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# MNE Financial Flexibility and Operational Performance: Evidence from Taiwan

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## Abstract

*This research constructs a framework to measure a multinational enterprise's financial flexibility containing three dimensions: (1) operational ability, (2) financing ability, and (3) liquidity ability. We then build a panel dataset of 100 information technology firms and 167 non-information technology firms in Taiwan during 1999-2003. Our major findings are as follows: (1) Export ratio, debts from foreign countries, spontaneous short-term debt ratio, and quick ratio have significantly positive effects on operational performance. (2) Foreign assets ratio has a significantly negative effect on operational performance. (3) Equity from foreign countries, mainland China investment, and external short-term debt ratio have no significant effects on operational performance.*

**Keywords:** financing ability, liquidity ability, operational ability.

## Introduction

With the international environment turning more competitive due to regulations of the World Trade Organization (WTO), multinational enterprises (MNEs) continue to seek suitable resources and low costs. Changes in the international operations have led to higher uncertainties for firms, and the risks undertaken by international enterprises are higher than those domestically (e.g., Vernon, 1985; Ghoshal, 1987; Miller and Bromiley, 1990; Werner et al., 1996). Therefore, when confronting a high and risky operational environment, MNEs must apply appropriate strategies that lower the fluctuations of profits and performance in order to achieve their operational goals. Flexibility is a necessary condition for MNEs to obtain advantages of degree of internationalization.

An MNE contains a network of activities located in different countries. Kogut and Kulatilaka (1994) suggest that the value of MNEs' networks drives from the opportunity to benefit and from uncertainty through the coordination of geographically-dispersed subsidiaries. In other words, the benefits from multinationality include the ownership of dispersed international operations that provide valuable operating flexibility through multinational coordination. Allen and Pantzalis (1996) find that returns

to multinationality are maximized for firms with networks that are in a number of foreign countries in which the MNE has operations, but not when the concentration of foreign subsidiaries is in a few countries. Therefore, an increase in foreign subsidiaries may positively contribute to an MNE's operational performance.

MNEs have both advantages and disadvantages. Hymer (1976) notes that an MNE operates at a disadvantage relative to a domestic company since a foreign company needs to control operations over longer distances and it is at a handicap in a foreign culture. This implies that MNEs have to confront higher risks than domestic companies. Hence, flexibility is a necessary condition for MNEs to obtain advantages of degree of internationalization (DOI).

Flexibility has been discussed in the literature for a long period of time. Kogut (1985) writes that MNEs can utilize an international activity network to provide operational flexibility. MNEs need not only operating and product abilities, but also flexibility in order to achieve the maximum profit and minimum risk.

Buckley and Casson (1998) define flexibility as the ability to reallocate resources quickly and smoothly in response to changes. The larger the significance is for

flexibility, the larger the amplitude and frequency of change will be in the environment. They indicate that flexibility can effectively eliminate the fluctuation of operational performance caused by environment changes, and firms' strategies have to be flexible. The volatility of profit that would occur if the firm made no response to change summarizes the impact on the firm of any volatility in its environment.

Kuo et al. (2003) find that MNEs use flexibility to deal with any change to their operating environment, generating a positive contribution to their operation performance. This research thus assumes that MNEs should have sufficient financial flexibility before engaging in international activities. If MNEs had no sufficient financial flexibility, then they would not operate for very long.

This research proposes that MNEs have sufficient flexibility to deal with change in their business environments. Therefore, we adopt a DOI index to measure flexibility. Sullivan (1994) believes *measuring the DOI* with a linear combination of FSTS (Foreign Sales as a Percentage of Total Sales), FATA (Foreign Assets as a Percentage of Total Assets), OSTs (Overseas Subsidiaries as a Percentage of Total Subsidiaries), PDIO (Psychic Dispersion of International Operations), and TMIE (Top Managers' International Experience) can reduce the error that results from sample, systematic, and random biases. Therefore, this research follows a part of Sullivan's result to measure firms' level of internationalization.

Previous research focuses on the operating aspects of financial flexibility. A goal of this research is to build a framework containing operational and financial aspects and to explain how financial flexibility affects operational performance. Singh and Hodder (2000) define financial flexibility as the ability to shift income and/or tax shields between subsidiaries and discuss flexibility from the financial aspect. Our research proposes that financial flexibility is composed by both operational and financial decisions. Singh and Hodder (2000) find that MNEs use the liquidity of funds between subsidiaries located in different countries to increase their financial flexibility and lower the volatility of firm value. Our research takes various financing sources as key factors of a firm's financial flexibility and discusses what relationship between financial flexibility and operational performance. For operational performance indices, both return on assets (ROA) and return on equity (ROE) are used.

The globalization of capital markets has accelerated dramatically in the past years in Taiwan. An increasing number of firms have chosen to raise capital through global equity markets (e.g., GDRs) and Euro-convertible bonds. Foreign debt has several advantages such as improving a firm's international reputation, low cost of capital, and an increase in financial flexibility (e.g., Adhikari et al., 1991;

Biddle and Saudagaran, 1991). There are also several benefits for a foreign equity issuer, including an enlarged investor base, an enhanced local market for shares, the opportunity to raise new capital, and a liquidity secondary market in other countries. Foreign financing sources hence can help improve financial flexibility.

Amihud and Mendelson (1986) propose the illiquidity premium hypothesis. It states that the market-observed expected return should be an increasing and concave function of liquidity (typically measured by the bid-ask spread). The intuition is that the present value of all future trading costs should be reflected in the security price. Since securities with wider bid-ask spreads involve higher trading costs, investors should demand higher rates of return for holding them. Therefore, a pair of otherwise identical securities differing only in liquidity should also differ in price. In summary, foreign financing sources can increase trade range and liquidity, hence having a positive influence on the firm's stock price and operational performance (e.g., Sanger and McConnell 1986; Dharan and Ikenberry, 1995).

The financing sources of firms can be categorized into short-term and long-term debts. Short-term debt is naturally more flexibility. Enrica and Antonio (2004) use a standard model of optimal borrowing without creditor runs, finding a significantly positive relation between short-term and financial crises. This means that a large amount of short-term debt is a fundamental source of financial fragility. On the other hand, Rodrik and Velasco (2000) show that the ratio of short-term debt to reserves helps predict large reversals of capital cash flow. Although the short-term debt ratio may increase operational risk, it does provide sufficient liquidity for firms. Buch and Lusinyan (2003) show that the share of short-term debt is positively related to GDP per capita and to the size of the financial system of the recipient country. Moreover, economic development has a significantly positive effect on the share of short-term debt due to lower costs from rolling over short-term debt. Diamond and Rajan (2000) suggest that short-term debt can play a beneficial role in improving an enterprise's operational performance.

In the research of working capital, short-term debt plays a role to provide liquidity and flexibility. Working capital is equal to current assets minus current liability. Firms with sufficient working capital have advantages such as paying expenditures by cash easily, being regarded as having a high credit rating, and getting financing from financial institutions easily. In the other hand, firms with too much working capital will decrease investing opportunities and then low return on investment. Short-term debt is one part of current liability. It means that firms using higher short-term debt will decrease working capital and then increase their efficiency to use funds.

This research distinguishes short-term debt into two parts. One is spontaneous short-term debt and the other is external

*Flexibility is a necessary condition for MNEs to obtain advantages of degree of internationalization.*

short-term debt. Spontaneous short-term debt includes accounts payable, notes payable, advance receipts, and tax payable. Higher spontaneous short-term debt implies that firms will not pay cash in the short term and hence firms increase their efficiency to use funds. External short-term debt includes short-term liability, commercial paper, and acceptance bills. Higher external short-term debt implies that firms have a higher ability to collect funds.

Although too a high short-term debt ratio is likely to cause financial crises, it also helps to provide sufficient liquidity for firms. There is no explicit conclusion in previous research about short-term debt and operational performance. Therefore, the short-term debt ratio is an interesting factor to discuss.

A firm's ability to switch assets to cash indicates financial flexibility. Davis and Peles (1993) find that high liquidity for a company's assets helps stabilize its net values when facing external shocks. Liquidity is indeed an important concern of management. If firms have insufficient current assets to satisfy current liabilities as they come due, then firms may be forced into bankruptcy. If the current or quick ratio decreases dramatically, then managers must take measures to ensure that future cash flows are available to pay current liabilities as they mature. The currency and quick ratios hence become a financial flexibility index.

*An MNE runs business in a more volatile environment and hence needs to increase its financial flexibility to improve operational performance.*

Previous researches of flexibility focus on operational or financial decision. The goal of this research is to combine three dimensions and find out how the financial flexibility affects firms' operational performance. The definition of financial flexibility in this research is firms' financial ability to hurdle past sudden changes. Financial flexibility is composed of three dimensions: DOI, financing sources, and liquidity ability. This research examines how these variables of financial flexibility affect operational performance. This research also compares the result of different industries.

This research is organized as follows: Section 1 introduces the background and motivation at first, defines what financial flexibility is, and describes framework and process of this research. Section 2 provides a framework for measuring financial flexibility and proposes three hypotheses in this section. Section 3 describes data sources, definition of variables, and the empirical model. Section 4 presents descriptive statistic analysis, empirical results, and discussion. Section 5 concludes this paper and proposes future research.

**A Framework for Measuring Financial Flexibility**

By reviewing existing studies, this research constructs a framework to measure an MNE's financial flexibility as Figure 1 shows. Financial flexibility can be decomposed into three domains: globalization ability, financing ability, and liquidity ability.

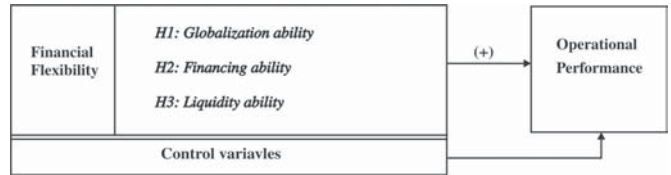


Figure 1: A Framework for Financial Flexibility and Operational Performance

**Globalization Ability**

First, the international diffusion of modern production technology has increased the number of industrial powers. It has hence increased the number of countries in which political and social disturbances can significantly impact global supplies of manufactured products. Liberalization of trade and capital markets makes the ripple effects of shocks travel farther and wider than in the past.

A much wider range of disturbances than ever before now affects any domestic market in the world. Every subsidiary of an MNE experiences a multiplicity of shocks from around the world. The shocks come from new sources of import competition and new competitive threats in export markets. While most shocks reveal themselves to firms as competitive threats, new opportunities for cooperation may sometimes be presented as well.

In order to conform to internationalization, MNEs should have the operating ability to deal with changes in their business environment (Kogut and Kulatilaka, 1994; Tannous, 1996; Buckley and Casson, 1998). Therefore, this research proposes that DOI is an operational ability for a MNE. Thus, there is an indirect relationship between DOI and operational performance (Hymer, 1976), and financial flexibility has a positive influence on MNEs' operational performance.

The existing literature has used some variables and approaches to measure a firm's DOI (Sullivan, 1994). Previous research on DOI has different results: DOI may have a positive, negative, U-shape, or inverted U-shape relationship with operational performance.

This research suggests that MNEs with a higher DOI will have a higher financial flexibility to use funds to increase operational performance. Hence, operational ability has a positive influence on MNEs' operational performance. We choose the following variables of financial flexibility to measure the DOI of MNEs and present the operational ability. Three hypotheses about operational performance are also proposed.

The first variable to measure DOI is ESTS. The index FSTS is used by many researchers for measuring DOI (Vernon, 1971; Grant, 1987). They all indicate that FSTS has a positive influence on firms' operational performance.



However, Tallman and Lu (1996) believe that an enterprise's export and sales by its foreign subsidiaries cannot be measured by FSTS. This paper adopts ESTS (Export Sales as a Percentage of Total Sales) to replace FSTS. Hence, we propose that ESTS has a significantly positive influence on MNE's operational performance.

The second variable to measure DOI is FATA. Daniels and Bracker (1989) indicate that performance improves significantly when FSTS and FATA are increased to 50%. While not a significant association, the performance seems to fall when FSTS and FATA increase beyond this threshold. It is difficult to calculate the sales amounts of foreign subsidiaries, because these are not disclosed in financial reports. This research assumes OSTs has a high relation with FATA. Therefore, the OSTs variable is omitted. Because we focus on the financial aspect, the DOI index of Sullivan's result such as TIME and PDIO will not be considered. We then propose that FATA has a positive influence on MNE's operational performance.

The third variable to measure DOI is MCTA (Investment in mainland China as a percentage of total assets). In the case of Taiwan, MNEs' DOI should consider investing in mainland China. The 1999 census from the *Chung Hua Institute for Economic Research* shows that the reason to invest in mainland China includes sufficient labor sources, cheap land, tax advantages, and a large-scale market. According to the statistics of the Investment Commission of the Ministry of Economics Affairs, investment into mainland China from Taiwan is increasing in both the number of cases and their amounts.

From 1999 to 2003, the annual investment flow into mainland China from Taiwan went up from 488 to 1,387 cases and from 1.252780 billion USD to 4.594985 billion USD. Therefore, mainland China investment is an important index to measure DOI. Therefore, investment into mainland China should be a DOI index for the case of Taiwan. This research hypothesizes that MCTA has a positive influence on MNEs' operational performance.

In summary, DOI is a part of variables to explain financial flexibility. This research hypothesizes that DOI has positive influence on MNEs' operational performance. Then, we expect that the three variables should have positive contribution to MNEs' profitability.

### Financing Ability

The second dimension of financial flexibility is financing ability. Singh and Hodder (2000) suggest that multinational firms can make facility investment decisions without tax rate differences across countries as a primary consideration. Financing sources are categorized by two ways: One is the term of the loan and the other is the origin of the loan. Short-term and foreign financing sources are more flexible than long-term and domestic financing sources (Allayannis et al., 2003; Enrica and Antonio, 2004). This research collects flexibly financing sources to represent the financial

flexibility of MNEs.

Short-term debt provides liquidity for funds. If firms use short-term debt properly, then they will get more investment opportunities. Hence, this research proposes that different financing sources have a positive influence on MNEs' operational performance.

Investors require a higher return when securities have low liquidity (Amihud and Mendelson, 1986; Brennan and Subrahmanyam, 1996; and Datar et al., 1998). MNEs use foreign funds to lower their financing cost and increase their financial flexibility. Then, this research thus proposes that foreign financing sources will have a positive influence on MNEs' operational performance. Therefore, financing ability has a positive influence on MNE's operational performance. This research adopts four variables to measure the financing ability of firms.

The first variable to measure financing ability is that firms use equity from foreign countries. Similar to debt from foreign countries, GDRs are popular financing sources for MNEs. For the example of GDRs, almost all non-U.S. companies that list their shares on U.S. exchanges do so by creating GDRs. GDRs were developed by JP Morgan in 1927 as an instrument for investors to register and earn dividends on non-U.S. stock without direct access to the overseas market itself. Investors therefore bear all currency risk and indirectly pay fees to the depository bank. There are advantages to GDRs for issuers, including an enlarged investor base, an enhanced local market for shares, an opportunity to raise new capital, and a liquid secondary market in the United States or other developed countries. No doubt firms using equity from foreign countries will improve their financial flexibility. This research proposes that equity from foreign countries has a positive influence on MNEs' operational performance.

The second variable to measure financing ability is that firms use debt from foreign countries. Due to the liberalization of capital markets and the internationalization of firms' operations, governments initiate regulations of financial markets to open them up to public access. Debt from foreign countries becomes one of the more important financing tools for firms. Adhidari et al. (1991) and Biddle and Saudagaran (1991) indicate that firms collecting debt from foreign countries have several reasons for doing so, such as improving their international presence, lowering financing costs, and having more flexibility in using funds. This research proposes that debt from foreign countries has a positive influence on MNEs' operational performance.

The third variable to measure financing ability is that firms use spontaneous short-term debt. Spontaneous short-term debt includes accounts payable, notes payable, advance receipts, and tax payable, which are different kinds of 'trade credit'. They are a trade credit without any cost if firms pay expenses in the limited time. If firms use spontaneous

*The short-term debt is a better index for financing ability than the long-run debt.*

short-term debt appropriately, then the benefit from trade credit will be higher than the market return. Besley and Osteryoung (1985) indicate that 90% of products of 87% of firms are sold by trade credit in a sample of 1982. Hence, spontaneous short-term debt is an important source of financing. This research proposes that spontaneous short-term debt will have a positive influence on MNEs' operational performance.

The fourth variable to measure financing ability is that firms use external short-term debt. External short-term debt includes short-term liability, commercial paper, and acceptance bills. Calomiris et al. (1994) indicate that high credit quality is a requirement for entry into the commercial paper market, but long-term credit quality (bond rating) is not a sufficient statistic for short-term quality. These characteristics allow firms to issue nearly riskless short-term debt and supply a near-money asset to the market, thereby reducing their interest costs by the amount of the commercial paper's liquidity premium. Calomiris et al. (1994) suggest three explanations for using external short-term debt such as commercial paper. First, firms of high credit quality can use commercial paper to finance inventory accumulation during downturns. Second, they also can use commercial papers to finance counter-cyclical increases in receivable accounts. This suggests that commercial paper issuers serve as intermediaries for other firms during downturns. Third, it may be that portfolio demand for commercial papers, which is a highly liquid and safe asset, increases during downturns.

Firms use external short-term debt to increase their financial liquidity and that external short-term debt is a financing ability to overcome a shortage of funds. Hence, the external short-term debt should have a positive influence on operational performance. In summary, flexible financing sources will have positive influences on firms' operational performance. We then propose the four variables will have positive contributions for firms' operational performance as well.

### Liquidity Ability

The final dimension of financial ability is liquidity ability. The current ratio and quick ratio represent the ability to switch assets to cash. If the firm has insufficient current assets to satisfy current liabilities, then managers must take measures to ensure that future cash flows are available to pay current liabilities as they mature. We hypothesize that liquidity ability can stabilize operational funds and has a positive influence on firms' operational performance. The current ratio and quick ratio are incorporated to represent the liquidity of a firm's funds (Davis and Peles, 1993). This research proposes that the current ratio and quick ratio have positive influences on MNEs' performance.

### Control Variables

In order to control the disturbance from other variables, we use four control variables: firm size, capital structure, R&D

expenses, and advertisement expenses.

Large-size MNEs have more resources to engage in international activities. We then propose that firms' size will have a positive influence on operational performance. (eg: Riahi-Belkaoui, 1998; Gomes and Ramaswamy, 1999). There are different results in previous research for the firm size. Fama and French (1992) find that small-sized firms have better operational performance. Han et al. (1998) also show that large-sized firms have complex organizations and have worse operational performance. This research adopts firms' size as a control variable which affects firms' operational performance. The logarithm of employees as a result is used to represent the size of an MNE (Contractor et al., 2003).

Capital structure is an important factor to firms' operational performance. MNEs with a high debt ratio should have higher cash flows to pay interest expenses. An increase in the debt ratio decreases net income as well as increases default risk. However, agency theory suggests that the financing decision will avoid the bad behavior of management and create growth opportunities if debt is used appropriately (Brigham and Ehrhardt, 2005).

Research and development (R&D) activity is very important, especially for the information technology (IT) industry. Caves (1982) finds that a firm's growth can be forecasted by its R&D activities. Some scholars suggest that advertising intensity should also be considered. Lu and Beamish (2004) indicate that marketing activity will increase an enterprise's notoriety. Thus, R&D and advertisement expenses are adopted in our model.

## Data and Empirical Method

### Data Sources and Description

The data of sample firms' financial characteristics are collected from the equity databases of *Taiwan Economic Journal* and *Market Observation Post System*. The study period is from 1999 to 2003. However, for consideration of the data's completeness of the sample firms during the period, we adopt 100 IT and 167 non-information technology industry (non-IT) companies, which are listed, as the research objects. Taiwan's IT industry has dominated other domestic industries since the 1990s, playing an important role in the global market. The IT industry is chosen for this study because many of Taiwan's new MNEs are mainly from the IT industry.

These non-IT industries include photoelectric manufactures (23 firms), electro-components (18 firms), IC manufactures (17 firms), motherboard (15 firms), PC and NB manufactures (6 firms), software and services (21 firms) companies. In order to discuss the difference across industries, the financial flexibilities of the IT and non-IT industries are compared. non-IT industries include spin and weave (22 firms), mechanical (18 firms), chemical and

*The liquidity ability affects an MNE's flexibility to change the contents of assets and liabilities.*

medical (15 firms), plastic (15 firms), food (13 firms), metallic (10 firms), rubber (9 firms), wholesale and retail (7 firms), electric equipment (7 firms), glass and ceramics (7 firms), constructor (7 firms), cement (6 firms), papermaking (4 firms), traffic (2 firms), tourism (1 firm), and other (24 firms) industries.

**Variables**

This study explores the influences of financial flexibility on the operational performance of a firm. We use the return on assets as the dependent variable to evaluate operational performance, and financial characteristics as independent variables. Many scholars use operational performance to estimate the impacts of DOI. This research suggests that financial flexibility such as DOI will affect an enterprise's operational performance. Return on equity is more sensitive to the debt ratio than return on

assets. ROA is adopted to measure an enterprise's operational performance.

For the operational performance variable, we use return on assets as the proxy variable to measure the operational performance. DOI originates from Sullivan (1994) in which FSTS, FATA, OSTs, TMIE, and PDIO are used for forming the principal component of internationalization. It is difficult to calculate the sales amounts of foreign subsidiaries, because they are not disclosed in financial reports. This research assumes that OSTs (oversea subsidiary as a percentage of total subsidiaries) has a very high correlation with FATA (foreign assets as a percentage of total assets). Therefore, the OSTs variable is omitted. Because we focus this research on the financial aspect, TIME and PDIO are not considered. The third index of DOI is mainland China investment as a percentage of total assets (MCTA).

*MNEs with a higher degree of internationalization should have a higher financial flexibility to efficiently allocate funds for increasing operational performance.*

Table 1: Operational Definition of Variables

Variable (Symbol)	Proxy (Symbol)	Measurement
Operational performance (FP)	Return on assets (ROA)	Net income / Total assets
	Return on equity (ROE)	Net income / Total equity
Globalization ability- Degree of internationalization (DOI)	Export sales as a percentage of total sales (ESTS)	Export sales / Total sales
	Foreign assets as a percentage of total assets (FATA)	Foreign assets / Total assets
	Investment in mainland China as a percentage of total assets (MCTA)	Mainland China investment / Total assets
Financing ability - Financing sources (FS)	Foreign equity (FE)	GDRs / Weighted average of capital
	Foreign debt (FD)	Dummy variable; if publish foreign convertible bond, then FD = 1
	Spontaneous short-term debt ratio (SD1)	Spontaneous short-term debt / Total debt
	External short-term debt ratio (SD2) debt	External short-term debt / Total debt
Liquidity ability- Financial ratios (FR)	Current ratio (CR)	Current assets / Current liabilities.
	Quick ratio (QR)	(Current assets – inventory – advance payment) / Current liabilities.
Control variables (CV)	Firm size (SIZE)	Natural logarithm of employees
	Debt ratio (DR)	Total debt / Total assets
	Advertisement expense (AE)	Advertisement expense / Net income
	Research & development expense (RD)	Research & development expense / Net income

Singh and Hodder (2000) point out that the financing decision can be adjustment instruments for MNEs. The debt period and region of loaners are also a part of financial flexibility. MNEs' quick ratios show a fast adjustment to equilibrium value. Therefore, sufficient flexibility, such as the quick ratio, is incorporated into the framework (Davis and Peles, 1993).

Table 1 is the operational definitions of these variables. The operational performance is used as the dependent variable, and the financial characteristics are independent variables. The financial flexibility includes three dimensions: (1) internationalization, including export sales as a percentage of total sales (ESTS), foreign assets as a percentage of total assets (FATA), and investment in mainland China as a percentage of total assets (MCTA); (2) financing sources, including foreign equity (FE), foreign debt (FD), spontaneous short-term debt (SD1), and external short-term debt (SD2); and (3) financial ratio, including current ratio (CR), and quick ratio (QR). The control variables affecting the information technology industry's operational performance are also taken into account, including firm size (SIZE), debt ratio (DR), advertising expense ratio (AE), and R&D expense ratio (RD).

**Panel-data Regression Models**

A longitudinal, or panel, dataset is one that follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample. Panel datasets for economic research possess several major advantages over conventional cross-sectional or time-series datasets. First, they usually give the researcher a large number of data points, increasing the degrees of freedom and avoiding the multicollinearity problem among explanatory variables. Second and more importantly, longitudinal data allow a researcher to analyze a number of important economic questions that cannot be addressed using cross-sectional or time-series datasets. This research hence utilizes the method of panel data.

There are three distinct types of panel data. The first type shows panel data with a constant intercept item; that is, the traditional ordinary least squares (OLS) model. The second type is a fixed-effects (FE) model in which its intercept varies over individuals. The third type is the random-effects (RE) model or variance component model in which the intercept is random (Hsiao, 2003).

Based on the adopted variables as above, the initially proposed empirical model is in Equations (1) and (2):

$$ROA_{it} = \tilde{\alpha}0 + \tilde{\alpha}1ESTS_{it} + \tilde{\alpha}2EATA_{it} + \tilde{\alpha}3MCTA_{it} + \tilde{\alpha}4FE_{it} + \tilde{\alpha}5FD_{it} + \tilde{\alpha}6SD1_{it} + \tilde{\alpha}7SD2_{it} + \tilde{\alpha}8CR_{it} + \tilde{\alpha}9QR_{it} + \tilde{\alpha}10SIZE_{it} + \tilde{\alpha}11RD_{it} + \tilde{\alpha}12AE_{it} + \tilde{\alpha}13RD_{it} + u_{it} \tag{1}$$

$$ROE_{it} = \tilde{\alpha}0 + \tilde{\alpha}1ESTS_{it} + \tilde{\alpha}2EATA_{it} + \tilde{\alpha}3MCTA_{it} + \tilde{\alpha}4FE_{it} + \tilde{\alpha}5FD_{it} + \tilde{\alpha}6SD1_{it} + \tilde{\alpha}7SD2_{it}$$

$$+ \tilde{\alpha}8CR_{it} + \tilde{\alpha}9QR_{it} + \tilde{\alpha}10SIZE_{it} + \tilde{\alpha}11RD_{it} + \tilde{\alpha}12AE_{it} + \tilde{\alpha}13RD_{it} + u_{it} \tag{2}$$

Since the panel data consist of both cross-sectional and longitudinal aspects, errors may occur in the ordinary least squares (OLS) estimation method if these firms do not have truncation terms. Panel data models may be classified into a fixed-effects model and a random-effects model. The fixed-effects model and random-effects model follow as below (Hsiao, 2003): fixed-effects model:  $y_{it} = \alpha_i + \beta\chi_{it} + v_{it}$  and random-effects model:  $y_{it} = \alpha_i + \beta\chi_{it} + v_{it}$ . In both the fixed-effects and random-effects models,  $y_{it}$  is the dependent variable and  $\chi_{it}$  is the independent variable. The identified difference between each firm is reflected in the intercept item of the regression model. The fixed-effects model uses a fixed intercept to represent the difference in inter-firm structures, while  $\alpha_i$  indicates the independent fixed intercept in each firm. The random-effects model uses a random intercept to represent the different structures in each cross-section, while  $\alpha'_i$  refers to the intercept in each firm being random.

**Empirical Results and Discussion**

This section contains the results of descriptive statistics analysis, the multicollinearity test, panel data analysis, and comparison of results for different industries.

**Descriptive Statistical Analysis**

Table 2 reports the descriptive statistics for the financial flexibility and control variables for whole samples over the 1999-2003 time periods. The whole samples include 100 IT industry firms and 167 non-IT industry firms. ROA and ROE are independent variables. The mean of ROA is higher than ROE's, but the risk and maximum of ROE is higher than ROA's results. ESTS's mean value equals to 46.39% represents that half of MNE's products export to foreign countries instead of selling to domestic consumers. The maximum of FATA is 2.4941 indicates that the MNE put more of their assets in foreign countries than in domestic firms. The mean of SD2 is higher than SD1 indicates that firms use more external short-term debt than spontaneous short-term debt to deal with short-term financing gap.

Table 3 reports the descriptive statistics for the financial flexibility and control variables for IT industry and non-IT industry over the 1999-2003 time periods. The ROA and ROE of IT industry are both equal to 1.43% and the standard deviations are 3.39% and 8.41%, respectively. The ROA and ROE of non-IT industry equal to 2.2% and -0.9% and the standard deviation equal to 3.39% and 8.41%. This indicates that the IT industry has higher profit and risk than non-IT industry.

The IT industry has higher ESTS and FATA and lower MCTA than the non-IT industry. The mean of ESTS for the IT industry equals to 70.15% which is much higher than 32.16% for the non-IT industry. Mean values of the IT

*Investment into mainland China from Taiwan has been increasing in both the number of cases as well as amounts.*

Table 2: Descriptive Statistics of Whole Samples

This table shows the descriptive statistic of whole samples. ESTS: Export sales / Total sales; FATA: Foreign assets / Total assets; MCTA: Mainland China investment / Total assets; FE: or GDRs / Weighted average of capital; FD: Dummy variable; if publish foreign convertible bond, then FD = 1; SD1: Spontaneous short-term debt / Total debt; SD2: External short-term debt / Total debt; CR: Current assets / Current liabilities; QR: (Current assets – inventory – advance payment) / Current liabilities; SIZE: Natural logarithm of employees; DR: Total debt / Total assets; AE: Advertisement expense / Net income; RD: Research & development expense / Net income.

	Mean	Std. Dev.	Minimum	Maximum
ROA	0.0067	0.0373	-0.3056	0.2338
ROE	-0.0003	0.0899	-0.9190	0.3086
ESTS	0.4639	0.3576	0.0000	1.0000
FATA	0.1091	0.1337	0.0000	2.4941
MCTA	0.0331	0.0476	0.0000	0.3037
FE	0.0418	0.3127	0.0000	5.3421
FD	0.0524	0.2230	0.0000	1.0000
SD1	0.1166	0.1090	0.0000	0.9392
SD2	0.4634	0.2221	0.0040	0.9420
CR	0.0191	0.0173	0.1755	0.0011
QR	0.0134	0.0157	0.0001	0.1681
DR	0.4114	0.1529	0.0495	0.9268
SIZE	6.4468	1.0948	3.0445	9.8543
AE	0.0274	0.1029	-0.0050	2.8332
RD	0.0232	0.0483	-0.2071	0.6598

industry's financing ability such as FE, FD, SD1, and SD2 are higher than the non-IT industry. This explains that IT industry needs more financial flexibility than non-IT industry. Both the IT and non-IT industries use more SD2 than SD1. The mean values of QR for IT and non-IT industries equal to 1.75% and 1.09% and the standard deviation value of QR for IT and non-IT industries equal to 1.86% and 1.30%. Therefore, firms keep the liquidity at the similar level. There are similar mean values of DR, SIZE, and AE for the IT and non-IT industries. The most different mean value is RD. The mean value is 4.66% for IT industry and 0.92% for the non-IT industry. After analyzing the descriptive statistics, we then use multicollinearity tests and correlation Analysis to select appropriate.

#### Multicollinearity Test and Correlation Analysis

This study manipulates variance inflation factors (VIF) to examine if collinear variables exist among the research variables before the selection of variables in a regression model. If the VIF value of an explanatory variable is greater than 10, then this

Table 3: Descriptive Statistics of IT and Non-IT Industries

This table shows the descriptive statistics of the IT and non-IT industries. ESTS: Export sales / Total sales; FATA: Foreign assets / Total assets; MCTA: Mainland China investment / Total assets; FE: GDRs / Weighted average of capital; FD: Dummy variable; if publish foreign convertible bond, then FD = 1; SD1: Spontaneous short-term debt / Total debt; SD2: External short-term debt / Total debt; CR: Current assets / Current liabilities; QR: (Current assets – inventory – advance payment) / Current liabilities; SIZE: Natural logarithm of employees; DR: Total debt / Total assets; AE: Advertisement expense / Net income; RD: Research & development expense / Net income.

	Mean	Std. Dev.	Minimum	Maximum
ROA	0.0143 <sup>a</sup> (0.0022) <sup>b</sup>	0.0414 (0.0339)	-0.3056 (-0.2964)	0.2338 (0.1578)
ROE	0.0143 (-0.0090)	0.0972 (0.0841)	-0.9190 (-0.8738)	0.3086 (0.1856)
ESTS	0.7015 (0.3216)	0.2810 (0.3211)	0.0000 (0.0000)	1.0000 (1.0000)
FATA	0.1293 (0.0971)	0.1291 (0.1350)	0.0002 (0.0000)	0.9730 (2.4941)
MCTA	0.0109 (0.0465)	0.0192 (0.0541)	0.0000 (0.0000)	0.1388 (0.3037)
FE	0.1094 (0.0013)	0.5036 (0.0156)	0.0000 (0.0000)	5.3421 (0.3540)
FD	0.1220 (0.0108)	0.3276 (0.1033)	0.0000 (0.0000)	1.0000 (1.0000)
SD1	0.1285 (0.1095)	0.1111 (0.1072)	0.0000 (0.0000)	0.9392 (0.9067)
SD2	0.5179 (0.4308)	0.2351 (0.2074)	0.0040 (0.0066)	0.9420 (0.9345)
CR	0.0230 (0.0168)	0.0198 (0.0153)	0.1755 (0.1710)	0.0029 (0.0011)
QR	0.0175 (0.0109)	0.0186 (0.0130)	0.0015 (0.0001)	0.1681 (0.1553)
DR	0.3810 (0.4296)	0.1466 (0.1537)	0.0495 (0.0655)	0.9041 (0.9268)
SIZE	6.4989 (6.4156)	1.1755 (1.0430)	3.4657 (3.0445)	9.8543 (9.7837)
AE	0.0125 (0.0363)	0.0559 (0.1218)	0.0000 (-0.0050)	1.1795 (2.8332)
RD	0.0466 (0.0092)	0.0694 (0.0181)	-0.0263 (-0.2071)	0.6598 (0.1411)

Note: a. IT industry; b. non-IT industry.

variable has a problem of multicollinearity with other explanatory variables. In order to avoid the problem of multicollinearity, we must delete any explanatory variable with VIF > 10 from the regression model. Appendix I has three data groups to calculate VIF and has the same result.

The result shows every CR's VIF value greater than 10



in step 1. The CR variable is then omitted to avoid the problem of multicollinearity. In total, we adopt ESTS, FATA, FD, SD1, SD1, LD, QR, DR, SIZE, AE, and RD as explanatory variables in our regression model. The result in step 2 does not have any variable with multicollinearity.

After eliminating the CR variable which has a multicollinearity problem, the empirical model can be expressed by Equations (3) and (4):

$$\begin{aligned} ROA_{it} = & \bar{a}0 + \bar{a}1ESTS_{it} + \bar{a}2EATA_{it} + \bar{a}3MCTA_{it} + \bar{a}4FE_{it} \\ & + \bar{a}5FD_{it} + \bar{a}6SD1_{it} + \bar{a}7SD2_{it} + \bar{a}8CR_{it} + \bar{a}9QR_{it} + \\ & \bar{a}10SIZE_{it} + \bar{a}11RD_{it} + \bar{a}12AE_{it} + \bar{a}13RD_{it} + uit. \end{aligned} \quad ..(3)$$

$$\begin{aligned} ROE_{it} = & \bar{a}0 + \bar{a}1ESTS_{it} + \bar{a}2EATA_{it} + \bar{a}3MCTA_{it} + \bar{a}4FE_{it} \\ & + \bar{a}5FD_{it} + \bar{a}6SD1_{it} + \bar{a}7SD2_{it} + \bar{a}8CR_{it} + \bar{a}9QR_{it} + \\ & \bar{a}10SIZE_{it} + \bar{a}11RD_{it} + \bar{a}12AE_{it} + \bar{a}13RD_{it} + uit. \end{aligned} \quad ...(4)$$

## Empirical Results

To adopt the above variables in our model, through testing for multicollinearity and conducting a correlation analysis, this study then manipulates the export ratio, foreign assets ratio, mainland China investment ratio, foreign equity, debt from foreign countries, spontaneous short-term debt ratio, external short-term debt ratio, quick ratio, debt ratio, size, advertisement ratio, R&D ratio, as independent variables in the panel data model. Appendix I shows the fixed-effects panel data regression results of all samples included IT and non-IT industry.

We first examine all samples and present the results in Appendix II. The results show that at the 1% significance level, according to the F-test and LM test, the panel data model is more appropriate. The p-value of Hausman test is less than 1%, showing that the fixed-effect model is should be adopted. SD1 and QR significantly improve ROA but have no significant effect on ROE.

We secondly examine only the IT industry and the results are presented in Appendix III. According to the F-test and LM-test, the panel data models are more appropriate than the OLS approach to estimate the effects of explanatory variables on ROA and ROE. The P-value of the Hausman test is less than 1%, showing that the random-effects model should be used. SD1 and QR significantly improve ROA but have no significant effect on ROE. This is a similar result as with Appendix II.

We thirdly examine only the non-IT industry and present the results in Appendix III. According to the F-test, the fixed-effects model is more appropriate, but according to the LM-test, the OLS approach is more appropriate. Based on the two tests, the panel data models should be used. The P-value of the Hausman test is less than 1%, showing that the random-effects model should be used. ESTS, SD1, and QR have different results on ROA and ROE.

From result of control variables, the debt ratio has a

significantly negative effect on operational performance at the 1% level. Firms with a higher debt need to pay more interest expenses, hence decreasing their operational performance. The firm size has no significant effect on operational performance in all samples (Appendix II) and the IT industry (Appendix III). This result is inconsistent with Fama and French (1992), Han et al. (1998), and Gomes and Ramaswamy (1999). This may be because firm sizes are relatively closer in our dataset. In the result of Appendix III, firm size has a significant positive effect on operational performance and this result is consistent with Gomes and Ramaswamy (1999). The R&D expense ratio has a significantly negative effect on operational performance at the 1% level in the IT industry, but not in the non-IT industry. The result is consistent with Lantz and Sahut (2005). The growth of IT firms is based on the innovative products and services; therefore, they invest heavily in research and development. If the R&D expenditure signals strategic positioning of a firm, then it can also significantly decrease the operational performances. The advertisement expense ratio has a significantly negative effect on an

***MNEs with a higher debt ratio need to pay more interest expenses, hence decreasing their operational performance.***

MNE's operational performance at the 1% level in the IT industry. Other things being equal, a higher AE ratio will generate a lower operational performance. This result is inconsistent with Lu and Beamish (2004) and Han et al. (1998). This might be because Taiwanese firms usually make profits from their manufacturing ability rather than their brand image.

For the result of globalization ability, ESTS has a significantly positive effect on an MNE's operational performance at the 5% level. This is consistent with *Vernon (1971), Grant (1987), and Daniels and Bracker (1989)*. EATA has a significantly negative effect on an MNE's operational performance at the 5% level. Our result is consistent with Collins (1990) who indicates that EATA has a negative influence on firms' operational performance. This does not support Hypothesis 1. Internationalization does not provide MNEs with the absolute positive flexibility. According to Contractor et al. (2003), too much investment into a foreign subsidiary will increase connection and communication costs, hence lowering an MNE's operational performance. According the result of this research, DOI cannot directly affect firms' performance. MCTA for both the IT and non-IT industries has an insignificant effect on ROA and ROE. The result of MCTA does not support Hypothesis 1. In summary, the result of this research supports part of Hypothesis 1.

For the result of financing sources from foreign countries, debt in foreign countries has a significantly positive effect on an MNE's operational performance in whole samples, which supports Hypothesis 2. This is consistent with Allayannis et al. (2003) and Stephen and Karolyi (1999). Although debt and equity from foreign countries have several advantages, the result in this research finds only a

contribution of debt from foreign countries to operational performance. Financial flexibility seems to be not the most important reason to issue foreign equity. When firms issue GDRs, the major reasons are for capital cost, international reputation, etc.

For the result of financing ability, SD1 and SD2 have significantly positive effects on an MNE's operational performance at the 5% level for the IT industry, which supports Hypothesis 2. SD1 has a significantly positive effect while SD2 has no significant effect on an MNE's operational performance for the non-IT industry and for all samples.

This means that the MNEs of the IT industry need more short-term debt than the non-IT industry and financial flexibility is more important in the IT industry than non-IT industry. The cost of short-term debt is lower than long-term debt, but the reinvestment risk is higher than long-term debt. Firms use short-term debt to increase flexibility and performance, and to avoid bankruptcy, which is consistent with Enrica and Antonio (2004) and Allayannis et al. (2003). Therefore, the result of this research also supports part of Hypothesis 2.

For the result of liquidity ability, the quick ratio has a significantly positive effect on an MNE's operational performance in the whole sample and the IT industry, but has an insignificant effect on an MNE's operational performance in the non-IT industry. This is consistent with Davis and Peles (1993). The different results between the IT and non-IT industries mean that IT industry firms need more financial flexibility in order to switch assets to cash in a short period of time. Hence, the result of this research support full of Hypothesis 3.

## Discussion

Previous research about flexibility mainly focuses on operational decision. The contribution of this research is to construct a three-dimensional framework to measure an MNE's financial flexibility.

Vernon (1971) uses the sample of fortune 500 in 1964 and finds that MNEs earn higher ROS and ROA than non-MNEs. Grant (1987) uses 304 British firms for 1968-1984 and finds that FSTS is positively associated with super profitability over a period of thirteen years. This research's findings of ESTS are consistent with Vernon (1971) and Grant (1987).

Since 2000, MNEs in Taiwan start invest even more in mainland China because of the following reasons: First, their policy to canvass foreign firms is energetic. Firms from Taiwan enjoy tax reductions in mainland China. Second, mainland China has relatively more abundant natural resources than Taiwan

However, MCTA have no significant affect on an MNE's operational performance. Although the mainland China market is prominent, Taiwanese MNEs face strong competition from Japanese, Korean, and local firms. Therefore, the result of MCTA has no significant influence on operational performance in the sample period.

Pinegar and Wilbricht (1989) use 137 U.S. firms as samples and find that firms can lower financing costs by issuing Euro-convertible bonds. The Ministry of Finance in Taiwan makes issuing Euro-convertible bonds open to public access in 1989. There are 97 Euro-convertible bonds cases until 2001 include currencies of Euro-dollar (83 cases), Swiss Franc (11 cases), and Japanese Yen (3 cases). The total number is 94 hundred millions USD, 6 hundred millions SFR, and 70 hundred millions JPY. The most cases are issued by the IT industry which has 57 cases.

The characteristics of the IT industry are technology intensive, short life cycle, and need sufficient for factory buildings, R&D expense. Therefore, the IT industry uses foreign financing sources more energetic than non-IT industry. This research collects dataset from 1999 to 2003 and the number is limited. Further research can collect longer time series to exam the same problem.

*Degree of internationalization has both positive and negative effects on operational performance. Increasing export can significantly improve an MNE's operational performance, while increasing the foreign assets cannot.*

Enrica and Antonio (2004) find a significantly positive relation between short-term debt and financial crises, implying that the large short-term debt is a fundamental source of financial fragility. Rodrik

and Velasco (2000) instead show that the ratio of short-term debt to reserves helps predict large reversals of capital cash flow. Although the short-term debt ratio may increase operational risk, it does provide sufficient liquidity for firms. Buch and Lusinyan (2003) show that the share of short-term debt is positively related to GDP per capita and to the size of the financial system of the recipient country. This research shows that both SD1 and SD2 have significantly positive influences on an MNE's financial performance. Although short-term debt provides firms sufficient financial flexibility, it implies risk for firms also. Further research can find out the optional point of short-term debt.

Finally, we hypothesize that liquidity ability can stabilize operational funds and has a positive influence on firms' operational performance. Davis and Peles (1993) indicate that current ratio and quick ratio are incorporated to represent the liquidity of a firm's funds. The result of this research shows that QR has a significantly positive influence on MNEs' operational performance.

## Concluding Remarks

With the international environment turning more competitive due to WTO regulations, MNEs continue to seek suitable resources and low costs. Changes in the international operations have led to higher uncertainties for firms, and the



risks undertaken by international enterprises are higher than those domestically. Therefore, when confronting a high and risky operational environment, MNEs must apply appropriate strategies to lower the fluctuations of profits and performance in order to achieve their operational goals.

This research discusses how the financial flexibility variable affects operational performance. We have built a panel dataset of 100 IT firms and 167 non-IT firms in Taiwan during 1999-2003 for empirical study. The contribution of our research is to find financial flexibility variables which can affect operational performance and to compare the difference between the IT and non-IT industry. We have made some proposes for MNEs' management and further research.

First, export sales as a percentage of total sales (ESTS), foreign debt (FD), spontaneous short-term debt (SD1) and the quick ratio (QR) contribute to operational performance in all samples, while foreign debt makes no contribution to the IT industry and non-IT industry. The ESTS have a positive effect on operational performance, meaning that domestic demand is not sufficient for manufactures. MNEs should increase exports to increase operational performance and sustainable development. SD1 has a significantly positive effect with operational performance, and it includes payment by credit and accrual expenses which provide financial flexibility to MNEs. The QR provides MNEs with the ability to cover current liability.

Second, foreign assets as a percentage of total assets has a significantly negative effect on operational performance. According to Contractor et al. (2003), too much investment into foreign subsidiaries will increase connection and communication costs, hence lowering its operational performance. Third, investment in mainland China as a percentage of total assets (MCTA) and foreign equity (FE) have no significant effects on operational performance.

We make three suggestions for further researches. First, this research does not consider macroeconomics aspects such as business cycles. The operational performance can be affected by business cycles in different firms and different industries. Second, we only consider the degree of internationalization to measure operational ability. More research can show how managers react to financial crises and how long it takes for them to solve problems. Globally, further research can add a variable for human resources. Third, this research discusses financial flexibility and operational performance. Previous research shows that flexibility can limit the volatility of operational performance and hence can lower risk. Future research can simultaneously take into account financial flexibility and operational risk.

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### Appendix I: Multicollinearity Tests

ESTS: Export sales / Total sales; FATA: Foreign assets / Total assets; MCTA: Mainland China investment / Total assets; FE: GDRs / Weighted average of capital; FD: Dummy variable; if publish foreign convertible bond, then FD = 1; SD1: Spontaneous short-term debt / Total debt; SD2: External short-term debt / Total debt; CR: Current assets / Current liabilities; QR: (Current assets – inventory – advance payment) / Current liabilities; SIZE: Natural logarithm of employees; DR: Total debt / Total assets; AE: Advertisement expense / Net income; RD: Research & development expense / Net income.

Variable	Whole sample		IT industry		non-IT industry	
	R <sup>2</sup>	VIF	R <sup>2</sup>	VIF	R <sup>2</sup>	VIF
Step 1						
ESTS	0.223	1.288	0.147	1.173	0.163	1.194
FATA	0.169	1.204	0.171	1.206	0.189	1.234
MCTA	0.090	1.099	0.061	1.065	0.119	1.135
FE	0.049	1.051	0.082	1.089	0.029	1.030
FD	0.103	1.114	0.169	1.203	0.022	1.022
SD1	0.292	1.413	0.414	1.708	0.224	1.288
SD2	0.250	1.333	0.304	1.437	0.240	1.316
CR	0.948	19.308	0.965	28.356	0.933	14.914
QR	0.949	19.541	0.964	27.772	0.933	14.890
DR	0.407	1.686	0.472	1.893	0.400	1.665
SIZE	0.268	1.366	0.344	1.526	0.254	1.340
AE	0.054	1.057	0.053	1.056	0.094	1.104
RD	0.253	1.339	0.394	1.650	0.106	1.119
Step 2						
ESTS	0.211	1.268	0.126	1.144	0.147	1.173
FATA	0.157	1.186	0.176	1.213	0.176	1.214
MCTA	0.090	1.099	0.073	1.079	0.118	1.133
FE	0.048	1.050	0.090	1.098	0.028	1.029
FD	0.102	1.114	0.169	1.204	0.022	1.022
SD1	0.288	1.405	0.407	1.687	0.221	1.284
SD2	0.246	1.325	0.328	1.488	0.240	1.316
QR	0.465	1.869	0.517	2.071	0.379	1.610
DR	0.376	1.603	0.449	1.813	0.370	1.587
SIZE	0.267	1.365	0.326	1.484	0.249	1.331
AE	0.042	1.043	0.052	1.055	0.069	1.075
RD	0.245	1.324	0.390	1.640	0.094	1.104

Appendix II : Results of the Fixed-effects Model for Whole Samples

Panel 1 shows the result of Equation (3) (Dependent variable is ROA in Equation (3)) and panel 2 shows the result of Equation (4) (Dependent variable is ROE in Equation (4)). ESTS: Export sales / Total sales; FATA: Foreign assets / Total assets; MCTA: Mainland China investment / Total assets; FE: GDRs / Weighted average of capital; FD: Dummy variable; if publish foreign convertible bond, then FD = 1; SD1: Spontaneous short-term debt / Total debt; SD2: External short-term debt / Total debt; QR: (Current assets – inventory – advance payment) / Current liabilities; SIZE: Natural logarithm of employees; DR: Total debt / Total assets; AE: Advertisement expense / Net income; RD: Research & development expense / Net income.

Variable	Panel 1			Panel 2		
	Estimated Coefficient	t-statistic	P-value	Estimated Coefficient	t-statistic	P-value
Constant	0.012	0.926	0.355	<b>0.062</b>	<b>1.904</b>	<b>0.058*</b>
ESTS	<b>0.015</b>	<b>3.737</b>	<b>0.000***</b>	<b>0.027</b>	<b>2.721</b>	<b>0.007***</b>
FATA	<b>-0.070</b>	<b>-6.030</b>	<b>0.000***</b>	<b>-0.162</b>	<b>-5.549</b>	<b>0.000***</b>
MCTA	-0.031	-1.085	0.279	-0.095	-1.323	0.187
FE	0.003	0.488	0.626	-0.006	-0.350	0.727
FD	<b>0.017</b>	<b>1.739</b>	<b>0.083*</b>	<b>0.057</b>	<b>2.281</b>	<b>0.023**</b>
SD1	<b>0.029</b>	<b>1.862</b>	<b>0.064*</b>	0.003	0.069	0.945
SD2	0.007	1.050	0.295	0.018	1.005	0.316
QR	<b>0.353</b>	<b>2.789</b>	<b>0.006***</b>	0.278	0.876	0.382
DR	<b>-0.069</b>	<b>-6.291</b>	<b>0.000***</b>	<b>-0.249</b>	<b>-9.112</b>	<b>0.000***</b>
SIZE	0.002	1.548	0.123	0.006	1.637	0.103
AE	0.007	0.422	0.673	0.035	0.795	0.427
RD	<b>-0.087</b>	<b>-2.607</b>	<b>0.010***</b>	<b>-0.199</b>	<b>-2.400</b>	<b>0.017**</b>
F-test	P-value=0.000***			P-value=0.000***		
LM-test	P-value=0.021**			P-value=0.000***		
Hausman test	P-value=0.000***			P-value=0.000***		
R <sup>2</sup> (Adj-R <sup>2</sup> )	0.457 (0.432)			0.443(0.417)		

Note: \*\*\* represents significance at the 1% level; \*\* represents significance at the 5% level; and \* represents significance at the 10% level.

Appendix III: Results of the Random-effects Model for the IT Industry.

Panel 1 shows the result of Equation (3) (Dependent variable is ROA in Equation (3)) and panel 2 shows the result of Equation (4) (Dependent variable is ROE in Equation (4)). ESTS: Export sales / Total sales; FATA: Foreign assets / Total assets; MCTA: Mainland China investment / Total assets; FE: GDRs / Weighted average of capital; FD: Dummy variable; if publish foreign convertible bond, then FD = 1; SD1: Spontaneous short-term debt / Total debt; SD2: External short-term debt / Total debt; QR: (Current assets – inventory – advance payment) / Current liabilities; SIZE: Natural logarithm of employees; DR: Total debt / Total assets; AE: Advertisement expense / Net income; RD: Research & development expense / Net income.

Variable	Panel 1			Panel 2		
	Estimated Coefficient	t-statistic	P-value	Estimated Coefficient	t-statistic	P-value
Constant	0.010	0.516	0.606	0.029	0.632	0.528
ESTS	<b>0.015</b>	<b>2.118</b>	<b>0.034**</b>	<b>0.033</b>	<b>1.897</b>	<b>0.058*</b>
FATA	<b>-0.064</b>	<b>-3.996</b>	<b>0.000***</b>	<b>-0.174</b>	<b>-4.554</b>	<b>0.000***</b>
MCTA	0.092	1.062	0.288	0.279	1.383	0.167
FE	0.000	-0.027	0.979	-0.001	-0.147	0.883
FD	0.000	-0.068	0.946	0.009	0.694	0.488
SD1	<b>0.041</b>	<b>1.981</b>	<b>0.048**</b>	0.021	0.437	0.662
SD2	<b>0.021</b>	<b>2.236</b>	<b>0.025**</b>	<b>0.048</b>	<b>2.198</b>	<b>0.028**</b>
QR	<b>0.255</b>	<b>1.821</b>	<b>0.069*</b>	0.285	0.858	0.391
DR	<b>-0.079</b>	<b>-4.714</b>	<b>0.000***</b>	<b>-0.215</b>	<b>-5.413</b>	<b>0.000***</b>
SIZE	0.003	1.290	0.197	0.006	1.346	0.178
AE	<b>-0.077</b>	<b>-2.690</b>	<b>0.007***</b>	<b>-0.150</b>	<b>-2.262</b>	<b>0.024**</b>
RD	<b>-0.109</b>	<b>-3.304</b>	<b>0.001***</b>	<b>-0.213</b>	<b>-2.737</b>	<b>0.006***</b>
F-test	0.000***			0.000***		
LM-test	0.068*			0.000***		
Hausman test	0.018**			0.012**		
R <sup>2</sup> (Adj-R <sup>2</sup> )	0.254 (0.236)			0.256 (0.238)		

Note: \*\*\* represents significance at the 1% level; \*\* represents significance at the 5% level; \* represents significance at the 10% level.

Appendix III: Results of the Random-effects Model for the Non-IT Industry

Panel 1 shows the result of Equation (3) (Dependent variable is ROA in Equation (3)) and panel 2 shows the result of Equation (4) (Dependent variable is ROE in Equation (4)). ESTS: Export sales / Total sales; FATA: Foreign assets / Total assets; MCTA: Mainland China investment / Total assets; FE: GDRs / Weighted average of capital; FD: Dummy variable; if publish foreign convertible bond, then FD = 1; SD1: Spontaneous short-term debt / Total debt; SD2: External short-term debt / Total debt; QR: (Current assets – inventory – advance payment) / Current liabilities; SIZE: Natural logarithm of employees; DR: Total debt / Total assets; AE: Advertisement expense / Net income; RD: Research & development expense / Net income.

Variable	Panel 1			Panel 2		
	Estimated Coefficient	t-statistic	P-value	Estimated Coefficient	t-statistic	P-value
Constant	0.008	0.639	0.523	<b>0.061</b>	<b>1.919</b>	<b>0.055*</b>
ESTS	<b>0.009</b>	<b>1.862</b>	<b>0.063*</b>	0.012	1.085	0.278
FATA	<b>-0.022</b>	<b>-2.283</b>	<b>0.022**</b>	<b>-0.038</b>	<b>-1.651</b>	<b>0.099*</b>
MCTA	-0.027	-1.059	0.290	<b>-0.132</b>	<b>-2.125</b>	<b>0.034**</b>
FE	-0.008	-0.108	0.914	0.010	0.059	0.953
FD	0.004	0.445	0.656	0.017	0.706	0.480
SD1	<b>0.041</b>	<b>3.145</b>	<b>0.002***</b>	0.002	0.062	0.950
SD2	-0.007	-0.987	0.324	-0.016	-0.900	0.368
QR	0.204	1.771	0.077*	0.061	0.217	0.828
DR	<b>-0.055</b>	<b>-5.248</b>	<b>0.000***</b>	<b>-0.243</b>	<b>-9.437</b>	<b>0.000***</b>
SIZE	0.002	1.628	0.104	<b>0.007</b>	<b>1.977</b>	<b>0.048**</b>
AE	-0.011	-1.180	0.238	-0.016	-0.697	0.486
RD	-0.089	-1.347	0.178	-0.048	-0.300	0.765
F-test	0.000***			0.000***		
LM-test	0.102			0.000***		
Hausman test	0.0220**			0.100		
R <sup>2</sup> (Adj-R <sup>2</sup> )	0.2209 (0.209)			0.218057(0.206641)		

Note: \*\*\* represents significance at the 1% level; \*\* represents significance at the 5% level; \* represents significance at the 10% level.

### Reflecting Applicability in Real Life:

1. In addition to financial flexibility, what kinds of flexibility can also help improve an MNE's operational performance?
2. What kinds of globalization strategies help most with improving an MNE's operational performance?
3. What are the best locations for your enterprise to invest to improve its financial flexibility and hence operational performance?



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