A comparison study of the influences of internationalization on financing and dividend among the electronic industries of Taiwan and US

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Abstract

This paper used the internationalized electronic industries in the US and Taiwan from 1999 to 2008 as the subjects to compare their debt ratio and the scale of cash dividend as the reference for financing strategies and decision. The evidence showed that the debt ratio and the cash dividend payout ratio of the internationalized electronic industries in the US were lower than those in Taiwan. Subject to the uniqueness and the high profit ability of the internationalized electronic industries in the US, they have more earnings and inside capital so that the debt ratio is lower. Also, the internationalized electronic industries in the US

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have higher internationalization level with higher system risk level that they tend to keep the cash against any incidents so the payout cash dividend is less.

**JEL classification numbers:** G31, G32  
**Keywords:** internationalization, electronic industry, debt ratio, dividend policy

1  Introduction

According to the statistics of Taiwan Electrical and Electronic Manufacturers’ Association, the production value of the related industries, from upstream to downstream, of Taiwan Electrical and Electronic in 2008 reached to 216.6 billion US dollars, account for 48.84% of the total industrial value in Taiwan. 46% of the market value of 1792 public issued companies belongs to electronic industry. From 2000 to 2008, the custom statistic showed that the electronic related products in Taiwan account for more than 50% of the export value, 20% of which were exported to the US. The worldwide top 10 of the semiconductor procurement brands in 2009, American business Whirlpool, Apple, and Dell were the top one, three, and five respectively. Their OEM factories were the listing companies in Taiwan, such as Taiwan Semiconductor Manufacture Company, Foxconn, and Asus; therefore, the electronic industries in the US and in Taiwan have high relationship. The dividend policy and business financing strategies, growing opportunities, and related interests also have close relationship. Therefore, this paper is to analysis the differences between the financing and dividend policies of the two countries so as to provide references for the financing and financial decisions of international electronic industries.
2 Literature and Hypothesis Development

2.1 Related research of financing decision

Reeb et al. [47] studied 880 international businesses in the US from 1987 to 1996 and found out that their debt ratio were prominent lower than home businesses. The results were in consistence with the study results of Burgman [12], Chen et al. [15], Doukas and Pantzalis [20], and Lee and Kwok [36]. But, Singh and Nejadmalayeri studied 90 French companies from 1996 to 1999 and found out that the total the debt ratio and long-term the debt ratio of a business had positive relationship with internationalization level [52]. Lee and Kwok [36] and Rajan and Zingales [46] thought that the differences between countries might affect the investment plan, fund raising, and financing policy of a business. Other scholars thought that the different internalization level would make different recourse distribution and financial decisions (see [1, 19, 46]). According to static trade off theory, in order to avoid too much total risk when facing the complicated international environment, the companies would adjust the liabilities to the most suitable ratio [33]. The electronic industries in the US have high internationalization level with mature business and marketing network become the market main stream. The products are unique and high profitability. On the contrary, the electronic products in Taiwan highly depend on the international big brands of the US. Most of the products are OEM products and the profit is lower. According to pecking order theory, when considering capital-raising, the top choice is inside capital. Outside capital is taken into consideration only when inside capital is not sufficient. Chang thought that due to the insufficient of proxy cost and investment, the business with high growing opportunities controlled the earnings by decreasing the liabilities [13]. Therefore, the debt ratio of the international electronic industry in the US might be lower than those in Taiwan.
2.2 Related research of dividend policy

Allen and Michaely compiled that from 1971 to 1992, the listing companies in the US paid the dividend with 50%~70% of the after-tax profit [4]. But, Fama and French studies the US between 1926 and 1999 and found out that the will of the business owners gave out cash dividend were decreasing after 1978, [22]. The debt ratio of the international industries and the payout ratio of cash dividend had negative correlation [1, 20, 36, 40]. Brav et al. [11] interviewed 308 Chief Financial Officers and found out that 30% of CFO thought that the operating strategies, financing behaviors, and financial decision had high similarities among businesses. Therefore, the cash dividend payout policy of the competitors was the important reference. Aggarwal and Kyaw [1] and Rozeff [48] thought that cash dividend and internationalization had positive correlation.

In 1980s, the electronic industries in Taiwan tended to payout stock dividend while traditional industries tended to payout cash dividend. In 2000s, the market value of the electronic industries in Taiwan has account for more than 50% in the stock market. The business owners then tended to payout cash dividend to avoid EPS dilution. The electronic industries tended to payout cash dividend since 2004 [37]. Fama and French thought that the American businesses were in the mature phase with high profit ability, large scale, and high growing opportunities but the intention to payout cash dividend were decreasing [22]. Review Taiwan, after the implement of combing two taxes and dividend balance policy, it was obvious that the high technology industries payout more cash dividend [29]. Therefore, the US and Taiwan have different cash dividend policies. Chiao et al. [17] thought that the industries in Europe and the US had higher internationalization level than those in Taiwan. Reeb et al. [47] pointed out that the higher the internationalization level the bigger the systematic risk. High systematic industries had high uncertainty of their future cash flow. They might payout lower cash dividend [1, 48]. In addition, high internationalization would have high growing with more positive reward investment plans to that the stockholders would not
worry about over or insufficient investment and were willing to accept lower dividend [6, 45]; therefore, the international electronic industries in the US might have less cash dividend than those in Taiwan.

3 Research design

3.1 Model verification

This paper used regression model to test the relationship between the debt ratio and cash dividend of the international electronic industries in the US and Taiwan. The empirical models are shown as follow.

**Theorem 3.1**

\[ Debt_{it} = \alpha_0 + \alpha_1 COUNT_{it} + \alpha_2 Div_{it} + \alpha_3 Risk_{it} + \alpha_4 ROA_{it} + \alpha_5 MTB_{it} + \alpha_6 MOG_{it} + \alpha_7 UNQ_{it} + \alpha_8 NDT_{it} + \alpha_9 Lsize_{it} + \alpha_{10} OL_{it} + \alpha_{11} FundDef_{it} + \alpha_{12} Tax_{it} + \epsilon_t \]

**Theorem 3.2**

\[ Div_{it} = b_0 + b_1 COUNT_{it} + b_2 Leverage_{it} + b_3 Beta_{it} + b_4 ROA_{it} + b_5 GR_{it} + b_6 Size_{it} + b_7 FCF_{it} + \epsilon_t \]

3.2 Measure variables

Debt ratio (Debt): this paper used “total liability at the end of the term divided by total asset at the end of the term” to measure the debt ratio (see [2, 8, 23, 44]). Cash dividend payout ratio (Div): Aggarwal and Kyaw [1] used cash dividend divided by aggregate earning of the year to measure the payout ratio. In Taiwan, it is often that the dividend of last year is distributed this year, so it does not use the aggregate earning of the year for measurement. Otherwise, cash dividend of each share divided by EPS is used for measurement [8, 20].
Country differences (COUNT): America internationalization electronic = 1; Taiwan internationalization electronic = 0.

In the aspect of the control variables of the debt ratio, the operational risk (Risk): if the market competitiveness is more aggressive, the operational risk will be higher. In order to avoid the total risk getting too high, the debt ratio will be lowered. Therefore, the operational risk and the debt ratio are negative correlated [1, 10, 16, 35]. Standard deviation of the first difference in EBIT divided by the average total asset over 5-years period is used for measurement. Profit ability (ROA): Shyam-Sunder and Myers [51] and Baskin [8] thought that when a company is in need for financing capital, it would look for inside capital and then outside capital for the insufficient part. Therefore, profit ability and the debt ratio should be in negative correlation [3, 5, 7, 54]. Income before extraordinary items divided by total asset is used for measurement. Growing opportunities (MTB): Nguyen and Faff thought that when a company had more growing opportunities, the insufficient investment problem would be smaller [42]. Therefore, growing opportunities and debt are negative correlated [5, 25, 44]. Market value divided by book value of the firm at the end of fiscal year is used for measurement. Asset mortgage value (MOG): asset mortgage value and the debt ratio are positive correlated [28, 30, 38, 54]. Net property, plant and equipment divided by total asset is used for measurement. Uniqueness (UNQ): the higher the uniqueness of the products the more competitive and profit ability they would have. The inside capital is then increased and the need for outside financing is decreased. Therefore, the uniqueness of the products and the debt ratio are negative correlated [10, 12, 34, 36, 54]. Ratio of R&D and advertising expenses to total sales is used for measurement. Non-debt tax shield (NDT): the tax saving interest of the debt would be balanced by non-debt tax shield. Therefore, non-debt tax shield and the debt ratio are negative correlated [18, 20, 43, 44]. Ratio of depreciation and amortization expenses to total sales is used for measurement.

Size: Graham, Lemmon and Wolf indicated that a larger size would have better
credit ratings and less information asymmetry [26]. It would be easier to seek for outside financing; therefore, the size and debt are positive correlated [1, 9, 20]. Natural log of total sales is used for measurement. Operation leverage (OL): Ferri and Jones [23] thought that when the operation leverage was greater, the differences of the earnings of a business and the cash flow would be greater. The capability of paying fix interest would be decreased. Therefore, operation leverage and the debt ratio are negative correlated. Annual percent change in EBIT divided by the percent change in sales is used for measurement. The model of the fund deficit (FundDef): the model of the capital gap of Shyam-Sunder and Myers [51] indicated that besides the business reaching or close to its liability ability, the predicting model of the fund deficit of the financing order would fill up new debt issue. Therefore, the fund deficit⁴ and the debt ratio are positive correlated. Dividend payout ratio (Div): Jensen thought that the dividend policy had close relationship with the capital structure [31]. The debt ratio and cash dividend payout ratio are negative correlated [1, 16]. Average tax rate (Tax): interest has the effect of debt tax shield; therefore tax rate and the debt ratio are positive correlated [27].

In the aspect of the control variables of cash dividend, the systematic risk (Beta): use Beta value to measure systematic risk. When a company is in the environment of high risk, the uncertainty of future cash flow is high and tends to payout less cash dividend. Therefore, Beta value and cash dividend have negative relationship [1, 48]. Profit ability: profit ability and cash dividend have positive relationship (see [1, 2, 22, 30, 48]).

Growing (GR): the business that has higher growing would have more positive net current value investment plans. The shareholders won’t worry about the situation of over investment and can accept lower dividend [1, 2, 6, 45]. Therefore, growing

⁴ FundDef = DIVt + Xt + DWt + Rt – Ct, Where, Ct = operating cash flow, after interest and taxes, DIVt = dividend payments, Xt = capital expenditures, DWt = net increase in working capital, Rt = current portion of long-term debt.
and cash dividend have negative relationship. Average past 5-year sales growth rate is used for measurement. Free cash flow (FCF): in order to lower proxy cost, the stockholders would ask for more dividend to reduce the free cash flow distributed by the administrators. Therefore, free cash flow and cash dividend have positive relationship [21]. Operating profit before depreciation expenses-interest-cash dividend) / beginning asset is used for measurement. Size: Chang and Rhee [14], Aggarwal and Kyaw [1], Smith and Watts [53] thought that larger size would have more inside capital and tended to payout more cash dividend; therefore, the size and cash dividend have positive relationship.

### 3.3 Sample

The data recourse of this paper is Compustat and the data base of Taiwan Economic Journal. The subjects are the listing companies in the US and Taiwan in the sample period from 1999 to 2008. The specimen screening conditions are: deleting insurance business, security business, public affairs and governmental business because of their operating characteristic and special financial structures; deleting 26,990 US observation values and 13,250 Taiwan observation values and deleting 5,800 in the US and 2,780 in Taiwan of non-electronic industries. And because of the existence period and the founded time are different, 10-year non-complete specimen are deleted, 19,820 in the US and 9,130 in Taiwan.

This paper used the overseas sales account more than 50% of total sales as the internationalization level variable5,2, deleting non-international electronic industries 965 in the US and 360 in Taiwan. Refer to the method adapted by

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5 The scholars mostly used the overseas sales account more than 20% of total sales as the internationalization level variable [1, 24, 34, 49, 50].
Aggarwal and Kyaw [1], the extreme values were handle in winsorize way that the first and the ninety-ninth percentiles of the observation value were winsorized. According to this, this paper acquired 405 internationalized (Note 2) electronic industries in the US and 980 internationalized electronic industries in Taiwan.

4 Empirical result and analysis

4.1 Descriptive statistic

Table 1 is the descriptive statistic of the internationalized electronic industries in the US and in Taiwan. The average values of the total asset of the internationalized electronic industries in the US and in Taiwan are 5170.7574 million dollars and 1101.7750 million dollars respectively. The two has a difference of 4.70 times showing that the scale of the internationalized electronic industries in the US is greater than those in Taiwan. The average the debt ratio of the internationalized electronic industries in the US is 0.378; lower than 0.414 of those in Taiwan. The average cash dividend payout ratio in the internationalized electronic industries in the US is 0.071; lower than 0.243 of those in Taiwan. In the aspects of profit ability, growing opportunities, product uniqueness, business systematic risk, operational risk, operation leverage, and the average of free cash flow, the internationalized electronic industries in the US are higher than those in Taiwan; and as for mortgage asset and non-debt tax shield, Taiwan has higher average than the US. The average values of the model of the fund deficit and average tax rate in the US are smaller than in Taiwan.
Table 1: Descriptive statistics of variables

| Variable | US (N=405) | | | | | | Taiwan (N=980) | | | |
|----------|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Debt     | 0.024 | 1.039 | 0.378 | 0.179 | 0.053 | 0.875 | 0.414 | 0.152 | 0.000 | 1.079 | 0.243 | 0.289 | 0.278 | 0.244 | 0.049 | 0.091 |
| Div      | 0.000 | 0.783 | 0.071 | 0.121 | 0.000 | 1.079 | 0.243 | 0.289 | 0.000 | 1.079 | 0.243 | 0.289 | 0.000 | 1.079 | 0.243 | 0.289 |
| Risk     | -21.992 | 12.577 | 0.413 | 3.624 | -24.698 | 21.487 | 0.075 | 4.885 | 0.000 | 1.079 | 0.243 | 0.289 | 0.278 | 0.244 | 0.049 | 0.091 |
| ROA      | -0.131 | 0.371 | 0.080 | 0.080 | -0.278 | 0.244 | 0.049 | 0.091 | 0.000 | 1.079 | 0.243 | 0.289 | 0.278 | 0.244 | 0.049 | 0.091 |
| MTB      | -2.902 | 13.634 | 2.667 | 2.129 | 0.284 | 8.802 | 1.785 | 1.363 | 0.284 | 8.802 | 1.785 | 1.363 | 0.284 | 8.802 | 1.785 | 1.363 |
| MOG      | 0.015 | 0.675 | 0.190 | 0.127 | 0.006 | 0.693 | 0.290 | 0.155 | 0.006 | 0.693 | 0.290 | 0.155 | 0.006 | 0.693 | 0.290 | 0.155 |
| UNQ      | 0.000 | 0.534 | 0.102 | 0.102 | 0.000 | 0.415 | 0.036 | 0.039 | 0.000 | 0.415 | 0.036 | 0.039 | 0.000 | 0.415 | 0.036 | 0.039 |
| NDT      | 0.010 | 0.242 | 0.057 | 0.050 | 0.002 | 0.719 | 0.083 | 0.088 | 0.002 | 0.719 | 0.083 | 0.088 | 0.002 | 0.719 | 0.083 | 0.088 |
| OL       | -0.162 | 0.543 | 0.109 | 0.111 | -14.918 | 5.837 | 0.099 | 2.130 | -14.918 | 5.837 | 0.099 | 2.130 | -14.918 | 5.837 | 0.099 | 2.130 |
| FundDeft | -1.241 | 0.752 | 0.022 | 0.199 | -0.336 | 1.063 | 0.413 | 0.241 | -0.336 | 1.063 | 0.413 | 0.241 | -0.336 | 1.063 | 0.413 | 0.241 |
| Beta     | -0.888 | 6.583 | 1.941 | 1.156 | 0.413 | 1.590 | 1.082 | 0.233 | 0.413 | 1.590 | 1.082 | 0.233 | 0.413 | 1.590 | 1.082 | 0.233 |
| GR       | -0.220 | 0.673 | 0.110 | 0.115 | -4.554 | 0.640 | 0.085 | 0.297 | -4.554 | 0.640 | 0.085 | 0.297 | -4.554 | 0.640 | 0.085 | 0.297 |
| FCF      | -0.154 | 0.220 | 0.045 | 0.069 | -0.848 | 0.515 | -0.018 | 0.165 | -0.848 | 0.515 | -0.018 | 0.165 | -0.848 | 0.515 | -0.018 | 0.165 |
| Tax      | -1.860 | 0.993 | 0.119 | 0.440 | 0.000 | 3.810 | 1.852 | 1.429 | 0.000 | 3.810 | 1.852 | 1.429 | 0.000 | 3.810 | 1.852 | 1.429 |

4.2 The regression analysis of the internationalized electronic industries in the US and in Taiwan

Table 2 is the relationship of the debt ratio between the internationalized electronic industries in the US and those in Taiwan. The debt ratio of the internationalized electronic industries in the US is lower than those in Taiwan and reach significant standard (coefficient is -0.042 and t-value is -3.013). The VIF
values of each variables are lower than the cut off value 10 which shows that each variable has no doubt in co-linearity. The products of the internationalized electronic of the US have the uniqueness while Taiwan has fewer self brands in internationalized electronic industries. The products are mostly OEM ones and the profit is lower. Therefore, the internationalized electronic industries in the US can easily possess more inside capital through operational earnings. The intention to financing is lower [8, 51]. This result is in consistence with the study of the scholars in [1, 12, 36, 46, 47] analyzing the internationalized industries of the listing companies in the US.

Table 2:  Regression analysis of the debt ratio

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>T-value</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.095</td>
<td>3.040***</td>
<td></td>
</tr>
<tr>
<td>COUNT</td>
<td>-0.042</td>
<td>-3.013***</td>
<td>2.986</td>
</tr>
<tr>
<td>Div</td>
<td>-0.050</td>
<td>-3.073***</td>
<td>1.394</td>
</tr>
<tr>
<td>Risk</td>
<td>-0.001</td>
<td>-1.607</td>
<td>1.032</td>
</tr>
<tr>
<td>ROA</td>
<td>-0.606</td>
<td>-11.171***</td>
<td>1.767</td>
</tr>
<tr>
<td>MTB</td>
<td>0.011</td>
<td>4.065***</td>
<td>1.440</td>
</tr>
<tr>
<td>MOG</td>
<td>0.118</td>
<td>3.544***</td>
<td>2.009</td>
</tr>
<tr>
<td>UNQ</td>
<td>-0.593</td>
<td>-8.685***</td>
<td>1.803</td>
</tr>
<tr>
<td>NDT</td>
<td>-0.509</td>
<td>-7.596***</td>
<td>2.102</td>
</tr>
<tr>
<td>Size</td>
<td>0.057</td>
<td>14.349***</td>
<td>1.223</td>
</tr>
<tr>
<td>OL</td>
<td>-0.004</td>
<td>-1.790</td>
<td>1.010</td>
</tr>
<tr>
<td>FundDeft</td>
<td>-0.061</td>
<td>-3.614***</td>
<td>1.915</td>
</tr>
<tr>
<td>Tax</td>
<td>-0.004</td>
<td>-1.473</td>
<td>1.457</td>
</tr>
<tr>
<td>F-Vaule</td>
<td>48.736***</td>
<td>Adj.R²</td>
<td>29.27%</td>
</tr>
</tbody>
</table>

*, **, *** Significant at the 10%, 5%, and 1% levels, respectively.
In control variables, growing opportunities, mortgage fix asset, and size have significant positive relationship with the debt ratio. This shows that internationalized electronic businesses have larger size, more assets that can be mortgaged, higher credit rating, and lower liability cost so that the businesses are willing to financed [28, 30, 38, 54]. Cash dividend, profitability, uniqueness, non-debt tax shield, and the model of fund deficit have significant negative relationship with the debt ratio. That means if the internationalized electronic industries have higher debt, greater profitability, higher non-debt tax shield, and less dividend payout, the financing intention of the businesses would be decreased [18, 20, 43, 44]. Tax rate, operating risk, and operation leverage are irrelevant with the debt ratio. This result is the same with the capital structure analysis of the US manufacturers by Titman and Wessels [54].

Table 3: Regression analysis of the cash dividend

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>T-value</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.055</td>
<td>1.160</td>
<td></td>
</tr>
<tr>
<td>COUNT</td>
<td>-0.232</td>
<td>-13.935</td>
<td>***</td>
</tr>
<tr>
<td>Leverage</td>
<td>-0.156</td>
<td>-3.704</td>
<td>***</td>
</tr>
<tr>
<td>Beta</td>
<td>-0.017</td>
<td>-2.020</td>
<td>*</td>
</tr>
<tr>
<td>ROA</td>
<td>0.791</td>
<td>10.057</td>
<td>***</td>
</tr>
<tr>
<td>SalesGR</td>
<td>0.026</td>
<td>1.008</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>0.036</td>
<td>5.072</td>
<td>***</td>
</tr>
<tr>
<td>FreCFLS</td>
<td>0.190</td>
<td>4.284</td>
<td>***</td>
</tr>
<tr>
<td>F-Vaule</td>
<td>66.10</td>
<td>Adj.R²</td>
<td>4.76%</td>
</tr>
</tbody>
</table>

*, **, *** Significant at the 10%, 5%, and 1% levels, respectively.
Table 3 is the relationship in the aspect of cash dividend between the internationalized electronic industries in the US and in Taiwan. The VIF value of each variable is far below cut off value 10; no doubt of co-linearity. The table shows that the cash dividend payout by the internationalized electronic industries in the US is less than those in Taiwan with a significant standard (the coefficient is -0.232 and t-value is -13.935). The internationalized level gets higher in the electronic industries in the US, the business systematic risk would be higher and the uncertainty of future cash flow would also be higher. Thus, the payout cash dividend is less [1, 32, 48]. On the contrary, after the implantation of two-tax combining and dividend balance policy in Taiwan, high technology industries increase the payout of the cash dividend [29].

In the aspect of control variables, profit ability, business scale, and free cash flow have significant positive relationship with the debt ratio, meaning the internationalized electronic industries would give out more cash dividend if the profit ability is higher, the size is bigger and the free cash flow is more. This result is the same with the study conclusion of the scholars [1, 14, 31].

The debt ratio and the systematic risk and cash dividend have significant negative correlation. This means if the internationalized electronic industries have higher debt, higher systematic risk, and the payout of the cash dividend would be less. This result is the same with the study conclusion of the scholars [1, 32, 48].

5 Conclusion

The electronic industry has become the most important industry in Taiwan, but most of the electronic products in the main stream market come from the electronic businesses in the US. This paper compared the debt ratio and the scale of cash dividend between the international electronic industries in the US and Taiwan from 1999 to 2008 as the reference for financing strategies and decision.
The evidence showed that the debt ratio and the cash dividend payout ratio of the international electronic industries in the US were lower than those in Taiwan might because of the uniqueness and the high profit ability of the internationalized electronic industries in the US. They have more earnings and inside capital so that the debt ratio is lower. The internationalized electronic industries in the US have higher internationalization level, better growing, and high uncertainty of the future cash flow so they tend to payout less cash dividend.

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