. On the contrary, suppose the firm provides generous compensation package to motivate the manager to work, the corporate value, as a measure of firm performance, should increase.

Therefore the higher the corporate value the more executive compensation.

H5: Executive compensation is a positive function of corporate value.

H6: Corporate value is a positive function of executive compensation.

## 2.4 Firm characteristics as control variables

### Firm performance

In literature, executive compensation and firm performance are found positively correlated (Murphy 1985; Smith and Watts 1992; Gaver and Gaver 1993). Firm performance can be categorized as financial and non-financial performance. Financial performance could either be accounting measure or market measure. Accounting measures and market measures of firm performance provide different information (Lambert and Larcker 1987) In this study, we use return on assets (ROA) and market return (RET) as measures for financial performance. Financial performance can also affect the corporate value and insider ownership since the better the firm performance the more the corporate value and, in turn, the more the manager's shareholding.

### Investment

McConnell and Muscarella (1985) show that investment positively affects corporate value. The investment may indirectly affect insider ownership and executive compensation through corporate value. We measure the investment as R&D and capital expenditure.

### Leverage

As a firm characteristic, leverage may directly affect the corporate value and indirectly affect insider ownership and executive compensation. We use two measures for leverage, i.e., the ratio of long-term debt to total assets and the ratio of total liabilities to equity.

### Growth

Smith and Watts (1992) and Chakraborty et al. (1999) contend that growth represents the investment opportunity. The growth may affect the corporate value and, in turn, the executive compensation. In addition, a firm's growth may attract managers

to devote in larger shareholding.

### Size

The managers in larger firms face complex managerial task. In such a situation, large firms usually provide large compensation to the talented executives (Finkelstein and Hambrick 1989). Firm size may also affect the insider ownership and corporate value.

## 3. Methodology

This study uses simultaneous equations model to investigate the possibility that executive compensation, insider ownership, and firm value are endogenously determined.

The simultaneous equations model can be specified in a functional form:

Compensation =  $f(\text{corporate value, insider ownership, firm performance, investment, leverage, size})$

Insider ownership =  $f(\text{compensation, corporate value, firm performance, investment, leverage, size})$

Corporate value =  $f(\text{compensation, insider ownership, one-period lagged compensation, firm performance, investment, growth, size})$

Measure of variables:

1. Compensation: salary and bonus for Taiwan sample and total compensation for the USA sample
2. Insider ownership: percentage of insider equity shareholding
3. Corporate value: Tobin's Q
4. Firm performance: market return (RET) and return on assets (ROA)
5. Investment: logarithm of capital expenditure and the ratio of R&D to total assets
6. Leverage: the ratio of long-term debt to total assets and the ratio of total liabilities to equity
7. Growth: market-to-book equity ratio
8. Size: logarithm of sales

The following table presents simultaneous equations analysis of compensation, insider ownership and firm value in a diagram.

Simultaneous Equations Analysis of Compensation,  
Insider Ownership, and Corporate Value



| Dependent Variable    | Independent Variable |                          |                        |
|-----------------------|----------------------|--------------------------|------------------------|
|                       | <u>Compensation</u>  | <u>Insider ownership</u> | <u>Corporate value</u> |
| Compensation          |                      | *                        | *                      |
| Insider ownership     | *                    |                          | *                      |
| Corporate value       | *                    | *                        |                        |
| 1-period lagged comp. |                      |                          | *                      |
| Firm Performance      | *                    | *                        | *                      |
| Investment            | *                    | *                        | *                      |
| Leverage              | *                    | *                        | *                      |
| Growth                |                      |                          | *                      |
| Size                  | *                    | *                        | *                      |

\* Asterisks indicate the independent and dependent variables in each equation.

#### 4. Sample

Taiwan government requires the listed firms provide executive compensation including salary, bonus and other fees for the public starting from 1996. However, since this study use 1-year lagged compensation and therefore we lose one-year data of 1996 in the sample. For comparison of the evidence from Taiwan and the USA, we have both samples during 1997-1999. Three-year average data are used as input to the simultaneous system. Therefore, firms should have 3-year complete data to be included in the sample. Finally, Taiwan sample includes 66 firms while the USA sample 234 firms.

Listed firms in Taiwan are classified into 21 industries. As shown in Table 1A, Taiwan sample of 66 firms covers 17 out of 21 industries, except industry of glass and ceramics, automobile, electronics II, and finance. Table 1B shows that the 234 firms of USA sample are drawn from 116 industries based on four-digit SIC classification. On average each industry has 4 firms in Taiwan sample while 2 in the USA sample.

Table 2A and Table 2B are descriptive statistics for Taiwan sample and the USA sample, respectively. Overall the data distributions for these two samples are not skewed except for corporate value and market return in Taiwan sample and market return and the ratio of R&D to total assets in the USA sample.

Taiwan data come from Taiwan Economic Journal Database while the USA data from two databases, ExecuComp and COMPUSTAT.

#### 5. Empirical Results

This study examines if executive compensation, insider ownership, and corporate

value are endogenously determined. Simultaneous system can cure the inconsistent estimation problem induced by ordinary least squares in the case that the variables are endogenously determined. This study compares the empirical results of Taiwan and the USA for the endogeneity among executive compensation, insider ownership, and corporate value.

In Panel A and Panel B of Table 3B, the USA evidence shows that under both OLS and three-stage least squares (3SLS), executive compensation is a negative function of insider ownership, and vice versa. In Panel A and Panel B of Table 3A, Taiwan evidence under OLS shows that executive compensation is a negative but insignificant function of insider ownership, and vice versa. However, under 3SLS, Taiwan evidence shows the same results as those of the USA evidence. Putting together, under 3SLS, Taiwan and the USA evidences show the same results that executive compensation is a negative function of insider ownership and vice versa.

In Panel B and Panel C of Table 3A, Taiwan evidence shows that under OLS the insider ownership and corporate value are not significantly correlated. But under 3SLS, insider ownership is a positive function of corporate value. However, in Panel B and Panel C, the USA evidence shows that under both methods of OLS and 3SLS, insider ownership and corporate value are positively endogenously determined.

As for the relation between executive compensation and corporate value, in Panel A and Panel C, Taiwan evidence is dramatically different from the USA evidence. Taiwan evidence shows that they do not have significant relation under OLS method. However, under 3SLS method, they are endogenously determined. On the other hand, corporate value is a positive function of 1-period lagged executive compensation but a negative function of current executive compensation. However, in Panel A and Panel C, the USA evidence shows no relation between executive compensation and corporate value under both methods.

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Table 1A Sample by Industry: Taiwan

| Obs   | SIC | Industry*             | Count |
|-------|-----|-----------------------|-------|
| 1     | 11  | Cement_Ceramics       | 2     |
| 2     | 12  | Foods                 | 2     |
| 3     | 13  | Plastics_Chemicals    | 2     |
| 4     | 14  | Textiles              | 5     |
| 5     | 15  | Electric_Machinery    | 3     |
| 6     | 16  | Elec. Appliance_Cable | 3     |
| 7     | 17  | Chemicals             | 4     |
| 8     | 19  | Paper_Pulp            | 1     |
| 9     | 20  | Steel_Iron            | 3     |
| 10    | 21  | Rubber                | 2     |
| 11    | 23  | Electronics           | 20    |
| 12    | 25  | Construction          | 4     |
| 13    | 26  | Transportation        | 3     |
| 14    | 27  | Tourism               | 2     |
| 15    | 29  | Wholesale_Retail      | 4     |
| 16    | 98  | Miscellaneous         | 1     |
| 17    | 99  | Others                | 8     |
| Total |     |                       | 69    |

\* Listed firms in Taiwan are classified into 21 industries.

Table 1B Sample by Industry: USA

| Obs | SIC  | Industry                     | Count |
|-----|------|------------------------------|-------|
| 1   | 1389 | OIL, GAS FIELD SERVICES, NEC | 1     |
| 2   | 1400 | MNG, QUARRY NONMTL MINERALS  | 2     |
| 3   | 2070 | FATS AND OILS                | 1     |
| 4   | 2330 | WOMENS,MISSES,JRS OUTERWEAR  | 1     |
| 5   | 2400 | LUMBER AND WOOD PDS, EX FURN | 1     |
| 6   | 2510 | HOUSEHOLD FURNITURE          | 2     |
| 7   | 2520 | OFFICE FURNITURE             | 1     |
| 8   | 2531 | PUBLIC BLDG & REL FURNITURE  | 1     |
| 9   | 2611 | PULP MILLS                   | 1     |
| 10  | 2670 | CONVRT PAPR,PAPRBRD,EX BOXES | 3     |
| 11  | 2810 | INDL INORGANIC CHEMICALS     | 1     |
| 12  | 2821 | PLASTICS,RESINS,ELASTOMERS   | 1     |
| 13  | 2833 | MEDICINAL CHEMS,BOTANICL PDS | 1     |
| 14  | 2834 | PHARMACEUTICAL PREPARATIONS  | 10    |
| 15  | 2835 | IN VITRO,IN VIVO DIAGNOSTICS | 2     |
| 16  | 2836 | BIOLOGICAL PDS,EX DIAGNSTICS | 4     |
| 17  | 2840 | SOAP,DETERGENT,TOILET PREPS  | 3     |
| 18  | 2842 | SPECIAL CLEAN,POLISH PREPS   | 2     |
| 19  | 2844 | PERFUME,COSMETIC,TOILET PREP | 2     |
| 20  | 2851 | PAINTS, VARNISHES, LACQUERS  | 2     |
| 21  | 2860 | INDUSTRIAL ORGANIC CHEMICALS | 2     |
| 22  | 2870 | AGRICULTURE CHEMICALS        | 2     |
| 23  | 2911 | PETROLEUM REFINING           | 2     |
| 24  | 3011 | TIRES AND INNER TUBES        | 2     |
| 25  | 3021 | RUBBER AND PLASTICS FOOTWEAR | 1     |
| 26  | 3221 | GLASS CONTAINERS             | 1     |
| 27  | 3312 | STEEL WORKS & BLAST FURNACES | 1     |
| 28  | 3320 | IRON AND STEEL FOUNDRIES     | 1     |
| 29  | 3330 | PRIM SMELT,REFIN NONFER METL | 1     |
| 30  | 3350 | ROLLING & DRAW NONFER METAL  | 1     |
| 31  | 3357 | DRAWNG,INSULATNG NONFER WIRE | 2     |
| 32  | 3420 | CUTLERY,HAND TOOLS,GEN HRDWR | 2     |
| 33  | 3440 | FABRICATED STRUCTURAL METAL  | 1     |
| 34  | 3442 | METAL DOORS,FRAMES,MOLD,TRIM | 1     |

|    |      |                              |    |
|----|------|------------------------------|----|
| 35 | 3452 | BOLT,NUT,SCREW,RIVETS,WASHRS | 1  |
| 36 | 3490 | MISC FABRICATED METAL PRODS  | 1  |
| 37 | 3523 | FARM MACHINERY AND EQUIPMENT | 1  |
| 38 | 3531 | CONSTRUCTION MACHINERY & EQ  | 3  |
| 39 | 3533 | OIL & GAS FIELD MACHY, EQUIP | 1  |
| 40 | 3540 | METALWORKING MACHINERY & EQ  | 2  |
| 41 | 3559 | SPECIAL INDUSTRY MACHY, NEC  | 4  |
| 42 | 3562 | BALL AND ROLLER BEARINGS     | 1  |
| 43 | 3564 | INDL COML FANS,BLOWRS,OTH EQ | 2  |
| 44 | 3571 | ELECTRONIC COMPUTERS         | 3  |
| 45 | 3572 | COMPUTER STORAGE DEVICES     | 1  |
| 46 | 3576 | COMPUTER COMMUNICATION EQUIP | 1  |
| 47 | 3577 | COMPUTER PERIPHERAL EQ, NEC  | 1  |
| 48 | 3578 | CALCULATE,ACCT MACH,EX COMP  | 1  |
| 49 | 3585 | AIR COND,HEATING,REFRIG EQ   | 1  |
| 50 | 3600 | ELECTR, OTH ELEC EQ, EX CMP  | 1  |
| 51 | 3620 | ELECTRICAL INDL APPARATUS    | 1  |
| 52 | 3621 | MOTORS AND GENERATORS        | 2  |
| 53 | 3630 | HOUSEHOLD APPLIANCES         | 1  |
| 54 | 3640 | ELECTRIC LIGHTING,WIRING EQ  | 2  |
| 55 | 3661 | TELE & TELEGRAPH APPARATUS   | 5  |
| 56 | 3663 | RADIO,TV BROADCAST, COMM EQ  | 1  |
| 57 | 3669 | COMMUNICATIONS EQUIP, NEC    | 1  |
| 58 | 3670 | ELECTRONIC COMP, ACCESSORIES | 2  |
| 59 | 3672 | PRINTED CIRCUIT BOARDS       | 2  |
| 60 | 3674 | VEHICULAR LIGHTING EQUIPMENT | 11 |
| 61 | 3678 | ELECTRONIC CONNECTORS        | 1  |
| 62 | 3714 | MOTOR VEHICLE PART,ACCESSORY | 7  |
| 63 | 3715 | TRUCK TRAILERS               | 1  |
| 64 | 3728 | AIRCRAFT PARTS, AUX EQ, NEC  | 2  |
| 65 | 3730 | SHIP & BOAT BLDG & REPAIRING | 1  |
| 66 | 3751 | MOTORCYCLES,BICYCLES & PARTS | 1  |
| 67 | 3821 | LAB APPARATUS AND FURNITURE  | 1  |
| 68 | 3823 | INDUSTRIAL MEASUREMENT INSTR | 2  |
| 69 | 3825 | ELEC MEAS & TEST INSTRUMENTS | 1  |
| 70 | 3826 | LAB ANALYTICAL INSTRUMENTS   | 1  |
| 71 | 3827 | OPTICAL INSTRUMENTS & LENSES | 1  |

|     |      |                              |   |
|-----|------|------------------------------|---|
| 72  | 3841 | SURGICAL,MED INSTR,APPARATUS | 3 |
| 73  | 3842 | ORTHO,PROSTH,SURG APPL,SUPLY | 4 |
| 74  | 3843 | DENTAL EQUIPMENT & SUPPLIES  | 1 |
| 75  | 3844 | X-RAY & RELATED APPARATUS    | 1 |
| 76  | 3845 | ELECTROMEDICAL APPARATUS     | 4 |
| 77  | 3861 | PHOTOGRAPHIC EQUIP & SUPPL   | 2 |
| 78  | 3942 | DOLLS AND STUFFED TOYS       | 1 |
| 79  | 3949 | SPORTING & ATHLETIC GDS,NEC  | 1 |
| 80  | 4813 | PHONE COMM EX RADIOTELEPHONE | 1 |
| 81  | 5000 | DURABLE GOODS-WHOLESale      | 1 |
| 82  | 5010 | MOTOR VEH PARTS, SUPPLY-WHSL | 1 |
| 83  | 5045 | COMPUTERS & SOFTWARE-WHSL    | 1 |
| 84  | 5070 | HARDWR, PLUMB, HEAT EQ-WHSL  | 1 |
| 85  | 5122 | DRUGS AND PROPRIETARY-WHSL   | 2 |
| 86  | 5200 | BLDG MATL,HARDWR,GARDEN-RETL | 1 |
| 87  | 5211 | LUMBER & OTH BLDG MATL-RETL  | 2 |
| 88  | 5311 | DEPARTMENT STORES            | 3 |
| 89  | 5331 | VARIETY STORES               | 6 |
| 90  | 5399 | MISC GENERAL MDSE STORES     | 1 |
| 91  | 5411 | GROCERY STORES               | 3 |
| 92  | 5500 | AUTO DEALERS, GAS STATIONS   | 1 |
| 93  | 5531 | AUTO AND HOME SUPPLY STORES  | 3 |
| 94  | 5600 | APPAREL AND ACCESSORY STORES | 2 |
| 95  | 5651 | FAMILY CLOTHING STORES       | 5 |
| 96  | 5661 | SHOE STORES                  | 1 |
| 97  | 5700 | HOME FURNITURE & EQUIP STORE | 2 |
| 98  | 5731 | RADIO,TV,CONS ELECTR STORES  | 1 |
| 99  | 5734 | CMP AND CMP SOFTWARE STORES  | 1 |
| 100 | 5812 | EATING PLACES                | 8 |
| 101 | 5912 | DRUG & PROPRIETARY STORES    | 3 |
| 102 | 5940 | MISC SHOPPING GOODS STORES   | 4 |
| 103 | 5945 | HOBBY, TOY, AND GAME SHOPS   | 2 |
| 104 | 6200 | SECURITY & COMMODITY BROKERS | 1 |
| 105 | 7200 | PERSONAL SERVICES            | 1 |
| 106 | 7370 | CMP PROGRAMMING,DATA PROCESS | 2 |
| 107 | 7372 | PREPACKAGED SOFTWARE         | 8 |
| 108 | 7373 | COMPUTER PERIPHERAL EQ, NEC  | 4 |

|     |      |                              |   |
|-----|------|------------------------------|---|
| 109 | 7374 | PREPACKAGED SOFTWARE         | 2 |
| 110 | 7812 | MOTION PIC, VIDEOTAPE PRODTN | 1 |
| 111 | 7990 | MISC AMUSEMENT & REC SERVICE | 3 |
| 112 | 8062 | GEN MED & SURGICAL HOSPITALS | 1 |
| 113 | 8090 | MISC HEALTH & ALLIED SVC,NEC | 1 |
| 114 | 8093 | SPEC OUTPATIENT FACILITY,NEC | 1 |
| 115 | 8700 | ENGR,ACC,RESH,MGMT,REL SVCS  | 1 |
| 116 | 9997 | CONGLOMERATES                | 1 |

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Total

234



Table 2A Descriptive Statistics for 1997-1999: Taiwan

| Variable | N  | Minimum | Mean   | Std Dev | Median | Maximum |
|----------|----|---------|--------|---------|--------|---------|
| COMP     | 69 | 6.358   | 8.811  | 0.687   | 8.845  | 10.981  |
| INSIDER  | 69 | 7.107   | 25.339 | 12.928  | 23.397 | 72.04   |
| VALUE    | 69 | -0.866  | -0.055 | 0.291   | -0.011 | 0.422   |
| COMPLAG  | 69 | 6.127   | 8.733  | 0.696   | 8.786  | 10.804  |
| ROA      | 69 | -3.033  | 8.337  | 5.635   | 8.103  | 20.947  |
| RET      | 69 | -35.207 | 11.213 | 40.663  | -5.15  | 150.497 |
| G_RD     | 69 | 0       | 0.01   | 0.014   | 0.003  | 0.058   |
| CAPEXP   | 69 | 9.007   | 12.887 | 1.305   | 12.825 | 16.514  |
| G_MBE    | 69 | 0.001   | 0.002  | 0.002   | 0.002  | 0.008   |
| DE       | 69 | 0.129   | 0.621  | 0.363   | 0.558  | 2.065   |
| MVE      | 69 | 6.799   | 9.355  | 1.21    | 9.189  | 12.871  |
| LEVERAGE | 69 | 0       | 0.112  | 0.089   | 0.095  | 0.358   |
| SIZE     | 69 | 12.182  | 15.491 | 1.093   | 15.479 | 17.842  |

COMP: executive total compensation; INSIDER: insider ownership;

VALUE: corporate value; COMPLAG: executive total compensation with one period lag; ROA: return on assets; RET: 1-year market return; G\_RD: R&D;

CAPEXP: capital expenditure; G\_MBE: market-to-book equity ratio; DE: total liability over stockholders' equity; MVE: market value of equity; LEVERAGE: long-term liability over total assets; SIZE: firm size.

Table 2B Descriptive Statistics for 1997-1999: USA

| Variable | N   | Minimum | Mean   | Std Dev | Median | Maximum |
|----------|-----|---------|--------|---------|--------|---------|
| COMP     | 234 | 4.733   | 7.908  | 1.057   | 7.864  | 11.271  |
| INSIDER  | 234 | 1.083   | 6.025  | 1.968   | 5.838  | 13.080  |
| VALUE    | 234 | 0.685   | 2.646  | 2.143   | 1.957  | 13.232  |
| COMPLAG  | 234 | 4.747   | 7.764  | 1.009   | 7.775  | 10.850  |
| ROA      | 234 | -60.407 | 7.596  | 8.157   | 7.625  | 23.703  |
| RET      | 234 | -44.905 | 26.752 | 39.420  | 18.784 | 257.714 |
| G_RD     | 234 | 0.000   | 0.048  | 0.084   | 0.021  | 0.875   |
| CAPEXP   | 234 | -0.610  | 3.808  | 1.575   | 3.695  | 8.590   |
| G_MBE    | 234 | 0.875   | 4.863  | 4.571   | 3.367  | 40.313  |
| DE       | 234 | -0.688  | 1.037  | 1.006   | 0.866  | 8.055   |
| MVE      | 234 | 4.452   | 7.863  | 1.698   | 7.670  | 12.489  |
| LEVERAGE | 234 | 0.000   | 0.159  | 0.139   | 0.136  | 0.620   |
| SIZE     | 234 | 2.199   | 7.404  | 1.566   | 7.316  | 11.841  |

COMP: executive total compensation; INSIDER: insider ownership;

VALUE: corporate value; COMPLAG: executive total compensation with one period lag; ROA: return on assets; RET: 1-year market return; G\_RD: R&D;

CAPEXP: capital expenditure; G\_MBE: market-to-book equity ratio; DE: total liability over stockholders' equity; MVE: market value of equity; LEVERAGE: long-term liability over total assets; SIZE: firm size.

Table 3A Comparison of Results from OLS and 3SLS: Taiwan

| Panel A                 | Dependent Variable: Compensation |          |        |                       |          |        |  |
|-------------------------|----------------------------------|----------|--------|-----------------------|----------|--------|--|
|                         | Ordinary Least Squares           |          |        | 3-Stage Least Squares |          |        |  |
|                         | Coefficient                      | Standard |        | Coefficient           | Standard |        |  |
|                         |                                  | Error    | p-vlue |                       | Error    | p-vlue |  |
| Intercept               | 3.320 ***                        | 1.065    | 0.003  | 5.408 **              | 2.313    | 0.023  |  |
| VALUE                   | 0.427                            | 0.297    | 0.155  | 4.385 **              | 2.031    | 0.035  |  |
| INSIDER                 | -0.004                           | 0.005    | 0.460  | -0.064 ***            | 0.019    | 0.001  |  |
| ROA                     | 0.051 ***                        | 0.017    | 0.005  | 0.089 **              | 0.036    | 0.017  |  |
| RET                     | -0.007 ***                       | 0.002    | 0.004  | -0.003                | 0.006    | 0.648  |  |
| G_RD                    | 1.348                            | 5.416    | 0.804  | 7.091                 | 13.715   | 0.607  |  |
| DE                      | -0.584 **                        | 0.26     | 0.029  | -0.200                | 0.497    | 0.69   |  |
| LEVERAGE                | -0.072                           | 1.057    | 0.946  | -7.517 *              | 3.987    | 0.064  |  |
| SIZE                    | 0.363 ***                        | 0.075    | <.0001 | 0.353 **              | 0.151    | 0.023  |  |
| Sample size             | 69                               |          |        | 234                   |          |        |  |
| Adj R <sup>2</sup>      | 0.385                            |          |        |                       |          |        |  |
| System                  |                                  |          |        |                       |          |        |  |
| Weighted R <sup>2</sup> |                                  |          |        | 0.346                 |          |        |  |
| <hr/>                   |                                  |          |        |                       |          |        |  |
| Panel B                 | Dependent Variable: Insider      |          |        |                       |          |        |  |
|                         | Ordinary Least Squares           |          |        | 3-Stage Least Squares |          |        |  |
|                         | Coefficient                      | Standard |        | Coefficient           | Standard |        |  |
|                         |                                  | Error    | p-vlue |                       | Error    | p-vlue |  |
| Intercept               | 20.463                           | 27.620   | 0.462  | 79.472 **             | 35.403   | 0.029  |  |
| COMP                    | -1.731                           | 3.120    | 0.581  | -13.695 ***           | 2.463    | <.0001 |  |
| VALUE                   | 6.678                            | 7.248    | 0.361  | 64.946 **             | 32.156   | 0.048  |  |
| ROA                     | 0.821 *                          | 0.429    | 0.060  | 1.342 ***             | 0.439    | 0.003  |  |
| RET                     | -0.055                           | 0.059    | 0.358  | -0.036                | 0.090    | 0.688  |  |
| G_RD                    | -140.662                         | 128.820  | 0.279  | 101.113               | 202.284  | 0.619  |  |
| CAPEXP                  | -2.069                           | 1.712    | 0.232  | -0.578                | 1.295    | 0.657  |  |
| DE                      | -0.468                           | 6.594    | 0.944  | -1.977                | 6.682    | 0.768  |  |
| LEVERAGE                | -10.802                          | 26.987   | 0.690  | -108.195 *            | 58.822   | 0.071  |  |
| SIZE                    | 2.828                            | 2.304    | 0.225  | 5.107 **              | 2.496    | 0.045  |  |
| Sample size             | 69                               |          |        | 234                   |          |        |  |
| Adj R <sup>2</sup>      | -0.001                           |          |        |                       |          |        |  |
| System                  |                                  |          |        | 0.346                 |          |        |  |

Weighted  $R^2$

| Panel C                 | Dependent Variable: Value |          |        |                       |          |        |
|-------------------------|---------------------------|----------|--------|-----------------------|----------|--------|
|                         | Ordinary Least Squares    |          |        | 3-Stage Least Squares |          |        |
|                         | Coefficient               | Standard |        | Coefficient           | Standard |        |
|                         |                           | Error    | p-vlue |                       | Error    | p-vlue |
| Intercept               | -0.668                    | 0.573    | 0.249  | -1.595                | 1.564    | 0.312  |
| COMP                    | -0.130                    | 0.161    | 0.423  | -1.853 **             | 0.872    | 0.038  |
| INSIDER                 | 0.002                     | 0.003    | 0.519  | 0.072                 | 0.059    | 0.230  |
| COMPLAG                 | 0.135                     | 0.159    | 0.400  | 2.008 **              | 0.834    | 0.019  |
| RET                     | -0.002 *                  | 0.001    | 0.090  | 0.008                 | 0.007    | 0.265  |
| G_RD                    | -5.944 **                 | 2.499    | 0.021  | 8.077                 | 12.475   | 0.520  |
| CAPEXP                  | 0.074 **                  | 0.033    | 0.027  | 0.125                 | 0.100    | 0.215  |
| G_MBE                   | 0.111                     | 38.512   | 0.998  | -291.793              | 330.795  | 0.381  |
| MVE                     | 0.043                     | 0.066    | 0.514  | 0.009                 | 0.214    | 0.968  |
| SIZE                    | -0.048                    | 0.053    | 0.370  | -0.172                | 0.241    | 0.478  |
| Sample size             | 69                        |          |        | 234                   |          |        |
| Adj R <sup>2</sup>      | 0.2023                    |          |        |                       |          |        |
| System                  |                           |          |        |                       |          |        |
| Weighted R <sup>2</sup> |                           |          |        | 0.346                 |          |        |

COMP: executive total compensation; INSIDER: insider ownership; VALUE: corporate value; COMPLAG: executive total compensation with one period lag; ROA: return on assets; RET: 1-year market return; G\_RD: R&D; CAPEXP: capital expenditure; G\_MBE: market-to-book equity ratio; DE: total liability over stockholders' equity; MVE: market value of equity; LEVERAGE: long-term liability over total assets; SIZE: firm size.

Asterisks indicate significance at 0.01 (\*\*\*), 0.05 (\*\*), and 0.10 (\*) levels, two-sided test.

Table 3B Comparison of Results from OLS and 3SLS: USA

| Panel A                          |             |                |        |                       |                |        |
|----------------------------------|-------------|----------------|--------|-----------------------|----------------|--------|
| Dependent Variable: Compensation |             |                |        |                       |                |        |
| Ordinary Least Squares           |             |                |        | 3-Stage Least Squares |                |        |
| Independent Variable             | Coefficient | Standard Error | p-vlue | Coefficient           | Standard Error | p-vlue |
| Intercept                        | 4.534 ***   | 0.328          | <.0001 | 13.812 ***            | 5.310          | 0.010  |
| VALUE                            | 0.085 **    | 0.038          | 0.027  | 0.522                 | 0.351          | 0.139  |
| INSIDER                          | -0.068 **   | 0.027          | 0.013  | -1.972 **             | 0.910          | 0.031  |
| ROA                              | 0.003       | 0.010          | 0.788  | 0.063                 | 0.049          | 0.205  |
| RET                              | 0.003 **    | 0.002          | 0.050  | -0.003                | 0.009          | 0.767  |
| G_RD                             | 2.702 ***   | 0.998          | 0.007  | -1.269                | 7.399          | 0.864  |
| DE                               | 0.000       | 0.065          | 0.997  | -0.490                | 0.355          | 0.169  |
| LEVERAGE                         | 0.425       | 0.502          | 0.399  | -0.247                | 3.107          | 0.937  |
| SIZE                             | 0.440 ***   | 0.036          | <.0001 | 0.649 ***             | 0.203          | 0.002  |
| Sample size                      | 234         |                |        | 234                   |                |        |
| Adj R <sup>2</sup>               | 0.500       |                |        |                       |                |        |
| System Weighted R <sup>2</sup>   |             |                |        | 0.215                 |                |        |

  

| Panel B                     |             |                |        |                       |                |        |
|-----------------------------|-------------|----------------|--------|-----------------------|----------------|--------|
| Dependent Variable: Insider |             |                |        |                       |                |        |
| Ordinary Least Squares      |             |                |        | 3-Stage Least Squares |                |        |
| Independent Variable        | Coefficient | Standard Error | p-vlue | Coefficient           | Standard Error | p-vlue |
| Intercept                   | 7.858 ***   | 1.059          | <.0001 | 7.037 ***             | 1.068          | <.0001 |
| COMP                        | -0.419 ***  | 0.161          | 0.010  | -0.495 ***            | 0.148          | 0.001  |
| VALUE                       | 0.371 ***   | 0.092          | <.0001 | 0.266 **              | 0.103          | 0.011  |
| ROA                         | -0.028      | 0.024          | 0.260  | 0.029                 | 0.021          | 0.174  |
| RET                         | -0.003      | 0.004          | 0.465  | -0.001                | 0.004          | 0.737  |
| G_RD                        | -5.622 **   | 2.448          | 0.023  | -0.921                | 2.350          | 0.695  |
| CAPEXP                      | 0.165       | 0.143          | 0.249  | 0.014                 | 0.079          | 0.859  |
| DE                          | -0.110      | 0.161          | 0.494  | -0.238                | 0.157          | 0.132  |
| LEVERAGE                    | -2.347 *    | 1.269          | 0.066  | -0.287                | 1.138          | 0.801  |
| SIZE                        | 0.123       | 0.158          | 0.436  | 0.311 ***             | 0.089          | 0.001  |
| Sample size                 | 234         |                |        | 234                   |                |        |
| Adj R <sup>2</sup>          | 0.145       |                |        |                       |                |        |

System  
Weighted  $R^2$

0.215

| Panel C                 |             | Dependent Variable: Value |        |             |                       |        |  |
|-------------------------|-------------|---------------------------|--------|-------------|-----------------------|--------|--|
|                         |             | Ordinary Least Squares    |        |             | 3-Stage Least Squares |        |  |
| Independent Variable    | Standard    |                           |        | Standard    |                       |        |  |
|                         | Coefficient | Error                     | p-vlue | Coefficient | Error                 | p-vlue |  |
| Intercept               | 0.991 **    | 0.481                     | 0.040  | -1.912      | 1.829                 | 0.297  |  |
| COMP                    | 0.093       | 0.181                     | 0.608  | -1.852      | 1.667                 | 0.268  |  |
| INSIDER                 | 0.095 ***   | 0.027                     | 0.001  | 0.593 ***   | 0.206                 | 0.004  |  |
| COMPLAG                 | -0.389 **   | 0.178                     | 0.030  | 1.691       | 1.507                 | 0.263  |  |
| RET                     | 0.003 *     | 0.002                     | 0.053  | 0.008 *     | 0.005                 | 0.078  |  |
| G_RD                    | 0.031       | 0.741                     | 0.967  | 2.225 *     | 1.320                 | 0.093  |  |
| CAPEXP                  | -0.126 **   | 0.058                     | 0.033  | -0.005      | 0.085                 | 0.949  |  |
| G_MBE                   | 0.284 ***   | 0.017                     | <.0001 | 0.283 ***   | 0.037                 | <.0001 |  |
| MVE                     | 0.888 ***   | 0.083                     | <.0001 | 0.566 ***   | 0.123                 | <.0001 |  |
| SIZE                    | -0.621 ***  | 0.079                     | <.0001 | -0.491 ***  | 0.133                 | 0.000  |  |
| Sample size             | 234         |                           |        | 234         |                       |        |  |
| Adj R <sup>2</sup>      | 0.874       |                           |        |             |                       |        |  |
| System                  |             |                           |        |             |                       |        |  |
| Weighted R <sup>2</sup> | 0.215       |                           |        |             |                       |        |  |

COMP: executive total compensation; INSIDER: insider ownership; VALUE: corporate value; COMPLAG: executive total compensation with one period lag; ROA: return on assets; RET: 1-year market return; G\_RD: R&D; CAPEXP: capital expenditure; G\_MBE: market-to-book equity ratio; DE: total liability over stockholders' equity; MVE: market value of equity; LEVERAGE: long-term liability over total assets; SIZE: firm size.

Asterisks indicate significance at 0.01 (\*\*\*), 0.05 (\*\*), and 0.10 (\*) levels, two-sided test.



Table 4 Comparison of the Results for Taiwan and the USA: 3SLS

| Panel A                 | Dependent Variable: Compensation |         |        |             |       |        |
|-------------------------|----------------------------------|---------|--------|-------------|-------|--------|
|                         | 3-Stage Least Squares            |         |        |             |       |        |
|                         | Taiwan                           |         |        | USA         |       |        |
|                         | Standard                         |         |        | Standard    |       |        |
|                         | Coefficient                      | Error   | p-vlue | Coefficient | Error | p-vlue |
| Intercept               | 5.408 **                         | 2.313   | 0.023  | 13.812 ***  | 5.310 | 0.010  |
| VALUE                   | 4.385 **                         | 2.031   | 0.035  | 0.522       | 0.351 | 0.139  |
| INSIDER                 | -0.064 ***                       | 0.019   | 0.001  | -1.972 **   | 0.910 | 0.031  |
| ROA                     | 0.089 **                         | 0.036   | 0.017  | 0.063       | 0.049 | 0.205  |
| RET                     | -0.003                           | 0.006   | 0.648  | -0.003      | 0.009 | 0.767  |
| G_RD                    | 7.091                            | 13.715  | 0.607  | -1.269      | 7.399 | 0.864  |
| DE                      | -0.200                           | 0.497   | 0.690  | -0.490      | 0.355 | 0.169  |
| LEVERAGE                | -7.517 *                         | 3.987   | 0.064  | -0.247      | 3.107 | 0.937  |
| SIZE                    | 0.353 **                         | 0.151   | 0.023  | 0.649 ***   | 0.203 | 0.002  |
| Sample size             | 234                              |         |        | 234         |       |        |
| System                  |                                  |         |        |             |       |        |
| Weighted R <sup>2</sup> | 0.346                            |         |        | 0.215       |       |        |
| Panel B                 | Dependent Variable: Insider      |         |        |             |       |        |
|                         | 3-Stage Least Squares            |         |        |             |       |        |
|                         | Taiwan                           |         |        | USA         |       |        |
|                         | Standard                         |         |        | Standard    |       |        |
|                         | Coefficient                      | Error   | p-vlue | Coefficient | Error | p-vlue |
| Intercept               | 79.472 **                        | 35.403  | 0.029  | 7.037 ***   | 1.068 | <.0001 |
| COMP                    | -13.695 ***                      | 2.463   | <.0001 | -0.495 ***  | 0.148 | 0.001  |
| VALUE                   | 64.946 **                        | 32.156  | 0.048  | 0.266 **    | 0.103 | 0.011  |
| ROA                     | 1.342 ***                        | 0.439   | 0.003  | 0.029       | 0.021 | 0.174  |
| RET                     | -0.036                           | 0.090   | 0.688  | -0.001      | 0.004 | 0.737  |
| G_RD                    | 101.113                          | 202.284 | 0.619  | -0.921      | 2.350 | 0.695  |
| CAPEXP                  | -0.578                           | 1.295   | 0.657  | 0.014       | 0.079 | 0.859  |
| DE                      | -1.977                           | 6.682   | 0.768  | -0.238      | 0.157 | 0.132  |
| LEVERAGE                | -108.195 *                       | 58.822  | 0.071  | -0.287      | 1.138 | 0.801  |
| SIZE                    | 5.107 **                         | 2.496   | 0.045  | 0.311 ***   | 0.089 | 0.001  |
| Sample size             | 234                              |         |        | 234         |       |        |
| System                  | 0.346                            |         |        | 0.215       |       |        |

Weighted  $R^2$

|                         | Dependent Variable: Value |         |        |             |          |        |
|-------------------------|---------------------------|---------|--------|-------------|----------|--------|
|                         | 3-Stage Least Squares     |         |        |             |          |        |
|                         | Taiwan                    |         |        | USA         |          |        |
|                         |                           | Standar |        |             | Standard |        |
|                         | d                         |         |        |             |          |        |
|                         | Coefficient               | Error   | p-vlue | Coefficient | Error    | p-vlue |
| Intercept               | -1.595                    | 1.564   | 0.312  | -1.912      | 1.829    | 0.297  |
| COMP                    | -1.853 **                 | 0.872   | 0.038  | -1.852      | 1.667    | 0.268  |
| INSIDER                 | 0.072                     | 0.059   | 0.230  | 0.593 ***   | 0.206    | 0.004  |
| COMPLAG                 | 2.008 **                  | 0.834   | 0.019  | 1.691       | 1.507    | 0.263  |
| RET                     | 0.008                     | 0.007   | 0.265  | 0.008 *     | 0.005    | 0.078  |
| G_RD                    | 8.077                     | 12.475  | 0.520  | 2.225 *     | 1.320    | 0.093  |
| CAPEXP                  | 0.125                     | 0.100   | 0.215  | -0.005      | 0.085    | 0.949  |
| G_MBE                   | -291.793                  | 330.795 | 0.381  | 0.283 ***   | 0.037    | <.0001 |
| MVE                     | 0.009                     | 0.214   | 0.968  | 0.566 ***   | 0.123    | <.0001 |
| SIZE                    | -0.172                    | 0.241   | 0.478  | -0.491 ***  | 0.133    | 0.000  |
| Sample size             | 234                       |         |        | 234         |          |        |
| System                  |                           |         |        |             |          |        |
| Weighted R <sup>2</sup> | 0.346                     |         |        | 0.215       |          |        |

COMP: executive total compensation; INSIDER: insider ownership; VALUE: corporate value; COMPLAG: executive total compensation with one period lag; ROA: return on assets; RET: 1-year market return; G\_RD: R&D; CAPEXP: capital expenditure; G\_MBE: market-to-book equity ratio; DE: total liability over stockholders' equity; MVE: market value of equity; LEVERAGE: long-term liability over total assets; SIZE: firm size.

Asterisks indicate significance at 0.01 (\*\*\*), 0.05 (\*\*), and 0.10 (\*) levels, two-sided test.

## 計畫成果自評

- 甲、研究內容與原計畫相符程度：本計畫確實依原計畫提案執行完成。
- 乙、達成預期目標情況：百分之百完全達成預期目標。
- 丙、研究成果之學術或應用價值：此一研究依理論基礎比較台灣與美國之情況，深具有學術價值。
- 丁、是否適合在學術期刊發表：由於具有學術價值，將投在學術期刊發表
- 戊、主要發現或其他有關價值等，作一綜合評估：本研究發現之前尚未發現而同時存在台灣與美國的現象，即主管酬勞與內部持股有互為內生的關係，對文獻為一大貢獻。