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Impact of Working Capital Management on Profitability: Study on Foreign Ownership in Taiwan

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This study examines the relationship between working capital management and profitability during 2000–2016 from the viewpoint of foreign ownership in the Taiwan stock market. Our findings reveal that a rise (decline) in working capital investment increases (decreases) profitability for foreign-controlled firms with lower net working capital (NWC) levels, where firms' NWC investments are generally insufficient. However, this phenomenon cannot be observed at higher NWC levels, where firms tend to make excess NWC investments. Further, we find no such asymmetric effect for firms without foreign ownership. Moreover, firms with higher foreign ownership are less likely to have a stronger effect on NWC management. These findings show that foreign investors positively impact profitability at the lower NWC level, and this is particularly true for firms with lower foreign ownership

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in the Taiwan stock market.

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1 Introduction

Net working capital (NWC) represents the level of capital required to sustain a firm's normal operations, operational expenses, ability to convert assets into cash, and prompt access to cash. In other words, it is a firm's turnover ability with regard to short-term debt of the company. Thus, NWC management has been an important financial strategy for firms and has attracted much academic and managerial attention. Previous studies, such as Blinder and Maccini (1991) and Wang (2002), show that active liquidity management could increase a firm's performance and value, indicating a relationship between a firm's NWC management and performance. More recently, authors including Baños-Caballero, García-Teruel and Martínez-Solano (2010, 2014) and Aktas *et al.* (2015) suggest that higher NWC holding has its pros and cons and that there is an optimal level of working capital investment that could balance costs and profits to maximize firm value.

Gillan and Starks (2003), Aggarwal *et al.* (2011) and Baños-Caballero *et al.* (2012) suggest that foreign investments can improve corporate governance capabilities outside of the United States, which could positively impact corporate performance. However, few studies document working capital management from the viewpoint of internationalization. An exception is Ben-Nasr (2016), who focuses on the impact of foreign ownership on the relationship between NWC investments and US firm values and finds that firms with foreign ownership have a higher value on NWC investments.

To expand its financial markets, the Taiwanese government has been actively promoting foreign investments in its domestic markets and gradually broadening regulations on foreign investment management since 2000. Such liberalization and internationalization has led to a drastic year-on-year increase in the ratio of foreign ownership in Taiwan's securities market. According to a report by Taiwan's Directorate General of Budget, Accounting, and Statistics (DGBAS), the ratio of foreign

shareholdings to total market capitalization in Taiwan increased from 16% in 2000 to 39% in 2016.

Research on the relationship between foreign ownership and the performance of working capital management has key implications for the government, investors, and managers, although few scholars examine this association in the context of Taiwan's stock market. Thus, this study analyzes the performance of NWC management in firms with and without foreign ownership during 2000–2016. In addition, it explores whether the impact of working capital investment on a firm's profitability differs between firms with higher and lower foreign shareholdings.

In recent years, electronics stocks have gained increasing importance in Taiwan's security market. According to a recent DGBAS report, in 2017, the trading value of electronics stocks reached TWD 173.879 billion, accounting for more than 70% of transactions in Taiwan's stock market and a 7.5% growth over those for the previous year. Given the major role of the electronics industry, this study examines the foreign ownership effect for not only all listed firms but also electronics firms. We divide the data into two subsamples, electronics and non-electronics industries, to explore the varying impact of foreign shareholding on working capital management and profitability between the two industries.

Our major findings are as follows. Among all listed firms, a rise (decline) in working capital investment increases (decreases) profitability for foreign-controlled firms with low NWC levels, where firms tend to have insufficient NWC investments. Conversely, we find no such effect for non-foreign-controlled firms regardless of the level of NWC investments. In the electronics industry, the profits of non-foreign-controlled firms would considerably reduce in the case of insufficient NWC investments, while excess NWC has no effect. It is therefore necessary for firms to focus on the management of insufficient NWC. Further, the profitability–NWC curve takes an inverted-U shape for non-electronics firms with foreign ownership. This indicates that the level of NWC investment has an impact on profits, and thus, it is critical to effectively manage working capital. Finally, in the samples comprising all listed firms and non-electronics firms, the profitability–NWC curve for low-foreign-controlled firms is steeper in the case of low NWC investments.

The remainder of this paper is structured as follows. Section 2 reviews the related research and develops the hypotheses. Section 3 describes data, variables, and

research design. Section 4 presents the empirical results and analysis. Section 5 presents the paper's conclusions.

2 Literature Review and Hypotheses

2.1 Foreign Ownership Effect on All Listed Firms

NWC management is an important short-term financial policy for a firm. While greater NWC holdings protect companies from the repercussions of price fluctuations, excess NWC could increase costs and risks. Studies have confirmed an optimal level of NWC. For instance, Blinder and Maccini (1991) highlight that large inventories can reduce supply costs, and this helps avoid price fluctuations and losses resulting from interruptions in production and insufficient stock. However, excess working capital holdings have a negative effect on firm's operation due to the increase of inventory cost, additional financing demand and the credit risks. Wang (2002) proposes that active liquidity management could increase a firm's performance and value. More recently, Baños-Caballero *et al.* (2012, 2014) and Aktas *et al.* (2015) show that the relationship between working capital and company performance describes an inverted U-shaped curve, thus highlighting an optimal level for working capital investment.

Furthermore, Gillan and Starks (2003) document that foreign ownership is associated with better manager supervision and corporate governance. They further show that the presence of foreign investors increases informative prices and reduces monitoring costs, consequently improving corporate governance across the world. Ferreira and Matos (2008) and Aggarwal *et al.* (2011) suggest that foreign owners play a critical role in enhancing corporate governance and positively impact operating performance and firm value outside of the United States. Importantly, they recognize that foreign institutional investors with fewer business ties to a company tend to be more independent and that this leads to effective monitoring of managers' actions and good corporate performance at the global level.

Several studies have shown that the involvement of foreign investors in the privatization process is associated with increased post-privatization performance and corporate restructuring. Megginson and Netter (2001), for instance, find that interna-

tional investors who purchase the share offering of state-to-market enterprise yield investment returns in developing and industrialized countries. Consistent with this viewpoint, Djankov and Murrell (2002) and Estrin *et al.* (2009) survey quantitative empirical studies conducted in transitional economies such as central and eastern Europe and conclude that privatization to outsiders, such as foreigners, is strongly associated with higher restructuring gains and larger post-privatization performances. In other words, foreign ownership is expected to be associated with more efficient NWC investments. Ben-Nasr (2016) demonstrates a steeper value–NWC curve for US firms with foreign ownership, which is more significant when net working capital is lower.

Drawing on the findings of existing studies, we hypothesize that the positive effect of low NWC investments is more evident in foreign-controlled companies:

H1: *For all listed firms with foreign ownership in the Taiwan stock market, the profitability–NWC curve is steeper when NWC investments are low.*

According to Frydman *et al.* (1999), foreign investors tend to be less financially constrained and bring an uncontroversial performance increase for companies located in transitional economies such as central Europe. Using a large sample of Chinese firms, Ding *et al.* (2013) find that the financial resources of firms with foreign ownership are substantially greater than those of their non-foreign-owned peers. Consequently, we propose that, compared to that of non-foreign-owned firms, the performance of foreign-owned firms is less affected by the unfavorable impact of high NWC investments. Accordingly, we hypothesize the following:

H2: *For all listed firms with foreign ownership in the Taiwan stock market, the profitability–NWC curve is flatter when NWC investments are high.*

Further, we expect the effects on the value of NWC management to vary between high and low foreign ownership and hypothesize the following:

H3: *The profitability–NWC curve differs between high and low foreign ownership in the Taiwan stock market.*

2.2 Foreign Ownership Effect for Electronics and Non-electronics Firms

The average proportion of foreign holdings in Taiwan's stock market is almost 30% and its characteristics differ between electronics and non-electronics firms. Thus, we examine the relationship between foreign ownership and the profitability of NWC management for electronics stocks and then compare the findings with those for non-electronics firms in our subsample.

H4: *The profitability–NWC curve differs between electronics and non-electronics firms with and without foreign ownership in Taiwan's stock market.*

3 Research Method

3.1 Research Sample

For this study, we source data from the *Taiwan Economic Journal (TEJ)*. The research sample comprises all listed companies in Taiwan, excluding those of the financial insurance industry. The study period is 2000–2016 and the data are collected annually. Excluding missing data, the number of total observations is 10,921. The subsamples include electronics and non-electronics firms and firms with high and low foreign ownership.

3.2 Definition of Variables

Table 1 presents details on the variables used in this study (e.g., abbreviation, names, and definitions), including the dependent variable (profitability or PRO), 10 independent variables, and three dummy variables. Table 2 explains the descriptive statistics for the regression variables: the means of PRO and the ratio of excess NWC to sales, XNWC, are 0.1570 and 0.0010 The augmented Dickey–Fuller (ADF) test on the dependent variable (PRO) and the 10 independent variables reveals there is no unit root and thus, the time-series data are stationary. Table 2 also presents the low Pearson correlation coefficients for all variables and reveals no multicollinearity

problems.

Table 1. Variable Definitions

Abbreviation	Full name	Definitions
Dependent variable		
PRO	Profitability	(Sales Revenue - Sales Cost) / Total Assets
Independent varia-		
E	Earnings Before Interest and	EBIT/Total Assets
LEV	Leverage	Total liabilities / Total assets
NFA	Net Fixed Assets	Net Fixed Assets / Total Assets
C	Cash and	(Cash + Cash Equivalents) / Total Assets
D	Cash Dividend	Cash Dividends / Total Assets
RD	R&D Expenses	R&D Expenses / Total Assets
I	Interest Expenses	Interest Expense / Total Assets
GROWTH	Growth	Intangible Assets Book Value / Total Assets
AGE	AGE	Firm age
XNWC	Excess-NWC	NWC/Sales - the median of NWC/Sales in the
Dummy variables		
NEG	Insufficient-NWC	NEG=1 (When XNWC is insufficient)
POS	Excess-NWC	POS=1 (When XNWC is excess)
HIGH_FOR	Ratio of foreign ownership	HIGH_FOR=1 (High ratio)

Table 2. Descriptive Statistics, Pearson Correlation Coefficient Matrix, and ADF Test Results

	Mean	S.D.	PRO	XNWC	E	LEV	NFA	C	D	RD	I	GROWTH	AGE	ADF test t statistics
PRO	0.1570	0.1254	1											-17.49***
XNWC	0.0010	0.2015	0.2702	1										-21.68***
E	0.0583	0.1272	0.3628	0.1880	1									-105.5***
LEV	0.4384	0.1719	-0.1695	-0.5514	-0.1737	1								-12.97***
NFA	0.3068	0.1830	-0.1585	-0.5429	-0.0614	-0.0064	1							-31.22***
C	0.1367	0.1147	0.3119	0.5239	0.1333	-0.3336	-0.2848	1						-7.62***
D	0.0290	0.0351	0.5737	0.3335	0.4173	-0.3443	-0.1353	0.3264	1					-19.49***
RD	1.9211	2.2149	0.1986	0.1678	0.0026	-0.1674	-0.0220	0.3101	0.1136	1				-25.01***
I	0.0061	0.0066	-0.3040	-0.4849	-0.2530	0.5658	0.2603	-0.2916	-0.3783	-0.1158	1			-7.71***
GROWTH	0.0137	0.0441	0.1187	-0.1122	0.0210	0.0112	-0.0096	-0.0045	0.0587	0.0057	0.0365	1		-76.49***
AGE	28.4656	13.6873	-0.1973	-0.1561	-0.0370	0.0382	0.0958	-0.2891	-0.1584	-0.2977	0.0281	-0.1000	1	-22.14***

Table 3. Test for Equality of Means between Foreign and Non-foreign Ownership

(A) All Listed Firm

Variables	Mean		Prob.
	FOR = 1	FOR = 0	
PRO	0.1559	0.1698	0.0025
XNWC	0.0011	0.0016	0.9481
E	0.0580	0.0606	0.5865
LEV	0.4357	0.4666	0.0000
NFA	0.3071	0.3080	0.8929
C	0.1390	0.1012	0.0000
D	0.0296	0.0225	0.0000
RD	1.9387	1.7285	0.0155
I	0.0058	0.0095	0.0000
GROWTH	0.0135	0.0192	0.1554
AGE	29.0655	24.6384	0.0000

(B) Electronics Firms

Variable	Mean		Prob.
	FOR = 1	FOR = 0	
PRO	0.1739	0.2285	0.0000
XNWC	0.1968	0.1972	0.0000
E	0.0626	0.1057	0.0000
LEV	0.4260	0.4188	0.4784
NFA	0.2734	0.2635	0.3442
C	0.1811	0.1477	0.0000
D	0.0324	0.0330	0.7721
RD	2.9360	2.7686	0.2780
I	0.0051	0.0060	0.0046
GROWTH	0.0142	0.0027	0.1116
AGE	21.6737	17.5226	0.0000

(C) Non-electronics Firms

Variables	Mean		Prob.
	FOR = 1	FOR = 0	
PRO	0.14041	0.14045	0.9951
XNWC	-0.0409	-0.0576	0.0599
E	0.0541	0.0377	0.0131
LEV	0.4441	0.4909	0.0000
NFA	0.3364	0.3306	0.5066
C	0.1025	0.0776	0.0000
D	0.0272	0.0172	0.0000
RD	0.9995	1.1445	0.0618
I	0.0064	0.0113	0.0000
GROWTH	0.0129	0.0243	0.0263
AGE	35.4815	28.2438	0.0000

Table 3 reports the test results for the equality of means between foreign and non-foreign ownership for all listed firms and the subsamples of electronics and non-electronics firms. Panels (B) and (C) show that the equality of mean for foreign and non-foreign ownership firms' XNWC significantly differs between electronics and non-electronics industries, indicating that NWC management varies between the two industries. Note that the means of most other variables also significantly differ, suggesting that NWC management significantly differs between foreign and non-foreign ownership firms and between electronics and non-electronics industries.

3.3 Research Design

This study explores the impact of foreign ownership on the NWC management and profitability of Taiwanese listed firms. Following Ben-Nasr (2016), we calculate XNWC as NWC/TA minus the median of industrial NWC/TA in the same year. In addition, we set two dummy variables, NEG and POS: XNWC*NEG denotes insufficient NWC investment and XNWC*POS is excess NWC investment.

Following the extant literature, we incorporate the following control variables:

earnings before interest and tax (E), leverage (LEV), net fixed assets (NFA), cash and equivalents (C), cash dividend (D), R&D expenses (RD), interest expenses (I), growth opportunities (Growth), and firm age (AGE). See Table 1 for the variables' definitions. This study also examines for the correlation among variables. We find that Pearson's correlation coefficient is not large, indicating that there is no multi-collinearity problem (Table 2).

We estimate the following regression equation:

$$PRO_{i,t} = \beta_0 + \beta_1 XNWC_{i,t} * NEG_{i,t} + \beta_2 XNWC_{i,t} * POS_{i,t} + \beta_3 E_{i,t} + \beta_4 LEV_{i,t} + \beta_5 NFA_{i,t} + \beta_6 C_{i,t} + \beta_7 D_{i,t} + \beta_8 RD_{i,t} + \beta_9 I_{i,t} + \beta_{10} GROWTH_{i,t} + \beta_{11} AGE_{i,t} + \varepsilon_{i,t}. \quad (1)$$

$$PRO_{i,t} = \beta_0 + \beta_1 XNWC_{i,t} * NEG_{i,t} + \beta_2 XNWC_{i,t} * POS_{i,t} + \beta_3 XNWC_{i,t} * NEG_{i,t} * HIGH\_FOR_{i,t} + \beta_4 XNWC_{i,t} * POS_{i,t} * HIGH\_FOR_{i,t} + \beta_5 E_{i,t} + \beta_6 LEV_{i,t} + \beta_7 NFA_{i,t} + \beta_8 C_{i,t} + \beta_9 D_{i,t} + \beta_{10} RD_{i,t} + \beta_{11} I_{i,t} + \beta_{12} GROWTH_{i,t} + \beta_{13} AGE_{i,t} + \varepsilon_{i,t}. \quad (2)$$

In regression equation (2), we add two interaction terms, XNWC*NEG*HIGH_FOR and XNWC*POS*HIGH_FOR. The remaining variables are the same as those in regression equation (1). When a firm's foreign ownership is larger than the median, it is said to have high foreign ownership. We estimate regression equation (2) to explore whether firms with high foreign ownership impact the profitability–XNWC relationship. We also conduct an ADF unit root test and find that the time-series data are stationary. Finally, this study applies the Newey–West method to equations (1) and (2) to account for autocorrelation and heteroscedasticity

4 Empirical Results and Analysis

4.1 All Listed Firms

To explore the impact of foreign ownership on the relationship between profitability and excess NWC, we first examine equation (1) and test H1 and H2. Table 4 reports the test results for all listed firms (Model 1), foreign-controlled firms (FOR = 1; Model 2), non-foreign-controlled firms (FOR = 0; Model 3), and high-foreign-controlled firms (HIGH_FOR; models 4 and 5). Our findings are as

follows.

First, Model 1 for the full sample demonstrates that the coefficient for XNWC*NEG is significantly positive and that for XNWC*POS is insignificantly negative, thus indicating that working capital policy, that is, insufficient or excess NWC, has varying effects on a firm's profitability. More specifically, a rise (decline) in working capital investment increases (decreases) the profitability of firms with lower NWC levels, where NWC investments are insufficient. However, this phenomenon cannot be observed when NWC levels are higher, where firms report excess NWC investments.

Second, we discuss the results for the impact of foreign ownership on the profitability–NWC relationship (Model 2) and compare the findings with those of Model 3. In Model 2, we find that the coefficient of XNWC*NEG is 0.1170 for foreign-controlled firms, which is significantly positive at the 1% level, whereas it is 0.0856 and insignificant for non-foreign-controlled firms in Model 3. The left-hand side of Fig 1 further explains our results. We see that compared to the non-foreign-controlled firms, foreign-controlled firms have a steeper profitability–NWC curve at a low NWC investment level. These findings are consistent with H1.

Third, the coefficient for XNWC*POS is –0.0330 and insignificant for foreign-controlled firms and we estimate similar values for non-foreign-controlled firms. The profitability–NWC curves for both firm types take the form of a zero slope (see the right-hand side of Fig 1). These findings reject H2 that posits that for firms with foreign ownership, the profitability–NWC curve is flatter in the case of high NWC investments. The findings for the profitability–NWC relationship at the higher NWC level are similar for foreign-owned and non-foreign-owned firms: that is, the profitability–NWC curves for both firm types take the shape of a zero slope. This is possibly because foreign investors do not always have more financial resources than their non-foreign-owned peers in Taiwan (Frydman *et al.*, 1999; Ding *et al.,* 2013). Further, our study finds that foreign ownership with high NWC investments in Taiwan is not related to better manager supervision and corporate governance.

To further investigate the differing impact of the high and low ratios of foreign ownership on NWC profitability, we examine regression equation (2) for all listed

firms and report the results for models 4 and 5 (see Table 4 and Figure 2). Model 4 includes all listed firms and Model 5 excludes samples with zero foreign ownership. The results show that in comparison to low-foreign-controlled firms, the Profitability-NWC curve of high-foreign-controlled firms is more gradual at the low NWC investment level. This suggests that an increase in NWC investments by high-foreign-controlled firms is likely to raise profits to less than that of low-foreign-controlled firms. In other words, the higher ratio of foreign ownership does not have a strong effect on a firm's profitability. Also, the profitability–NWC curves for both of high- and low-foreign-controlled firms take the shape of a zero slope. These findings, thus, indicate that H3 is not well supported due to the similar pattern with only slight difference of high and low foreign ownership.

Table 4. Foreign Ownerships and NWC Profitability

Variable	Full sam-	FOR=1	FOR=0	HIGH_FOR(1)	HIGH_FOR(2)
	(1)	(2)	(3)	(4)	(5)
XNWC*NEG	0.1181***	0.1170***	0.0856	0.1422***	0.1438***
	(0.0285)	(0.0295)	(0.0994)	(0.0262)	(0.0271)
XNWC*POS	-0.0302	-0.0330	-0.0711	-0.0406	-0.0479
	(0.0313)	(0.0319)	(0.0863)	(0.0314)	(0.0323)
XNWC*NEG*HIGH_FOR				-0.0534*	-0.0550*
				(0.0312)	(0.0316)
XNWC*POS*HIGH_FOR				0.0278	0.0364
				(0.0323)	(0.0325)
E	0.1238	0.1210	0.2216***	0.1233	0.1203
	(0.0872)	(0.0869)	(0.0684)	(0.0868)	(0.0863)
LEV	0.1163***	0.1196***	0.0176	0.1127***	0.1157***
	(0.0202)	(0.0207)	(0.0714)	(0.0199)	(0.0204)
NFA	0.0120	0.0140	-0.0125	0.0108	0.0132
	(0.0163)	(0.0167)	(0.0722)	(0.0163)	(0.0167)
C	0.1008***	0.1058***	-0.0815	0.0976***	0.1016***
	(0.0332)	(0.0341)	(0.0708)	(0.0334)	(0.0343)
D	1.6009***	1.5881***	2.5243***	1.5871***	1.5717***
	(0.1769)	(0.1767)	(0.8282)	(0.1775)	(0.1767)
RD	0.0059***	0.0058***	0.0137**	0.0058***	0.0057***
	(0.0015)	(0.0016)	(0.0055)	(0.0016)	(0.0016)
I	-2.6612***	-2.8298***	-0.7491	-2.5510***	-2.7155***
	(0.6195)	(0.6661)	(1.1341)	(0.5972)	(0.6422)
GROWTH	0.3084***	0.3256***	-0.1109	0.2973***	0.3138***
	(0.0807)	(0.0855)	(0.1426)	(0.0810)	(0.0859)
AGE	-0.0004**	-0.0004*	-0.0011	-0.0004**	-0.0004*
	(0.0002)	(0.0002)	(0.0007)	(0.0002)	(0.0002)
Constant	0.0488***	0.0457***	0.1265**	0.0510***	0.0481***
	(0.0156)	(0.0159)	(0.0548)	(0.0157)	(0.0160)
Adjusted R-squared	0.4097	0.4064	0.6893	0.4106	0.4075
F-statistic	390.57***	378.04***	23.19***	331.88***	321.48***
Observations	10,921	9,919	791	10,921	9,919

Notes: 1. The sample period is 2000–2016.
2. The values in the parentheses represent standard deviations.
3. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.
4. HIGH_FOR(1) includes all listed firms and HIGH_FOR(2) excludes samples with zero foreign ownership.

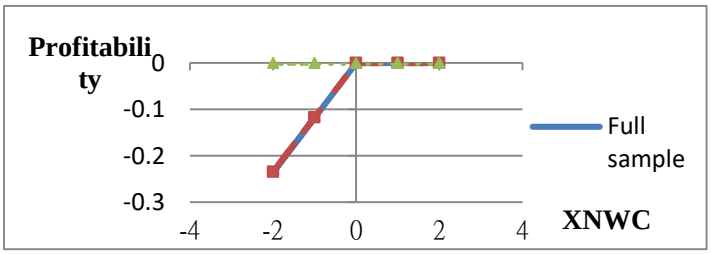

Figure 1. Profitability–NWC Curve for Foreign and Non-foreign-controlled Stocks for All Listed Firms

Notes:

$$\textit{Full Sample: } PRO_{i,t} = 0.1181XNWC_{i,t}*NEG_{i,t} + 0.0000XNWC_{i,t}*POS_{i,t}. \quad (1)$$

$$\textit{FOR = 1: } PRO_{i,t} = 0.1170XNWC_{i,t}*NEG_{i,t} + 0.0000XNWC_{i,t}*POS_{i,t}. \quad (1)$$

$$\textit{FOR = 0: } PRO_{i,t} = 0.0000XNWC_{i,t}*NEG_{i,t} + 0.0000XNWC_{i,t}*POS_{i,t}. \quad (1)$$

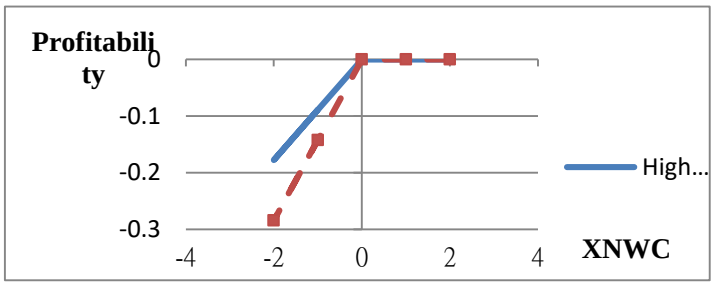

Figure 2. Profitability–NWC Curve for High- and Low-foreign-controlled Stocks in All Listed Firms

Notes:

$$\textit{High\_FOR =1: } PRO_{i,t} = 0.1422XNWC_{i,t}*NEG_{i,t} + 0.0000XNWC_{i,t}*POS_{i,t} - 0.0534XNWC_{i,t}*NEG_{i,t}*HIGH\_FOR_{i,t} + 0.0000XNWC_{i,t}*POS_{i,t}*HIGH\_FOR_{i,t} \quad (2)$$

$$\textit{High\_FOR = 0: } PRO_{i,t} = 0.1422XNWC_{i,t}*NEG_{i,t} + 0.0000XNWC_{i,t}*POS_{i,t} + 0.0000XNWC_{i,t}*NEG_{i,t}*HIGH\_FOR_{i,t} + 0.0000XNWC_{i,t}*POS_{i,t}*HIGH\_FOR_{i,t}. \quad (2)$$

4.2 Electronics Firms

In recent years, the share of electronics stocks has increased to more than 50% of Taiwan's stocks turnover. Thus, this study also examines the influence of foreign ownership on working capital management and profitability for electronics stocks. Table 5 presents the test results for equations (1) and (2).

First, Model 1 for all electronics firms reveals that the coefficient for XNWC*NEG is 0.1153 and significant at the 1% significance level and that for XNWC*POS is insignificantly positive. This result suggests that profits will further reduce if firms hold insufficient NWC, although excess NWC has no such effect.

Next, models 2 and 3 report the regression results of equation (1) for firms with foreign and non-foreign ownership. The coefficients of XNWC*NEG are significantly positive for both foreign-controlled and non-foreign-controlled firms. Fig. 3 shows the pattern of the profitability–NWC curves for foreign-controlled and non-foreign-controlled electronics firms. More specifically, non-foreign-controlled firms have a steeper profitability–NWC curve when working capital is insufficient; nevertheless, both curves have positive slopes. Further, the coefficients of XNWC*POS are positive and insignificant for both foreign-controlled and non-foreign-controlled firms. Fig. 3 shows that the profitability–NWC curves are horizontal for both subsamples.

The equation (2) is also estimated to examine whether a high foreign ownership ratio positively impacts firm performance. Models 4 and 5 in Table 5 present the results (see also Fig. 4). Evidently, the profitability–NWC curve has a similar pattern for high- and low-foreign controlled firms, indicating that in comparison to low-foreign ownership, high-foreign ownership does not have good effect on improving the profitability of working capital management for the electronics industry.

Table 5. Foreign Ownerships and NWC Profitability for the Electronics Industry

Variable	Full sam-(1)	FOR=1 (2)	FOR=0 (3)	HIGH FOR(1) (4)	HIGH FOR(2) (5)
XNWC*NEG	0.1153***	0.1155***	0.3269**	0.1174***	0.1194***
	(0.0308)	(0.0310)	(0.1412)	(0.0323)	(0.0325)
XNWC*POS	0.0139	0.0109	0.1235	0.0103	0.0043
	(0.0339)	(0.0341)	(0.1608)	(0.0405)	(0.0412)
XNWC*NEG*HIGH_FOR				-0.0035	-0.0065
				(0.0330)	(0.0331)
XNWC*POS*HIGH_FOR				0.0071	0.0126
				(0.0343)	(0.0348)
E	0.5141***	0.5116***	0.5054**	0.5137***	0.5109***
	(0.0457)	(0.0457)	(0.2165)	(0.0456)	(0.0456)
LEV	0.0928***	0.0918***	0.1406	0.0924***	0.0911***
	(0.0255)	(0.0254)	(0.1554)	(0.0255)	(0.0254)
NFA	-0.1009***	-0.1013***	0.0714	-0.1011***	-0.1016***
	(0.0216)	(0.0217)	(0.1324)	(0.0217)	(0.0218)
C	-0.0484	-0.0483	-0.0724	-0.0488	-0.0490
	(0.0344)	(0.0347)	(0.2090)	(0.0340)	(0.0343)
D	0.9712***	0.9770***	0.6004	0.9694***	0.9740***
	(0.1470)	(0.1477)	(0.6411)	(0.1475)	(0.1479)
RD	0.0100***	0.0099***	0.0233***	0.0100***	0.0099***
	(0.0014)	(0.0014)	(0.0054)	(0.0014)	(0.0014)
I	-1.6191**	-1.6348**	4.9489	-1.6134**	-1.6247**
	(0.7851)	(0.7878)	(3.1811)	(0.7808)	(0.7839)
GROWTH	0.1889***	0.1896***	3.7658	0.1882***	0.1883***
	(0.0679)	(0.0680)	(3.4496)	(0.0696)	(0.0696)
AGE	-0.0001	0.0000	-0.0006	-0.0001	0.0000
	(0.0002)	(0.0002)	(0.0016)	(0.0002)	(0.0002)
Constant	0.0832***	0.0838***	-0.0127	0.0835***	0.0843***
	(0.0190)	(0.0190)	(0.1006)	(0.0191)	(0.0191)
Adjusted R-squared	0.6176	0.6162	0.7675	0.6174	0.6160
F-statistic	423.99***	417.54***	8.50***	358.55***	353.17***
Observations	4,898	4,609	266	4,898	4,609

Notes: 1. The sample period is 2000–2016.
2. The values in the parentheses represent standard deviations.
3. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.
4. HIGH_FOR(1) includes all listed firms and HIGH_FOR(2) excludes samples with zero foreign ownership.

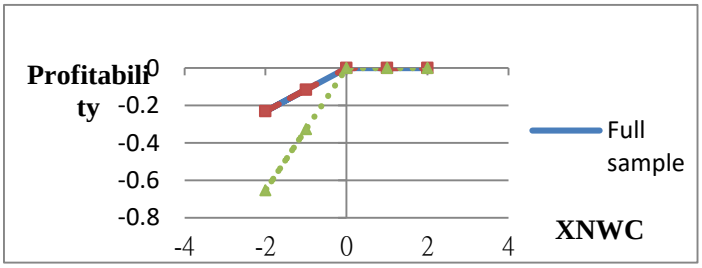

Figure 3. Profitability–NWC Curve for Foreign and Non-foreign-controlled Firms in Taiwan's Electronics Industry

Notes:

*Full Sample: PROi,t = 0.1153XNWCi,t*NEGi,t + 0.0000XNWCi,t*POSi,t.* (1)

*FOR = 1: PROi,t = 0.1155XNWCi,t*NEGi,t + 0.0000XNWCi,t*POSi,t* (1)

*FOR = 0: PROi,t = 0.3269XNWCi,t*NEGi,t + 0.0000XNWCi,t*POSi,t* (1)

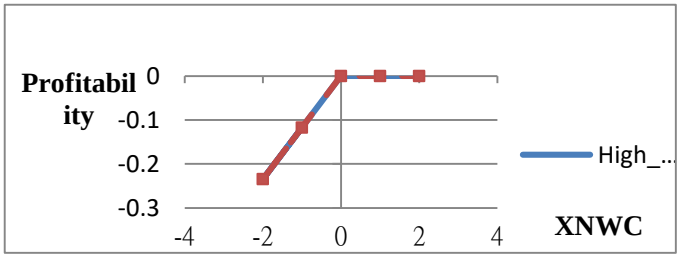

Figure 4. Profitability–NWC Curve for High- and Low-foreign-controlled Firms in Taiwan's Electronics Industry

Notes:

*High_FOR = 1: PROi,t = 0.1174XNWCi,t*NEGi,t + 0.0000XNWCi,t*POSi,t+ 0.0000XNWCi,t*NEGi,t*HIGH_FORi,t + 0.0000XNWCi,t*POSi,t*HIGH_FORi,t* (2)

*High_FOR = 0: PROi,t = 0.1174XNWCi,t*NEGi,t + 0.0000XNWCi,t*POSi,t + 0.0000XNWCi,t*NEGi,t*HIGH_FORi,t + 0.0000XNWCi,t POSi,t*HIGH_FORi,t* (2)

4.3 Non-electronics Firms

In this subsection, we compare the effects between the electronics and non-electronics industry by estimating equations (1) and (2). Table 6 presents the regression results.

First, Model 1 presents the results for all electronics firms and reveals that the coefficient for XNWC*NEG is 0.1059 at the 1% significance level and that for XNWC*POS is −0.1051 at the 5% significance level, indicating an inverted U-shaped relationship. In particular, profits are likely to decline when firms have insufficient or excess NWC.

Second, models 2 and 3 describe the regression results for equation (1) for firms with and without foreign ownership. Model 2's results suggest that the coefficient for XNWC*NEG is significantly positive for firms with foreign ownership; however, it is insignificant for firms with non-foreign ownership, as seen in Model 3. In addition, the coefficient of XNWC*POS is significantly negative for firms with foreign ownership in Model 2 but insignificant for firms with non-foreign ownership in Model 3. In other words, an inverted U-shaped relationship exists only for firms with foreign ownership in Model 2. Fig. 5 illustrates our results.

A comparison of the results in tables 5 and 6 reveals that the profitability–NWC curve differs between electronics and non-electronics firms with and without foreign ownership in the Taiwan stock market. Thus, our results support H4.

Third, we estimate equation (2) to examine the influence of high and low foreign ownership on NWC profitability. Models 4 and 5 present our results (see also Fig. 6). The findings suggest that firms with high foreign ownership have a weak effect on increasing firm performance when NWC is lower. In addition, the coefficients of XNWC*POS*HIGH_FOR are insignificant for high and low foreign ownership and the profitability–NWC curves are similar for both types of ownership structure when working capital is high. That is, the higher ratio of foreign ownership does not have strong effect on increasing a firm's profitability.

Finally, we compare Fig. 5 and Fig. 3 to analyze the varying foreign ownership effects between the electronics and non-electronics industry and find that that the non-electronics industry has an optimal amount of NWC holdings. If firms deviate

from the optimal level, irrespective of NWC being excess or insufficient, profit performance will reduce. Thus, the non-electronics industry must carefully manage its NWC. On the other hand, in the electronics industry, profitability will decline if firms have insufficient NWC investments, whereas excess NWC investment has no such effect. This implies that the electronics industry must focus on the problem of insufficient NWC investment. We also compare Fig. 6 and Fig. 4 and find that foreign investors positively impact the profitability of electronics and non-electronics firms with low NWC levels, and this is particularly the case for firms with a low foreign ownership ratio.

Table 6. Foreign Ownerships and NWC Profitability for Non-electronics Industry

Variable	Full Sam-(1)	FOR=1 (2)	FOR=0 (3)	HIGH_FOR(1 (4)	HIGH_FOR(2 (5)
XNWC*NEG	0.1059***	0.1018***	0.0647	0.1508***	0.1516***
	(0.0345)	(0.0362)	(0.0883)	(0.0319)	(0.0338)
XNWC*POS	-0.1051**	-0.1119**	-0.1226	-0.1066***	-0.1174***
	(0.0463)	(0.0477)	(0.0973)	(0.0409)	(0.0427)
XNWC*NEG*HIGH_FO				-0.1228***	-0.1211***
				(0.0422)	(0.0424)
XNWC*POS*HIGH_FO				0.0224	0.0312
				(0.0584)	(0.0582)
E	0.0635	0.0599	0.2026**	0.0625	0.0590
	(0.0470)	(0.0451)	(0.0664)	(0.0459)	(0.0441)
LEV	0.1097***	0.1180***	-0.0433	0.1006***	0.1084***
	(0.0263)	(0.0271)	(0.0825)	(0.0255)	(0.0262)
NFA	0.0711***	0.0757***	0.0068	0.0685***	0.0745***
	(0.0223)	(0.0228)	(0.0638)	(0.0227)	(0.0229)
C	0.2611***	0.2729***	-0.0206	0.2527***	0.2623***
	(0.0659)	(0.0688)	(0.0807)	(0.0660)	(0.0689)
D	1.5265***	1.5010***	2.8831**	1.5016***	1.4735***
	(0.1741)	(0.1749)	(0.9350)	(0.1764)	(0.1767)
RD	0.0050**	0.0048*	0.0093	0.0049*	0.0046*
	(0.0025)	(0.0025)	(0.0106)	(0.0025)	(0.0025)
I	-2.9761**	-3.3279**	-0.5200	-2.6417***	-2.9667***
	(0.8832)	(0.9661)	(1.0882)	(0.8315)	(0.9055)
GROWTH	0.3491**	0.3894**	-0.2568	0.3282**	0.3668**
	(0.1490)	(0.1666)	(0.1593)	(0.1461)	(0.1644)
AGE	-0.0013**	-0.0013**	-0.0016**	-0.0014***	-0.0013***
	(0.0004)	(0.0004)	(0.0008)	(0.0004)	(0.0004)
Constant	0.0624***	0.0573**	0.1641**	0.0684***	0.0635***
	(0.0221)	(0.0227)	(0.0603)	(0.0223)	(0.0229)
Adjusted R-squared	0.3722	0.3685	0.7045	0.3767	0.3730
F-statistic	178.40***	170.95***	19.21***	154.06	147.55***
Observations	6,023	5,310	525	6,023	5,310

Notes: 1. The sample period is 2000–2016.
2. The figures in the parentheses are standard deviations.
3. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.
4. HIGH_FOR(1) includes all listed firms and HIGH_FOR(2) excludes firms with zero foreign ownership.

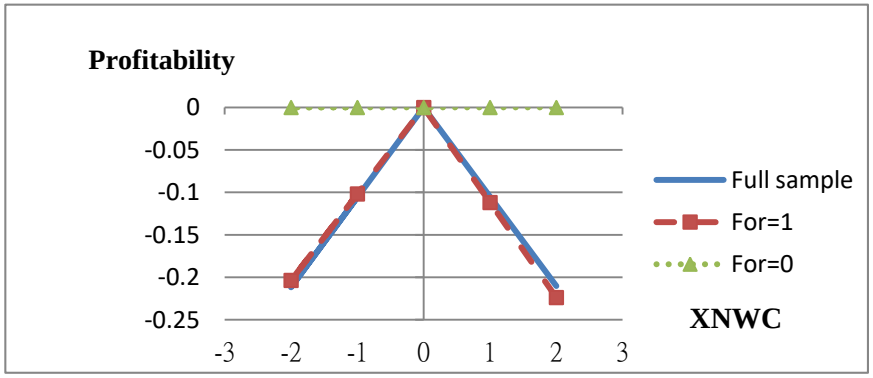

Figure 5. Profitability–NWC Curve for Foreign- and Non-foreign-controlled Firms in Taiwan's Non-electronics Industry

Notes:

*Full Sample: PROi,t = 0.1059XNWCi,t*NEGi,t − 0.1051XNWCi,t*POSi,t* (1)

*FOR = 1: PROi,t = 0.1018XNWCi,t*NEGi,t − 0.1119XNWCi,t *POSi,t* (1)

*FOR = 0: PROi,t = 0.0000XNWCi,t*NEGi,t + 0.0000XNWCi,t*POSi,t* (1)

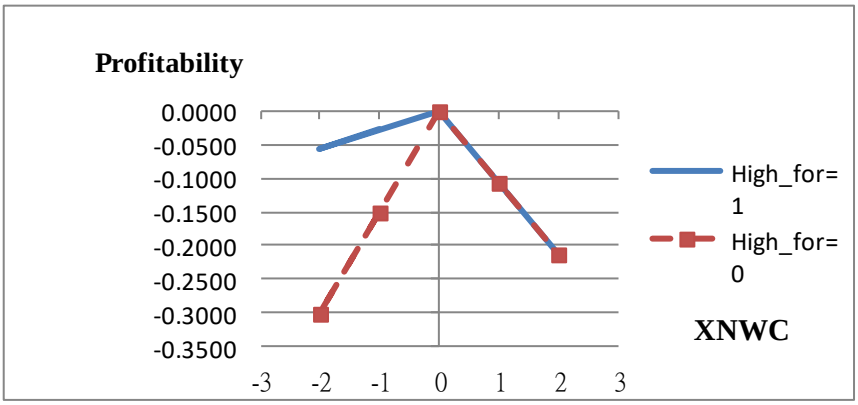

Figure 6. Profitability–NWC Curve for high- and Low-foreign-controlled Firms in Taiwan's Non-electronics Industry

Notes:

*High_FOR = 1: PROi,t = 0.1508XNWCi,t*NEGi,t − 0.1066XNWCi,t*POSi,t − 0.1228XNWCi,t*NEGi,t*HIGH_FORi,t + 0.0000XNWCi,t*POSi,t*HIGH_FORi,t* (2)

*High_FOR = 0: PROi,t = 0.1508XNWCi,t*NEGi,t − 0.1066XNWCi,t*POSi,t + 0.0000XNWCi,t*NEGi,t*HIGH_FORi,t + 0.0000XNWCi,t*POSi,t*HIGH_FORi,t* (2)

5 Conclusions

In 2016, the ratio of foreign shareholdings to total market capitalization among Taiwan's listed firms reached 39% and foreign investors have become critical legal entities who can influence the investor structure and create abundant financial momentum in the securities market. These factors have prompted Taiwan's securities market to gradually progress toward globalization and liberalization.

Despite the significance of the relationship between foreign ownership and working capital management performance, few studies focus on the foreign ownership effect in the Taiwan stock market. Thus, this study first examines the association between foreign ownership and the profitability of NWC management in the Taiwan stock market from 2000 to 2016. The data include all listed firms divided into electronics and non-electronics industries and firms with high and low foreign ownership.

Our major findings are as follows. Among all listed firms, low NWC levels significantly reduce a firm's profit, whereas excess NWC has no such impact. In addition, foreign ownership positively impacts a firm's profitability when NWC investments are low. In other words, foreign-controlled firms with a low NWC level experience an increase (a decrease) in performance; however, we find no such influence by higher NWC levels. Thus, foreign-controlled firms should pay more attention to insufficient NWC investments. This study also finds that low-foreign-controlled firms have a stronger impact on improving a company's profitability than high-foreign-controlled firms if the company addresses its insufficient NWC investments by increasing them. This indicates that higher foreign ownership ratio does not have strong effect on the profitability of NWC management.

As for the subsamples, in the electronics industry, we find that profits will decrease when firms have insufficient NWC, although this phenomenon cannot be observed in the case of excess NWC. In other words, the electronic industry must focus on bolstering insufficient NWC investments. In the non-electronics industry, firms with foreign ownership have an optimal NWC holding amount. Here, both excess and insufficient NWC investments will reduce profits, suggesting that the non-electronics industry must effectively manage its NWC.

In sum, the results demonstrate that foreign investors positively impact profitability at low NWC levels in Taiwan's stock market and this is particularly true for

firms with a lower foreign ownership ratio. Importantly, our findings disclose the impact of international investors on NWC performance in the Taiwan stock market, thus contributing to the completion of literature.

Reference

Aggarwal, R., Erel, I., Ferreira, M. and P. Matos, (2011), "Does governance travel around the world? Evidence from institutional investors," *Journal of Financial Economics*, 100, 154-181.

Aktas, N., Croci, E. and D. Petmezas, (2015), "Is working capital management value-enhancing? Evidence from firm performance and investments," *Journal of Corporate Finance*, 30, 98-113.

Baños-Caballero, S., García-Teruel, P. J. and P. Martínez-Solano, (2010), "Working capital management in SMEs," *Accounting & Finance*, 50, 511-527.

Baños-Caballero, S., García-Teruel, P. J. and P. Martínez-Solano, (2012), "How does working capital management affect the profitability of Spanish SMEs?" *Small Business Economics*, 39, 517-529.

Baños-Caballero, S., García-Teruel, P. J. and P. Martínez-Solano, (2014), "Working capital management, corporate performance, and financial constraints," *Journal of Business Research*, 67, 332-338.

Ben-Nasr, H., (2016), "State and foreign ownership and the value of working capital management," *Journal of Corporate Finance*, 41, 217-240.

Blinder, A. S. and L. J. Maccini, (1991), "The resurgence of inventory research: what have we learned?" *Journal of Economic Surveys*, 54, 291-328.

Ding, S., Guariglia, A. and J. Knight, (2013), "Investment and financing constraints in China: Does working capital management make a difference?" *Journal of Banking & Finance*, 37, 1490-1507.

Djankov, S. and P. Murrell, (2002), "Enterprise restructuring in transition: A quantitative Survey," *Journal of Economic Literature*, 40, 739-792.

Estrin, S., Hanousek, J., Kocenda, E. and J. Svejnar, (2009), "The effects of privatization and ownership in transition economies," *Journal of Economic Literature*, 47, 699-728.

Ferreira, M. A., and P. Matos, (2008), "The colors of investors' money: The role of

institutional investors around the world," *Journal of Financial Economics*, 88, 499-533.

Frydman, R., Gray, C., Hessel, M. and A. Rapaczynski, (1999), "When Does Privatization Work? The Impact of Private Ownership on Corporate Performance in the Transition Economies," *Quarterly Journal of Economics*, 114, 1153-1191.

Gillan, S., and L. Starks, (2003), "Corporate governance, corporate ownership, and the ownership, and the role of institutional investors: A global perspective," *Journal of Applied Finance*, 13, 4-22.

Megginson, W. L. and J. M. Netter, (2001), "From State to Market: A Survey of Empirical Studies on Privatization," *Journal of Economic Literature*, 39, 321-389.

Wang, Y. J., (2002), "Liquidity management, operating performance, and corporate value: evidence from Japan and Taiwan," *Journal of Multinational Financial Management*, 12, 159-169.