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The Influence of Internationalization Degree on the Performance of Industry-Specific Companies: A Case Study of Taiwan (2001-2017)

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ABSTRACT

In this study, a total of 924 enterprises and 15,708 companies were used for listed companies in 2001-2017, and two industries were identified as scientific and technological industries and traditional industries from the research samples, among which 556,9452 (60.17%) were in the science and technology industry and 6,256 in traditional industries. The proportion of total sales of overseas sales was regarded as the index of internationalization. The results demonstrated that the influence of internationalization of the technology industry on the performance of companies exhibited an inverse U relationship, and the traditional industry exhibited a positive U relationship. Moreover, the international degree of the science and technology industry was more than 71.68%. The strengthening of internationalization will exert a negative impact on the performance of a company. In addition, traditional industry was more dependent on the domestic market, international reaches 38.49%, and the party can accelerate a company's performance. This finding is ascribed to that the effect of internationalization on the performance of a company differs markedly as long as the degree of dependence of the two industries in the international market and the domestic market is different.

Keywords: International Company Performance, Panel Data Electronics, Company's Performance
JEL Classifications: C23, L25

1. INTRODUCTION

Consensus among scholars regarding the concept of internationalization has never been reached, and broad definitions and operational definitions of the variable are divergent. For example, Geringer et al. (1989) adopted degrees of internationalization, Dess et al. (1995) used the degree of international hyperkeratosis, Delios and Beamish (1999), Dess et al. (1995) expressed internationalization in terms of regional hyperkeratosis and in terms of Grant (1987), and Kotabe et al. (2002), a non-one used in addition to the noun, As a result, the measurement of variables is also varied, some of which are measured by a single item, while others are measured by the establishment of a single indicator of multiple items. In fact, each measure reflects the value of Gomes and Ramaswamy (1999), of different degrees of involvement abroad, and the international polygonal of different countries should be measured by appropriate indicators (Geringer et al., 2000).

Five operational ways exist to measure the internationalization of enterprises according to performance attributes: (1) the proportion of overseas sales to total sales (FSTS); (2) research development intensity (RDI); (3) marketing intensity (AI); (4) the proportion of export sales to total sales (ESTS); and (5) and the proportion of overseas profits to total profits (FPTP).

Kafouros et al. (2008), Hsu and Pereira (2008), Bae et al. (2008), Gaur and Kumar (2009), Filatotchev and Piesse (2009), Brouthers et al. (2009), and Shih-Yung et al. (2019) measure the degree of internationalization of a company by using the proportion of overseas sales to total sales (FSTS). Eppink and Van (1988) supports the use of the proportion of overseas profits to total profits (FPTP) to measure the degree of internationalization. Caves (1982) asserts that research and development activities can predict the growth of multinational enterprises. Sullivan (1994) pointed out that the degree of export activity (ESTS) can determine the extent of internationalization of enterprises. Franko (1989) found that RDI is an important principle to gain market share in global competition. Similarly, some researchers conclude that the scale of marketing function of multinational enterprises is important. In addition, Caves (1982), Keown et al. (1989), and Capon et al. (1990) report that measuring advertising intensity (AI) assists to explain the degree of international involvement of enterprises. Extant literature on the impact of internationalization on corporate performance is presented in Table 1. It can be observed that most scholars have found that the higher is the degree of the internationalization of enterprises in each country, the greater is the positive impact on corporate performance, and can even achieve a U-shaped relationship. Only a few countries have no, or a negative, impact on the results.

In March 1, 2018, U.S. President Donald Trump announced that the U.S. would levy new tariffs on steel and aluminum as early as the following week, comprising 25% tariffs on steel and 10% tariffs on aluminum. As soon as this was announced, major financial indices declined. On March 1, the three major stock indices in the U.S. stock market fell by more than 1%. The Dow Jones Industrial Index, which accounts for a large proportion of industrial companies in the U.S., also fell sharply. Indeed, a 3-day decline ensued, and basically constituted the end of an economic rebound that had occurred since February 2018. Classical technical analysis also showed the appearance of the ominous "double-top" phenomenon. China's stock market reflected this early on, in which the Hang Seng China Enterprise Index fell 8.7%, followed by the Shanghai Composite Index decreasing 6.36%, Hang Seng Index falling 6.21%, and the Shanghai and Shenzhen 300 Index decreasing 5.9%. The impact of world trade on the economies of various countries is becoming increasingly large and interdependent. In this study, we explore the impact of internationalization on the performance of other companies in industries, and take the listed companies in developed economies (Taiwan) as the economies of focus.

This research is divided into four sections. The first section is the Introduction, which introduces the importance of international trade and related literature on the impact of internationalization on corporate performance. The second section is research data and research method. The data and analysis in the second section are divided into technology industry and traditional industry. Explanation of variables and panel data analysis constitutes the research method of this study. The third section is Empirical Analysis, which is divided into univariate analysis, bivariate analysis, general regression analysis, and panel data analysis. The final chapter is the Conclusion, which summarizes the results of this study.

2. RESEARCH DATA AND METHOD

In 1992, Taiwan's per capita GDP exceeded 10,000 USD and formally entered the ranks of the world's developed economies. In 1993, Taiwan became one of the top 20 economies globally. Therefore, the data of this study are selected after the beginning of the 21st century. From 2001 to 2017, listed companies in Taiwan (excluding the financial industry) were included, and 924 samples with incomplete data were deleted, comprising a total of 15,708 samples. Sources are from the Taiwan Stock Exchange.

The sample number of industries is shown in Table 2. The table shows that the electronic industry accounts for the largest share of listed companies in Taiwan, constituting more than half (60.17%). The research industry in this study is divided into two parts: (1) the electronic industry (termed here as the *science and technology industry*); and (2) the non-electronic industry (termed here as the traditional industry).

2.1. Study Variables

Three main research variables exist in general empirical analysis, i.e., explanatory variables, interpreted variables, and control variables. The purpose of this study is to explore the impact of corporate internationalization on corporate performance. Therefore, the explanatory variable of this study is the degree of corporate internationalization, and the explanatory variable is corporate performance. The control variable is the explanatory variable of this study, which has an impact on corporate performance. This study adopts the aspects of pledge, D/A, company size, director structure (3), etc. The proportion of R&D funds, the age of enterprises, and the growth rate of fixed assets (Lasset) are 6+3. Detailed research variables are introduced as follows.

2.1.1. Explanation variable - internationalization degree (ER)

There are five operational ways to measure the internationalization of enterprises by performance attributes: (1) the proportion of overseas sales to total sales (FSTS); (2) RDI; (3) marketing intensity (AI); (4) the proportion of export sales to total sales (ESTS); and (5) the proportion of overseas profits to total profits (FPTP).

Kafouros et al. (2008), Hsu and Pereira (2008), Bae et al. (2008), Gaur and Kumar (2009), Filatotchev and Piesse (2009), and Brouthers et al. (2009) measure the degree of internationalization of the company by using the proportion of overseas sales to total sales (FSTS). Caves (1982) reports that research and development activities can predict the growth of multinational enterprises. Franko (1989) found that RDI is an important principle to gain market share in global competition. Similarly, some researchers report that the scale of marketing function of multinational enterprises is important. Caves (1982), Keown et al. (1989), and Apon et al. (1990) think that measuring by advertising intensity (AI) assists to explain the degree of international involvement of enterprises. Sullivan (1994) pointed out that the degree of export activity (ESTS) can divide the degree of internationalization of enterprises. Eppink and Van (1988) supports the use of the proportion of overseas profits to total profits (FPTP) to measure

Table 1: Internationalization and corporate performance

Empirical results of scholars (years)	Samples	Internationalization indicators	Performance indicators	Empirical results
Errunza and Lemma (1984)	Historical month of 60 securities and market over-payment	FSTS, OSC	Excess evaluation	The degree of internationalization has a positive effect on the evaluation effect
Geringer et al. (1989)	The United States and 100 manufacturers in Europe in 1981	FSTS	ROA, ROS	Inverted U-type relation
Gomes and Ramaswamy (1999)	1990-1995 95 manufacturers in the United States	FSTS; FATA; OCC and extraction of FSTS, FATA, OCC into a single index	ROA, ROS	Inverted U-type relation
Lu and Beamish (2001)	164 small and medium-sized manufacturers in Japan from 1986 to 1997	Number of FDI in ESTS	ROA, ROS	There is a negative relationship between ESTS and performance, while the number of FDI pieces is inversely U-shaped.
Qian (2002)	71 small and medium-sized manufacturers in the United States, 1989-1993	FSTS	ROS	U-type relation
Siah (2007)	152 manufacturing companies in Australia and New Zealand in 2004	FSTS	Net profit	Positive correlation
Chang (2007)	Asia-Pacific MNCs, 1998-2002	FSTS, FATA	ROS	International expansion in the Asia-Pacific region: horizontal S curve; global expansion: irrelevant
Chang and Wang (2007)	2402 companies in COMPUSTAT, USA, 1996-2002	FSTS	ROA, ROE, ROS	U-type correlation
Chari et al. (2007)	1995-1996 131st company of Computerword	OCC, FSTS	Tobin's Q	Unrelated
Fang et al. (2007)	There are 4964 enterprises in Japan from 1990 to 2003	International experience	Loss, profit and loss are balanced, profit and loss are balanced	Unrelated
Contractor et al. (2007)	269 Indian enterprises, 1997-2001	FSTS	ROA, ROE, ROS	U-type correlation
Bobillo et al. (2008)	1991-2001, 1,500 enterprises in Germany, France, the United Kingdom, Spain and Denmark.	FSTS	ROA	Horizontal S-type correlation
Venzin et al. (2008)	Five banks with international operations in 2005	FSTS, FATA, FETE	ROE, ROA cost-to-equity ratio	Partial positive correlation
Qian et al. (2008)	189 MNCs of Fortune 500 in 1996-2000	Region polyhedralization FSTS, FATA, FETE	ROA, ROS	Positive correlation
Kafouros et al. (2008)	84 manufacturing industries in the UK, 1989-2002	FSTS×RDI	Sales revenue per employee in each company	Positive correlation
Hsu and Pereira (2008)	1050 companies in the United States, 1990-2000	FSTS, FPTP, FATA	ROS, ROI, ROE	Positive correlation
Driffield et al. (2008)	409 MNCs in the United Kingdom, 1990-1999	OCC	Total productivity	Inverted U-type correlation
Blesa and Ripolles (2008)	2005 198 enterprises in Spain and 383 MNCs in Belgium	International commitments	Profitability profit market share	Positive correlation
Bae et al. (2008)	US. 2,025 com- panies, 1997-2000	FSTS	ROE, ROA, ROS SG5, MVBV	MVBV: horizontal S-type related balance: independent
Gaur and Kumar (2009)	India manufacturing and services, 1997-2001	FSTS	ROS, ROA	Positive correlation
Filatotchev and Piesse (2009)	From 1985 to 2000, there were 1110 initial listed companies in Britain, France, Germany and Italy.	FSTS	Sales growth	Positive correlation
Brouthers et al. (2009)	In 2005, there were 706 companies in Barbados, Dominica, Jamaica, Grenada, Saint Lucia, Trinidad, Tobago, Greece, and the Caribbean	Overseas market number, FSTS	Sales profit contribution	Positive correlation

(Contd...)

Table 1: ***(Continued)***

Empirical results of scholars (years)	Samples	Internationalization indicators	Performance indicators	Empirical results
Bouquet et al. (2009)	2001-2002 the United States, Canada, France, Germany, the United Kingdom, Japan had a total of 135 MNCs	International attention at headquarters (global scanning, overseas communication, global exchange)	ROS, ROE, ROA	U-type correlation
Banalieva and Santoro (2009)	2000-2006 701 MNCs from 28 countries in Europe, Asia, America and Africa	Global orientation in the region	ROA, ROS	Negative correlation; but the interaction between the two is positive.
Filatotchev et al. (2005)	711 SMEs in China	The global network of MNCs' Experience in the entrepreneur's home	Pre-tax gross profit for sales growth of market occupation rate	Negative correlation; but the interaction effect of the two is a positive correlation
Dastidar (2009)	2980 MNCs worldwide, 1990-1998	Sales weighted benchmark value for each interval	Tobin's Q	Unrelated
Shih-Yung et al. (2017)	924 listed companies in Taiwan, 2001-2017	FSTS	Tobin's Q	Positive correlation

Table 2: Sample number industry distribution

Industrial type	Trade department store	Spinning and weaving	Electric machinery	Electrical equipment	Electronics	Agriculture and forestry	Iron and steel
Number of companies	10	45	68	15	556	1	39
Industrial type	Sightseeing	Shipping	Biochemistry	Other	Building materials construction	Automobile	Rubber
Number of companies	1	5	63	49	4	2	11
Industrial type	Foodstuff	Cement	Papermaking	Plastic	Oil and electricity gas	Cultural creativity	Total
Number of companies	15	2	6	23	1	8	924

the degree of internationalization. In order to adapt to Taiwan's environment, this study measures the degree of internationalization by the proportion of overseas sales to total sales (FSTS).

2.1.2. Explained variable - corporate performance (Tobin's Q)

In this study, Tobin's Q, the most commonly used indicator of corporate market performance, is used, such as La Porta et al. (2002) Tobin's Q. However, when calculating Tobin's Q, the replacement cost of the company's assets must be known, and thus it cannot be used. So, we replace it with Proxy Q, such as Claessens et al. (2002) Proxy Q, which is measured as follows:

2.1.3. Control variables

1. R&D expenditure (RD)

R&D expenditure (RD) refers to the proportion of research and development expenses to sales revenue. Bradley, Jarrell and Kim (1984), Morck et al. (1988), Titman and Wessels (1988), Crutchley and Hansen (1989), McConnell and Servaes (1990), Hermalin and Weisbach (1991), Jensen et al. (1992), and Wei et al.(2017) concluded that the more R&D that the company spent, the higher its growth in the future (data from the Taiwan Stock Exchange).

R&D expenditure ratio = R&D expenditure/business income

2. Company size (SC)

In general, the size of a company takes the natural logarithm of its total assets or activity-based costs as the proxy variable. In this study, the natural logarithm of total assets is used as the measurement standard. When the company's scale is larger, it is easier to make use of the advantages of economies of scale, and its operating performance is often superior. Therefore, this study takes the total book assets of sample companies at the end of each year as the natural logarithm as the proxy variable of company size (data from the Taiwan Stock Exchange).

Company size = log (total assets)

3. Director structure

Regarding this variable, we adopt three variables: (1) board size (BSIZE; BS); (2) proportion of external directors (PE); and (3) part-time status of directors and supervisors (CP). Yermack (1996) and Shih-Yung et al. (2017) explored the relationship between the size of the board of directors and corporate performance, and empirical results demonstrated that a negative correlation exists between the size and performance of the board of directors. Specifically, a small board of directors can better fulfill the responsibilities of supervisors, and thus enhance corporate value. Fich and Shivdasani (2005) found that, when most members of the board of directors concurrently held three or more supervisory positions in other companies, corporate performance was reduced. Core et al., (1999) and Shivdasani and Yermack (1999) proposed that, when the board of directors held too many positions concurrently, they could not effectively supervise and manage the company. However, the empirical results of other studies reach the opposite conclusion. For example, Ferris and Pritchard (2003) found no evidence to show that most of the supervisors evade their responsibilities on the board of directors when they hold three or more supervisory positions. Yermack (2004) reported that, when most of the board supervisors held three or more board supervisory positions, they still fulfilled their supervisory responsibilities. From the supervisory perspective, although external supervisors possess less information to supervise and manage, they can play an independent supervisory role due to their independent status. Internal supervisors hold positions within the company and have more information to supervise and control managers, but this is the case because they possess less information to supervise and manage. Indeed, they may share a common interest, and thus may be more likely to be controlled by managers or collaborate with them to make unfavorable corporate strategies. Fama (1980) and Baysinger and Hoskisson (1990) believe that external directors and supervisors have an independent status and similar professional knowledge, and the company hires them to improve the company's performance through their professional knowledge. Therefore, a higher ratio of external directors to supervisors not only achieves effectiveness of supervision, but benefits from their professional knowledge to improve corporate performance.

The size of the board = the number of directors.

The proportion of external directors and supervisors = the number of external directors and supervisors/the number of all directors and supervisors.

The part-time status of directors and supervisors is a fictitious variable. If more than half of the directors and supervisors have three or more part-time jobs (including standard jobs), it is 1, and 0 otherwise. Due to the problem of data acquisition, the definition of position is mainly based on the directors, supervisors, and managers in the annual reports of listed companies.

4. Firm age; AG

In this study, enterprise age refers to the natural age of the enterprise. Its calculation model is as follows:

Business age= (time of research data (12/31 of that year) - business establishment time)/365

5. Debt ratio (D/A; DA)

Myers and Turnbull (1977), Jensen (1986), Morck et al., (1988), Stulz (1990), and Shih-Yung et al. (2017) argued that debt ratio implies corporate tax shield; and the higher is the debt ratio, the lower is the interest rate and the smaller is the value of the company. Therefore, this study utilizes this variable to explore the impact of corporate value (data from the Taiwan Stock Exchange).

Liability ratio = book value of liabilities; book value of assets

6. Lasset; LA

Agrawal and Knoeber (1996), Titman and Wessels (1988), and Shih-Yung et al. (2017) all concluded that the higher is the asset growth rate, the more investment growth opportunities the company will have in the future, and it is one of the comp

any's operating performance indicators. The data sources are from the Taiwan Stock Exchange.

(Total fixed assets for the current year - total fixed assets for the previous year-total fixed assets for the previous year.)

7. Pledge of supervisors (PL)

This ratio is one of the commonly used indicators of corporate governance. Yeh et al. (2001) and Shih-Yung et al. (2017). argued that the higher is the pledge ratio of major shareholders' equity, the deeper is their involvement in the stock market, and the worse is the company's performance (data from the Taiwan Stock Exchange).

The pledge ratio of the board of directors = the number of pledges of the board of directors and the number of shares held by all of the board of directors and supervisors

The effect of control variables on corporate performance is shown in Table 3.

2.2. Research Methods

Since this study explores the impact of internationalization on corporate performance from 2001 to 2017, panel data are the data for this study.

Panel data consider both cross-sectional and time series data. Therefore, when analyzing panel data, if the data are heterogeneous, the traditional analysis method, i.e., the least square method (OLS), will result in invalid estimates. This is because the traditional least squares method (OLS) can only deal with cross-sectional or time series data. When cross-sectional and time series data exist simultaneously, the least squares method (OLS) ignores the differences between cross-sectional or time series, resulting in inefficient estimation results. However, the mixing of all time-series and cross-sectional data is not necessarily suitable for the panel data model, and can be compared with the general regression model through the mixed regression equation model.

The panel data model can be essentially divided into the fixed effect model and the random effect model. Because the fixed effect model and the random effect model possess unique characteristics and applicability, they can be selected by simple judgment. Intuitively, if the cross-sectional unit is selected without a sampling process, the fixed effect model should be adopted; conversely, when the selected cross-sectional unit is sampled, the random effect model should be adopted. Mundlak (1978) asserted that if the intercept term of the stochastic effect model was correlated with the explanatory variables, there would be errors. Consequently, fixed effect should be used in this case. If the intercept term was not related to the explanatory variables, the stochastic effect should be used. The Hausman Test proposed by Husman (1978) can be employed to select the decision model.

3. EMPIRICAL ANALYSIS

3.1. Univariate Analysis

Narrative statistics analysis is now applied. The sample number of this study is 15708, including 9452 in the science and technology industry and 6256 in traditional industry. The results of narrative statistics of each research variable are shown in Tables 4 and 5, respectively.

The explanatory variable of this study is export ratio. The average value of the science and technology industry is 68.45%, while traditional industry is only 47.87%. Moreover, the science and technology industry is left-sided (−0.9181), but not large, while the traditional industry is right-sided (−0.0866). In terms of kurtosis, the two industries exhibit a platykurtic pattern.

The average (Tobin's Q) of company performance is 1.13, while the traditional industry is only 1.03. Both industries are right-biased, and both belong to the distribution of high fjord. The average value of the technology industry is 1.13, while the traditional industry is only 1.03.

Regarding other variables, i.e., the size of the average number, the development and development rate of the science and technology industry, the proportion of independent directors, the part-time status of the directors, and the fixed assets, are higher than those of the traditional industry, and the traditional industry is at the factory age. In addition, the proportion of the load and the stock of the board of supervisors is higher than that of the science and technology industry.

3.2. Bivariate Analysis

From the matrix tables of correlation coefficients in Tables 6 and 7, it can be found that the correlation coefficients among the explanatory variables are mostly of low correlation, indicating that the interaction between them has little effect, and the regression analysis will not produce results different from the actual situation. Scale, age, D/A ratio, and the pledge ratio of supervisors in the two industries are negatively correlated with the dependent variable Tobin's Q. Moreover, most of these variables are negatively correlated with other variables, while other variables are positively correlated with Tobin's Q. However, the impact of variables on Tobin's Q requires further econometric analysis.

3.3. Regression Analysis

Prior to panel data analysis, general regression analysis should be performed to determine which model is suitable for sample data. In this study, the general regression analysis model is used. First, the explanatory variable export ratio is analyzed. Then, all control variables are analyzed. Finally, overall variables are analyzed. Since, previous researchers found that the degree of internationalization has a U-shaped relationship, a regression analysis of the U-type relationship was carried out in this study. The results are shown in Tables 8 and 9.

From Table 8, it can be seen that the regression equations of the analysis results of the whole variables of the science and technology industry are as follows. For convenience of expressing the regression equations, the sub-coefficients of the underlying formula are presented in the last three decimal places:

Tobin's Q = 1.049+0.004ER-0.00003ER2+0.002RD+0.033SC
(0.090) (0.001) (0.000) (0.001) (0.006)
*** *** *** ** ***
-0.012AG+0.011BS+0.005PE-0.029CP-0.012DA
(0.001) (0.004) (0.001) (0.026) (0.001)
*** *** *** *** ***
+0.003LA-0.001PL
(0.003) (0.001)
***

In the general regression model, the degree of internationalization of the science and technology industry has an inverted U relationship,

Table 3: Summary of the definitions of variables and expected effect

Variable	Definitions	Expected	Notes
Dependent variable			
Tobin's Q	$\frac{\text{Market value of equity (common stocks +special stocks)+book value of debts}}{\text{Book value of assets}}$		
Independent variable			
R&D expense ratio (RD)	R & D expense/operation revenue	?	Morck et al. (1988), Shih-Yung et al. (2017).
Control variables			
Degree of internationalization (FS)	Foreign Sales as a percentage of Total Sales, FSTS (FSTS)	+	Bae et al. (2008); Gaur and Kumar (2009); Filatotchev and Piesse (2009); Brouthers et al. (2009)
Pledge ratio (PL)	Pledge/shares held	-	Yeh et al. (2001), Shih-Yung et al. (2017)
Liability ratio (DA)	Book value of debts/book value of assets	?	McConnell and Servaes (1990), Shih- Yung et al. (2017)
Scale (SC)	In (total assets)	+	Shih-Yung et al. (2017)
Board size (BS)	seats of directors	-	Yermack (1996), Shih-Yung et al. (2017)
Concurrent post holding (CP) (dummy variable)	$\begin{cases} 1, & \text{half of the directors hold three or more positions} \\ 0, & \text{else} \end{cases}$	?,-	Fich and Shivdasani (2005)-Shih-Yung et al. (2017)
Proportion of external directors (PD)	Number of external directors/total number of directors	+	Fama (1980), Baysinger and Hoskisson (1990), Shih-Yung et al. (2017)
Growth rate of fixed assets (LA)	$\left(\text{Total fixed assets of the year} - \text{Total fixed assets of last year}\right) / \text{Total fixed assets of last year}$	+	Agrawal and Knoeber (1996)

Table 4: Description of statistics 1 - science and technology industry

	Tobin's Q	ER	RD	SC	AG	BS	PE	CP	DA	LA	PL
Obs.	9452	9452	9452	9452	9452	9452	9452	9452	9452	9452	9452
Mean	1.1279	68.4500	5.1514	15.0357	21.4323	9.0003	17.9294	0.1139	40.7968	7.4041	5.7919
Med.	0.9000	77.7300	2.6700	14.8437	20.5370	9.0000	20.0000	0.0000	40.9400	-0.3042	0.0000
Max.	18.3300	100.2300	185.1100	21.9492	63.9808	19.0000	80.0000	1.0000	132.8900	108.0000	100.0000
Min.	0.0000	0.0000	0.0000	9.8297	1.1014	0.0000	0.0000	0.0000	0.9000	-99.1470	0.0000
Std.	0.8116	29.3330	8.4351	1.4513	9.4812	2.0672	15.1697	0.3178	17.1837	30.4968	13.9862
Sk	4.7850	-0.9181	5.8475	0.8316	0.4187	-0.6400	0.1781	2.4300	0.1854	1.3918	3.1871
K	53.3740	2.7008	67.4691	4.2180	2.8766	7.7331	2.0769	6.9048	2.8194	6.4961	14.3387

Table 5: Description of statistics 2 - traditional industries

	Tobin's Q	ER	RD	SC	AG	BS	PE	CP	DA	LA	PL
Obs.	6256	6256	6256	6256	6256	6256	6256	6256	6256	6256	6256
Mean	1.0322	47.8719	2.0475	15.3449	33.7389	9.6165	10.2736	0.0683	44.2219	4.3726	10.0706
Med.	0.8500	45.9250	0.6100	15.1719	33.2740	9.0000	0.0000	0.0000	44.5750	−0.2460	0.0000
Max.	28.1400	107.9600	165.0000	20.3547	71.7178	29.0000	75.0000	1.0000	109.5200	108.0000	100.0000
Min.	0.0200	0.0000	0.0000	9.7953	1.8795	0.0000	0.0000	0.0000	1.7300	−99.9169	0.0000
Std.	0.7708	33.5245	5.3654	1.5008	12.7814	2.8509	13.6323	0.2522	17.2373	23.0691	18.8754
Sk	11.1956	0.0866	11.1825	0.7237	0.1232	1.6570	0.9495	3.4241	0.1468	1.5278	2.3729
K	298.1085	1.6074	217.5371	3.7454	2.5133	9.8320	2.7618	12.7243	2.7615	10.6785	8.6658

Table 6: Correlation coefficient matrix table 1 - science and technology industry

	Tobins Q	ER	RD	SC	AG	BS	PE	CP	DA	LA	PL
Tobins Q	1										

ER	0.0057	1									
	(0.5543)	-----									

RD	0.1205	−0.0044	1								
	(11.8001)	(−0.4236)	-----								
	***		-----								
SC	−0.0232	0.2026	−0.1577	1							
	(−2.2594)	(20.1103)	(−15.5234)	-----							
	**	***	***	-----							
AG	−0.1667	0.2383	−0.1453	0.2342	1						
	(−16.4378)	(23.8577)	(−14.2781)	(23.4209)	-----						
	***	***	***	***	-----						
BS	0.0475	0.081	−0.061	0.2923	0.0699	1					
	(4.6249)	(7.8994)	(−5.9361)	(29.7156)	(6.8109)	-----					
	***	***	***	***	***	-----					
PE	0.1075	0.0713	0.0205	0.0068	0.0019	0.0959	1				
	(10.508)	(6.953)	(1.9937)	(0.66)	(0.18)	(9.3679)	-----				
	***	***	**			***	-----				
CP	0.0043	0.0518	0.0374	0.2537	−0.0325	0.0782	0.0291	1			
	(0.415)	(5.0441)	(3.6399)	(25.497)	(−3.1589)	(7.628)	(2.8323)	-----			
		***	***	***	***	***	***	-----			
DA	−0.2703	0.0135	−0.3339	0.2156	0.0857	−0.0127	0.0057	0.0401	1		
	(−27.2928)	(1.3077)	(−34.4334)	(21.4629)	(8.3663)	(−1.232)	(0.5529)	(3.9039)	-----		
	***		***	***	***			***	-----		
LA	0.1315	−0.0675	−0.0395	0.0262	−0.1675	−0.0315	0.0121	−0.002	0.0111	1	
	(12.8915)	(−6.5803)	(−3.8389)	(2.5514)	(−16.5151)	(−3.0633)	(1.1726)	(−0.1943)	(1.0839)	-----	
	***	***	***	**	***	***				-----	
PL	−0.0631	0.0587	−0.0221	0.1963	0.094	0.0531	−0.0472	0.0441	0.111	−0.0477	1
	(−6.1466)	(5.7192)	(−2.1512)	(19.4599)	(9.1816)	(5.1714)	(−4.5934)	(4.295)	(10.8618)	(−4.6386)	-----
	***	***	**	***	***	***	***	***	***	***	-----

*.** and ***denote significance at the 0.1, 0.05 and 0.01 level, respectively

while the other control variables are not obvious in the part-time condition of the Dong supervisor. The other is a significant condition, in which the R & D expense rate, the size of the company, the scale of the board of directors, and the proportion of the independent supervisors are in a positive relationship. At the same time, the proportion of factory-age, liability ratio, and stock-pledge ratio of the board of supervisors exhibit a negative relationship.

According to Table 9, the regression equations of the analysis results of the traditional industrial variables are as follows. For the convenience

Table 7: Correlation coefficient matrix table 2 - traditional industries

	Tobins Q	ER	RD	SC	AG	BS	PE	CP	DA	LA	PL
Tobins Q	1 ----- -----										
ER	0.1112 (8.8459) ***	1 ----- -----									
RD	0.1673 (13.4223) ***	0.0071 (0.5602)	1 ----- -----								
SC	−0.107 (−8.5143) ***	−0.039 (−3.0862) ***	−0.2326 (−18.909) ***	1 ----- -----							
AG	−0.1343 (−10.7185) ***	−0.1495 (−11.9541) ***	−0.1915 (−15.4292) ***	0.4846 (43.8129) ***	1 ----- -----						
BS	0.0199 (1.5758)	−0.0634 (−5.0199) ***	−0.0352 (−2.7867) ***	0.3552 (30.0454) ***	0.2266 (18.3966) ***	1 ----- -----					
PE	0.1754 (14.0893) ***	0.1773 (14.2431) ***	0.0854 (6.7793) ***	−0.1421 (−11.3496) ***	−0.128 (−10.2067) ***	−0.0073 (−0.5765)	1 ----- -----				
CP	−0.0002 (−0.0187)	−0.0172 (−1.3595)	−0.0513 (−4.0635) ***	0.3169 (26.4265) ***	0.1399 (11.1739) ***	0.0842 (6.6837) ***	0.0115 (0.9133)	1 ----- -----			
DA	−0.1547 (−12.3806) ***	0.0531 (4.2031) ***	−0.1325 (−10.5687) ***	0.2381 (19.3889) ***	0.0241 (1.9103) *	−0.0284 (−2.2473) **	−0.0505 (−4.0008) ***	0.0087 (0.6864)	1 ----- -----		
LA	0.1285 (10.2505) ***	0.0612 (4.849) ***	−0.0054 (−0.4247)	0.0165 (1.3038)	−0.0854 (−6.7747) ***	−0.0049 (−0.3848)	0.0673 (5.3353) ***	−0.0026 (−0.2093)	0.0293 (2.3184) **	1 ----- -----	
PL	−0.1121 (−8.9218) ***	−0.0721 (−5.7176) ***	−0.0932 (−7.399) ***	0.2969 (24.5856) ***	0.1426 (11.3925) ***	−0.007 (−0.5526)	−0.1656 (−13.2754) ***	0.1244 (9.9153) ***	0.2202 (17.8482) ***	−0.0493 (−3.9056) ***	1 ----- -----

Table 8: General regression equation model 1 - science and technology industry

Variable	Coefficient std. error and significance level				
C	1.1171 (0.0212)	0.9827 (0.0296) ***	1.1067 (0.0881) ***	1.1031 (0.0881) ***	1.0493 (0.0896) ***
ER	0.0002 (0.0003) ***	0.0076 (0.0012) ***		0.0009 (0.0003) ***	0.0044 (0.0011) ***
ER^2		−0.0001 (0.0000) ***			−0.00003 (0.0000) ***
RD			0.0026 (0.0010) ***	0.0025 (0.0010) **	0.0022 (0.0010) **
SC			0.0359 (0.0062) ***	0.0332 (0.0063) ***	0.0330 (0.0063) ***
AG			−0.0118 (0.0009) ***	−0.0123 (0.0009) ***	−0.0122 (0.0009) ***
BS			0.0127 (0.0040) ***	0.0126 (0.0040) ***	0.0115 (0.0040) ***
PE			0.0055 (0.0005) ***	0.0054 (0.0005) ***	0.0053 (0.0005) ***
CP			−0.0288 (0.0256)	−0.0300 (0.0256)	−0.0286 (0.0256)
DA			−0.0123 (0.0005) ***	−0.0123 (0.0005) ***	−0.0123 (0.0005) ***
LA			0.0029 (0.0003) ***	0.0029 (0.0003) ***	0.0029 (0.0003) ***
PL			−0.0014 (0.0006) **	−0.0014 (0.0006) **	−0.0015 (0.0006) ***
R-squared	0.0000	0.0045	0.1239	0.1248	0.1257
Sum squared resid	6225.1450	6197.5420	5454.0920	5448.5240	5442.6750

of expressing the regression equations, the sub-coefficients of the underlying formula are presented in the last three decimal places:

$$\text{Tobin's Q} = \underset{(0.110)}{1.209} - \underset{(0.001)}{0.005ER} + \underset{(0.000)}{0.001ER^2} + \underset{(0.002)}{0.018RD} - \underset{(0.008)}{0.000SC}$$
$$\underset{(0.001)}{0.004AG} + \underset{(0.003)}{0.013BS} + \underset{(0.001)}{0.006PE} + \underset{(0.039)}{0.084CP} - \underset{(0.001)}{0.006DA}$$
$$+\underset{(0.000)}{0.004LA} - \underset{(0.001)}{0.001PL}$$

According to the general regression model, the degree of internationalization of traditional industries exhibits a positive U-relationship. Among other control variables, only the size of the company is not significant, while others are significant. Among the significant ones, R & D expense rate, Dong supervisor part-time status, board size, and proportion of independent supervisors showed a positive relationship; whereas, plant age, debt ratio, and ratio of stock pledge exhibited a negative relationship.

It is obvious that the influence of internationalization degree of traditional industry and technology industry on company performance is not the same. Moreover, company size has a positive or negative relationship with part-time status of supervisor Dong. The actual results need to be studied further to determine whether the sample number of this study belongs to the general regression model or panel data model.

3.4. Panel Data Analysis

Since the sample of this study is panel data, it is necessary to discern whether or not the time series of sample data and cross-sectional data exert an influence. In this study, the mixed regression model (pooled regression model) was used. The results of the correlation analysis are shown in Tables 10 and 11.

In Table 10, it was found that R-squared (0.0006, 0.0113, 0.1721, 0.1725, and 0.1773) of the five groups was larger than that of the general regression (0.0000, 0.0045, 0.1239, 0.1248, and 0.1257), and that the sum squared reside (5463.4340, 5435.4170, 4924.3570, 4921.7320, and 4915.6810) of the mixed regression model was also smaller than that of the general regression (6225.1450, 6197.5420, 5454.0920, 5448.526, and 5442. 750). This result indicates that the sample technology industry is suitable for panel data analysis.

Table 11 shows that the R-squared (0.0329, 0.0477, 0.1731, 0.1735, and 0.1797) of the five groups is larger than that of the general regression (0.0124, 0.0214, 0.0945, 0.1002, and 0.1062), and the sum squared reside (3134.4050, 3107.6060, 2861.6630, 2856.4580, and 2825.3940) of the mixed regression model is also smaller than that of the general regression (3670.6610, 3637.1840, 3365.4840, 3344.2410 and 3321.7100). This result indicates that the traditional industries in this study sample are suitable for panel data analysis.

A fixed effect model and random effect model could potentially be used for panel data analysis. Which model is more efficient for data analysis can be judged by the Hausman Test proposed by Husman (1978). The results are shown in Tables 12 and 13.

The results of the Hausman test in Tables 12 and 13 show that the fixed-effect model is the most efficient model for data of the science and technology industry.

Table 9: General regression equation mode l 2 - traditional industries

Variable	Coefficient, std. error, and significance level				
C	0.9099 (0.0169) ***	1.0197 (0.0222) ***	1.2237 (0.1098) ***	1.1652 (0.1098) ***	1.2093 (0.1097) ***
ER	0.0026 (0.0003) ***	−0.0057 (0.0011) ***		0.0018 (0.0003) ***	−0.0051 (0.0011) ***
ER^2		0.0001 (0.0000) ***			0.0001 (0.0000) ***
RD			0.0176 (0.0018) ***	0.0178 (0.0018) ***	0.0178 (0.0018) ***
SC			0.0007 (0.0084)	−0.0025 (0.0084)	−0.0003 (0.0083)
AG			−0.0053 (0.0008) ***	−0.0046 (0.0009) ***	−0.0046 (0.0008) ***
BS			0.0108 (0.0035) ***	0.0120 (0.0035) ***	0.0130 (0.0035) ***
PE			0.0076 (0.0007) ***	0.0069 (0.0007) ***	0.0066 (0.0007) ***
CP			0.0576 (0.0391)	0.0606 (0.0390)	0.0841 (0.0390) **
DA			−0.0056 (0.0006) ***	−0.0058 (0.0006) ***	−0.0057 (0.0006) ***
LA			0.0038 (0.0004) ***	0.0038 (0.0004) ***	0.0037 (0.0004) ***
PL			−0.0014 (0.0005) ***	−0.0013 (0.0005) **	−0.0012 (0.0005) **
R-squared	0.0124	0.0214	0.0945	0.1002	0.1062
Sum squared resid	3670.6610	3637.1840	3365.4840	3344.2410	3321.7100

Table 10: Mixed regression equation model 1 - science and technology industry

Variable	Coefficient, std. error, and significance level									
C	0.9930		0.8837		0.9953		0.9980		0.9518	
	(0.0105)	***	(0.0144)	***	(0.0462)	***	(0.0463)	***	(0.0460)	***
ER	−0.0003		0.0057				0.0002		0.0040	
	(0.0001)	**	(0.0006)	***			(0.0001)		(0.0005)	***
ER^2			−0.0001						0.0000	
			(0.0000)	***					(0.0000)	***
RD					0.0030		0.0029		0.0025	
					(0.0008)	***	(0.0008)	***	(0.0008)	***
SC					0.0227		0.0217		0.0208	
					(0.0033)	***	(0.0034)	***	(0.0034)	***
AG					−0.0083		−0.0085		−0.0083	
					(0.0004)	***	(0.0004)	***	(0.0004)	***
BS					0.0122		0.0122		0.0114	
					(0.0021)	***	(0.0021)	***	(0.0021)	***
PE					0.0031		0.0031		0.0031	
					(0.0003)	***	(0.0003)	***	(0.0003)	***
CP					−0.0405		−0.0411		−0.0374	
					(0.0139)	***	(0.0139)	***	(0.0138)	***
DA					−0.0085		−0.0084		−0.0084	
					(0.0003)	***	(0.0003)	***	(0.0003)	***
LA					0.0018		0.0018		0.0018	
					(0.0001)	***	(0.0001)	***	(0.0001)	***
PL					−0.0005		−0.0005		−0.0005	
					(0.0003)		(0.0003)		(0.0003)	
R-squared	0.0006		0.0113		0.1721		0.1725		0.1773	
Sum squared resid	5463.4340		5435.4170		4924.3570		4921.7320		4915.6810	

Table 11: Mixed regression equation model 2 - traditional industries

Variable	Coefficient, std. error, and significance level									
C	0.8359		0.8941		0.7924		0.7813		0.8336	
	(0.0054)	***	(0.0075)	***	(0.0404)	***	(0.0397)	***	(0.0403)	***
ER	0.0016		−0.0033				0.0012		−0.0030	
	(0.0001)	***	(0.0004)	***			(0.0001)	***	(0.0004)	***
ER^2			0.0001						0.0000	
			(0.0000)	***					(0.0000)	***
RD					0.0189		0.0191		0.0179	
					(0.0015)	***	(0.0014)	***	(0.0015)	***
SC					0.0195		0.0148		0.0149	
					(0.0029)	***	(0.0029)	***	(0.0029)	***
AG					−0.0035		−0.0030		−0.0029	
					(0.0003)	***	(0.0003)	***	(0.0003)	***
BS					0.0026		0.0040		0.0041	
					(0.0013)	**	(0.0013)	***	(0.0013)	***
PE					0.0042		0.0038		0.0036	
					(0.0003)	***	(0.0003)	***	(0.0003)	***
CP					0.0091		0.0155		0.0184	
					(0.0118)		(0.0121)		(0.0120)	
DA					−0.0033		−0.0033		−0.0034	
					(0.0002)	***	(0.0002)	***	(0.0002)	***
LA					0.0015		0.0015		0.0014	
					(0.0002)	***	(0.0002)	***	(0.0002)	***
PL					−0.0012		−0.0010		−0.0010	
					(0.0002)	***	(0.0002)	***	(0.0002)	***
R-squared	0.0329		0.0477		0.1731		0.1735		0.1797	
Sum squared resid	3134.4050		3107.6060		2861.6630		2856.4580		2825.3940	

The final results of this study are as follows:

Model 1.1. Explain variable fixed effect model

Tobin's q = 1.084+0.001ER
(0.021) (0.000)
*** ***

Model 2.1. Control variable fixed effect model

Tobin's Q=1.084+0.004RD+0.035SC-0.010AG+0.013BS
(0.090) (0.001) (0.006) (0.001) (0.004)
*** *** *** *** ***

+0.005PE-0.0195CP-0.012DA+0.003LA-0.0012PL
(0.001) (0.025) (0.001) (0.000) (0.001)
*** *** *** ***

Model 3.1. Overall fixed effect model

Tobin's Q =0.004+1.069ER+0.001RD+0.032SC-0.010AG
(0.089) (0.000) (0.001) (0.006) (0.001)
*** *** *** *** ***
+0.013BS+0.005PE-0.020 CP-0.012DA
(0.004) (0.001) (0.025) (0.001)
*** *** *** ***
+0.003LA-0.001PL
(0.000) (0.0016)
**

Model 4.1. Explanatory variable U-shaped relation fixed effect model

Tobin's Q =0.965+0.007ER-0.0001ER^2
(0.029) (0.001) (0.000)
*** *** ***

Model 5.1. Overall U-shaped relation fixed effect model

Tobin's Q = 1.022+0.004ER-0.00003ER^2+0.003RD+0.032SC
(0.090) (0.001) (0.000) (0.001) (0.006)
*** *** *** *** ***
-0.010AG+0.012BS+0.005PE-0.019CP-0.012DA
(0.001) (0.004) (0.001) (0.025) (0.001)
*** *** *** *** ***
+0.003LA-0.001PL
(0.000) (0.001)
**

The results of Model 5.1 show that the degree of internationalization of the science and technology industry has a significant inverse U relationship with corporate performance. The coefficient of ER is 0.004100 and that of ER2 is −0.0000286. Conversion reveals that when the degree of internationalization reaches 71.68%, the degree of internationalization will begin to have a negative relationship with corporate performance.

In addition, the results demonstrate that R&D expenditure rate, company size, board size, proportion of independent directors and supervisors, and growth rate of fixed assets exert a positive impact on corporate performance; age, debt ratio, and share pledge ratio of directors and supervisors have a negative impact on corporate performance; and part-time status of directors and supervisors has no significant impact.

Data from traditional industries are presented in Tables 14 and 15. It is found that individual models are not the most efficient for fixed-effect models or random-effect models. The best model equations are listed below.

The final results of this study on the production of traditional industries are as follows:

Model 1.2. Model for interpreting random effects of variables

Tobin's q = 0.908+0.003ER
(0.032) (0.001)
*** ***

Model 2.2. Control variable fixed effect model

Tobin's Q= 1.426+0.016RD-0.006SC-0.010AG+0.016BS
(0.109) (0.002) (0.008) (0.001) (0.004)
*** *** *** *** ***

+0.005PE+0.045CP-0.005DA+0.005LA-0.001PL
(0.001) (0.038) (0.001) (0.000) (0.001)
*** *** ***

Model 3.2. Overall fixed effect model

Tobin's Q =1.372+0.001ER+0.016RD-0.008SC-0.009AG
(0.109) (0.000) (0.002) (0.008) (0.001)
*** *** *** *** ***

+0.017BS+0.005PE+0.047CP-0.005DA
(0.004) (0.001) (0.038) (0.001)
*** *** *** ***

+0.005LA-0.001PL
(0.000) (0.001)

Model 4.2. A random effect model for explaining the U-shaped relation of variables

Table 12: Fixed effect and stochastic effect model 1 - science and technology industry

Variable	Coefficient, std. error, and significance level					
	Fixed	Random	Fixed	Random	Fixed	Random
C	1.0842	1.1937	1.0843	1.8359	1.0687	1.8443
	(0.0212) ***	(0.0332) ***	(0.0890) ***	(0.1389) ***	(0.0891) ***	(0.1393) ***
ER	0.0006	−0.0010			0.0010	0.0003
	(0.0003) **	(0.0004) ***			(0.0003) ***	(0.0004)
RD			0.0035	−0.0111	0.0035	−0.0111
			(0.0010) ***	(0.0012) ***	(0.0010) ***	(0.0012) ***
SC			0.0346	−0.0349	0.0319	−0.0362
			(0.0061) ***	(0.0101) ***	(0.0061) ***	(0.0103) ***
AG			−0.0099	−0.0131	−0.0104	−0.0133
			(0.0010) ***	(0.0013) ***	(0.0010) ***	(0.0013) ***
BS			0.0129	0.0422	0.0129	0.0418
			(0.0039) ***	(0.0044) ***	(0.0039) ***	(0.0044) ***
PE			0.0051	0.0047	0.0051	0.0047
			(0.0006) ***	(0.0006) ***	(0.0006) ***	(0.0006) ***
CP			−0.0195	0.0292	−0.0204	0.0291
			(0.0249)	(0.0270)	(0.0249)	(0.0270)
DA			−0.0123	−0.0077	−0.0123	−0.0077
			(0.0005) ***	(0.0006) ***	(0.0005) ***	(0.0006) ***
LA			0.0030	0.0019	0.0030	0.0019
			(0.0003) ***	(0.0002) ***	(0.0003) ***	(0.0002) ***
PL			−0.0012	−0.0023	−0.0012	−0.0023
			(0.0006) **	(0.0006) ***	(0.0006) **	(0.0006) ***
Hausman test	5.1225		311.9074		313.5910	
	1		9		10	
	**		***		***	

Table 13: Fixed and stochastic effects model 2 - science and technology industry

Variable	Coefficient, std. error, and significance level			
	Fixed	Random	Fixed	Random
C	0.9650	1.1151	1.0219	1.8132
	(0.0291) ***	(0.0399) ***	(0.0904) ***	(0.1408) ***
ER	0.0073	0.0036	0.0041	0.0022
	(0.0012) ***	(0.0013) ***	(0.0011) ***	(0.0013)
ER^2	−0.0001	0.0000	−0.00003	−0.00002
	(0.0000) ***	(0.0000) ***	(0.0000) ***	(0.0000)
RD			0.0031	−0.0112
			(0.0010) ***	(0.0012) ***
SC			0.0317	−0.0361
			(0.0061) ***	(0.0103) ***
AG			−0.0103	−0.0131
			(0.0010) ***	(0.0013) ***
BS			0.0121	0.0410
			(0.0040) ***	(0.0045) ***
PE			0.0050	0.0047
			(0.0006) ***	(0.0006) ***
CP			−0.0192	0.0291
			(0.0249)	(0.0270)
DA			−0.0122	−0.0077
			(0.0005) ***	(0.0006) ***
LA			0.0030	0.0019
			(0.0003) ***	(0.0002) ***
PL			−0.0013	−0.0023
			(0.0006) **	(0.0006) ***
Hausman test	8.3930		311.6157	
	2		11	
	0.0150		0.0000	

Table 14: Fixed and stochastic effects model 1 - traditional industries

Variable	Coefficient, std. error, and significance level					
	Fixed	Random	Fixed	Random	Fixed	Random
C	0.9212	0.9080	1.4258	1.4447	1.3721	1.4208
	(0.0167) ***	(0.0321) ***	(0.1089) ***	(0.1815) ***	(0.1093) ***	(0.1813) ***
ER	0.0023	0.0026			0.0014	0.0023
	(0.0003) ***	(0.0005) ***			(0.0003) ***	(0.0004) ***
RD			0.0159	0.0030	0.0161	0.0029
			(0.0018) ***	(0.0021)	(0.0018) ***	(0.0021)
SC			-0.0063	−0.0298	−0.0084	−0.0366
			(0.0082)	(0.0137) **	(0.0082)	(0.0137) ***
AG			−0.0097	0.0051	−0.0090	0.0055
			(0.0009) ***	(0.0014) ***	(0.0009) ***	(0.0014) ***
BS			0.0162	0.0096	0.0169	0.0103
			(0.0035) ***	(0.0048) **	(0.0035) ***	(0.0048) **
PE			0.0050	0.0057	0.0045	0.0053
			(0.0008) ***	(0.0008) ***	(0.0008) ***	(0.0008) ***
CP			0.0447	−0.0327	0.0473	−0.0267
			(0.0382)	(0.0451)	(0.0381)	(0.0450)
DA			−0.0051	−0.0065	−0.0053	−0.0064
			(0.0006) ***	(0.0007) ***	(0.0006) ***	(0.0007) ***
LA			0.0046	0.0032	0.0045	0.0032
			(0.0004) ***	(0.0004) ***	(0.0004) ***	(0.0004) ***
PL			−0.0006	−0.0009	−0.0005	−0.0008
			(0.0005)	(0.0006)	(0.0005)	(0.0006)
Hausman test	0.0080		250.5028		231.2107	
	1		9		10	
			***		***	

Table 15: Fixed and stochastic effects model 2 - traditional industries

Variable	Coefficient, std. error, and significance level			
	Fixed	Random	Fixed	Random
C	1.0288	0.9715	1.4111	1.4565
	(0.0219) ***	(0.0369) ***	(0.1091) ***	(0.1805) ***
ER	−0.0058	−0.0023	−0.0051	−0.0024
	(0.0011) ***	(0.0015)	(0.0011) ***	(0.0014)
ER^2	0.0001	0.0001	0.0001	0.0000
	(0.0000) ***	(0.0000) ***	(0.0000) ***	(0.0000) ***
RD			0.0161	0.0032
			(0.0018) ***	(0.0021)
SC			−0.0063	−0.0353
			(0.0082)	(0.0137) ***
AG			−0.0089	0.0054
			(0.0009) ***	(0.0014) ***
BS			0.0178	0.0109
			(0.0035) ***	(0.0048) **
PE			0.0044	0.0052
			(0.0008) ***	(0.0008) ***
CP			0.0696	−0.0180
			(0.0382)	(0.0450)
DA			−0.0053	−0.0064
			(0.0006) ***	(0.0007) ***
LA			0.0045	0.0032
			(0.0004) ***	(0.0004) ***
PL			−0.0004	−0.0007
			(0.0005)	(0.0006)
Hausman test	3.9350		232.6439	
	2		11	
	0.1398		0.0000	

$$\text{Tobin's Q} = \underset{(0.037)}{0.972} - \underset{\substack{(0.002)\\ ***}}{0.002ER} + \underset{\substack{(0.000)\\ ***}}{0.0001ER^2}$$

Model 5.2. Overall U-shaped relation fixed effect model

$$\text{Tobin's Q} = \underset{\substack{(0.109)\\ ***}}{1.411} - \underset{\substack{(0.001)\\ ***}}{0.005ER} + \underset{\substack{(0.000)\\ ***}}{0.00006ER^2} + \underset{\substack{(0.002)\\ ***}}{0.016RD} - \underset{\substack{(0.008)\\ ***}}{0.006SC}$$

$$- \underset{\substack{(0.001)\\ ***}}{0.009AG} + \underset{\substack{(0.004)\\ ***}}{0.018BS} + \underset{\substack{(0.001)\\ ***}}{0.004PE} + \underset{\substack{(0.038)\\ ***}}{0.070CP} - \underset{(0.001)}{0.005DA}$$

$$+ \underset{(0.000)}{0.005LA} - \underset{(0.001)}{0.000PL}$$

The results of Model 5.2 show that the degree of internationalization of traditional industries has a significant positive U-relationship with corporate performance. The coefficient of ER is −0.005104, and the coefficient of ER2 is 0.0000663. Conversion reveals that when the degree of internationalization reaches 38.49%, the degree of internationalization has a positive relationship with corporate performance.

In addition, the results demonstrate that R&D expenditure rate, board size, proportion of independent directors and supervisors, and growth rate of fixed assets have a positive impact on corporate performance; factory age and the proportion of liabilities have a negative impact on corporate performance; and company size, part-time status of directors and supervisors, and stock pledge of directors and supervisors have no significant impact.

4. CONCLUSION

The impact indicators of internationalization include: (1) the proportion of overseas sales to total sales (FSTS); (2) RDI; (3) marketing intensity (AI); (4) the proportion of export sales to total sales (ESTS); and (5) the proportion of overseas profits to total profits (FPTP). Considering the problem of data acquisition and calculation, this study uses the proportion of overseas sales to total sales as an indicator of internationalization.

The impact of internationalization on corporate performance has been investigated by scholars as positive correlation, irrelevant, inverted U, or positive U. There are few negative correlation results. Overall, research tends to dilute the positive and negative relationship. Therefore, further analysis and comparison of category data can reveal the actual situation. This study does not perform overall analysis, and instead adopts industry-specific analysis, The impact of industrial internationalization on corporate performance is found to be different or even opposite.

Taiwan's science and technology industry internationalization has an inverted U effect on corporate performance, while the traditional industry has a positive U effect. The main reason for this is that Taiwan's science and technology industry has become a major international exporter, and the degree of internationalization has reached a certain target (the study found that it has reached 71.68%). In pursuit of higher internationalization, it is thought that more costs will be incurred. To show the inverse U relationship, traditional industries rely on the domestic market relatively, the construction of internationalization is relatively small, and thus the initial degree of internationalization has a narrow impact on company performance.

However, when internationalization reaches a certain degree (this study determines this to be 38.49%), it can accelerate the contribution of company performance.

Regardless of the industry, R&D expenditure rate, board size, independent directors and supervisors ratio, and fixed assets growth rate have a positive impact on corporate performance; whereas, factory age and debt ratio have a negative impact on corporate performance. The scale of the company has a positive relationship with the science and technology industry, which shows that Taiwan's science and technology industry is facing international competition. Only the scale of the company can produce economies of scale and increase the competitiveness of the company itself.

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