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Charles Y. Tang
Pace University

Surinder Tikoo
State University of New York, New Paltz

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Charles Y. Tang, Ph.D.
Professor of Accounting
Lubin School of Business
Pace University

and

Surinder Tikoo, Ph.D.
Assistant Professor of Business Administration
State University of New York, New Paltz

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Charles Y. Tang, Ph.D.

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Charles Y. Tang is Assistant Professor of Accounting at the Lubin School of Business, Pace University.

Surinder Tikoo is Assistant Professor of Business Administration at the State University of New York at New Paltz.

ABSTRACT

This paper examines the association between the stock returns and accounting earnings of firms that have different levels of operational flexibility. Operational flexibility is a firm's ability to respond profitably to environmental fluctuations by shifting factors of production within a multinational network of subsidiaries. The geographic breadth and depth of a firm's multinational network are used as indicators of operational flexibility. We find there is a significantly greater coefficient between stock returns and accounting earnings for multinational firms that operate in many countries, but limit their concentration in any one foreign country, than for other multinational firms or domestic firms. This coefficient is significantly smaller for multinational firms whose foreign subsidiaries are highly concentrated in a few countries. When all multinational firms are pooled together, we find their earnings-returns association does not differ from that of domestic firms.

INTRODUCTION

A multinational corporation with operations in multiple geographic locations can profitably respond to country-specific environmental shocks and fluctuations by shifting factors of production across national borders. This ability, termed operational flexibility, has been studied by scholars in management, manufacturing, finance, and economics. Kogut (1983, 1985a, 1985b, 1989), who has led the conceptual discussion of operational flexibility, convincingly argues that a multinational firm has flexibility options that enable it to exploit profit opportunities generated by varying country environments. Researchers in different disciplines have developed mathematical models that verify the value creation potential of operational flexibility (e.g., Huchzermeier and Cohen 1996; Kogut and Kulatilaka, 1994; Mello et al. 1995).

Despite compelling theoretical work on the value of operational flexibility, only one empirical study has addressed this subject. Allen and Pantzalis (1996) find operational flexibility to be positively associated with their excess market value measure, suggesting that operational flexibility enhances the market value of a firm. Their empirical tests, however, are constructed under a special condition, and as a result, their findings cannot be generalized. Further, their study does not account for firm size, a variable that is positively related to excess market value (Berger and Ofek 1995; Errunza and Senbet 1984; Lang and Stulz 1994). When we analyze the Allen and Pantzalis data using their methodology, but add a control variable for firm size, we do not find any significant effect for operational flexibility.

We use a different approach to examine whether operational flexibility has a payoff for firms. Specifically, we examine the coefficient that relates stock returns to changes in earnings for firms that have different levels of operational flexibility. This coefficient, often referred to as the earnings response coefficient (ERC), represents the stock price response to the earnings changes reported by a firm (Beaver 1968; Collins and Kothari 1989). The ERC indicates the extent to which investors revise their expectations about a firm's future earnings based on information conveyed by changes in current earnings.

The ERC varies across firms: Its magnitude depends on the impact that changes in current earnings have on future earnings. Investors assess these implications in terms of earnings persistence and earnings growth potential. Current earnings changes are considered persistent if investors expect the firm to maintain its new earnings level going forward. In such a case, the current earnings changes have a permanent effect on future earnings and, therefore, greatly affect investors' expectations of future earnings. Consequently, the ERC will be large when earnings changes are perceived to be permanent. If a change in current earnings is perceived as a one-time event, there will be little or no stock price reaction from investors, and the ERC will be small.

Earnings growth potential is also a major determinant of ERC because investors value firms with high earnings growth momentum. A current earnings change that implies greater growth potential has more of an impact on investors' expectations of future earnings than earnings changes

that imply little or no growth potential. Therefore, expected growth potential positively affects ERCs. The relationship between the ERC and expected earnings persistence and earnings growth is a carefully studied and well-documented area in accounting literature (e.g., Collins and Kothari 1989; Kormendi and Lipe 1987).

Several studies use the ERC as a test statistic to make inferences about investors' expectations of firms that differ with respect to a study variable (e.g., Teoh and Wong 1993; Teets 1992). In a similar approach, we examine differences in the ERCs of firms with different levels of operational flexibility. By doing so, we can determine the impact of operational flexibility on investors' valuation of firms' earnings. If we find the ERCs of firms with high levels of operational flexibility to be significantly greater than those of firms with low levels of operational flexibility, we can infer that investors view operational flexibility as creating value for firms.

OPERATIONAL FLEXIBILITY AND ERC

Operational flexibility positively affects the ERC for at least two reasons. First, it enables firms to achieve higher earnings growth. Given the differences in business environments across countries, firms with operational flexibility can make profit-maximizing decisions regarding the location to declare profits, the appropriate markets in which to concentrate market power, and the location to raise low-cost capital. Differences in taxation codes across countries make it possible for firms to transfer some profits and/or losses to locations where they are tax-advantaged. In the event of an environment change that results in increased labor costs in a particular country, operational flexibility enables multinational corporations (MNCs) to shift the labor-intensive part of their production from the high-cost country to a low-cost one. Such shifts cannot be achieved easily if the firm is confined to a single country. Thus, operational flexibility gives MNCs the ability to shift the production possibility frontier outward, which results in an increase in expected future cash flows, and thus growth (Mello et al., 1995).

Second, operational flexibility enables firms to reduce the uncertainty of future earnings that arises from economic exposure and hence increase earnings persistence. Economic exposure is the long-term effect of changes in exchange rates on the future prices, sales, and costs (Hill, 1997). All firms, with and without operational flexibility, face unanticipated shifts in nominal and real exchange rates. Firms without operational flexibility must rely on financial instruments to hedge against these risks. Yet financial instruments for hedging long-term risk may not be readily available or may be costly. Multinational corporations, however, can hedge their economic exposure by using the choices that operational flexibility offers.

NETWORK STRUCTURE AND OPERATIONAL FLEXIBILITY

While operational flexibility is valuable to firms, it comes with a cost. A multinational network of subsidiaries is complex, difficult to manage (Roth, 1992; Roth et al., 1991), and entails significant agency and transaction costs. Agency costs stem from controlling potential mismanagement in subsidiaries and from monitoring the opportunistic behavior of subsidiary managers. Transaction costs stem from managing the numerous internal transactions among managers in different foreign subsidiaries and external transactions with government agencies, suppliers, and customers in different countries (Hitt et al., 1997). These costs reduce a firm's growth potential and increase the uncertainty of future earnings. Accordingly, firms benefit from their multinational networks only if the positive value effect of operational flexibility exceeds the negative value effect of the accompanying agency and transaction costs.

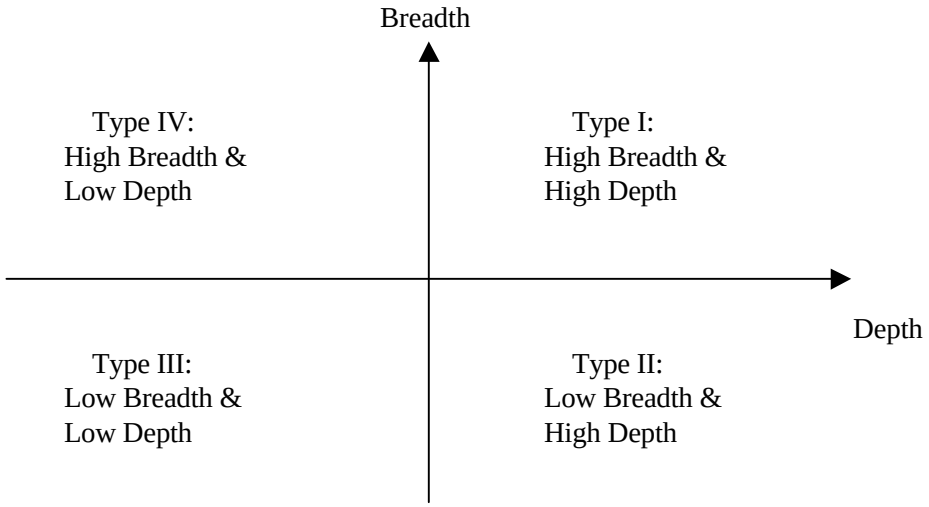
When firms widen their network by establishing subsidiaries in different countries, they enhance the potential for operational flexibility. Instead of locating subsidiaries in many countries, firms can concentrate them in a few countries. When firms thus deepen their network, it diminishes the potential for operational flexibility. In a study of the wealth effects of international mergers and acquisitions, Doukas and Travlos (1988) find no positive reaction to firms' stock prices when they deepen their network by acquiring subsidiaries in countries where they already have operations. They do find a significant positive stock price reaction for acquisitions in countries where firms have no existing operation. Accordingly, the value impact of operational flexibility and agency and transaction costs should be positive for MNCs that have a broad but less concentrated network, and negative for MNCs with a narrow but highly concentrated network.

HYPOTHESIS TESTING

We predict the ERC to be a positive function of the breadth and a negative function of the depth of a firm's multinational network. To examine the link between the ERC and breadth and depth of the MNC subsidiary network, we created five groups of firms. We first divided our overall sample of firms into domestic firms and MNCs. The MNC sample was further divided into four groups, depending on whether the breadth and the depth of an MNC's subsidiary network were less than or greater than the median breadth and depth of the overall MNC sample (see Figure 1). Here, and in the rest of the paper, we emphasize median breadth and depth instead of mean because of skewness in the variables in the sample distribution

Figure 1

Classification of MNCs into Different Types According to the Structure of Their Multinational Network



Notes:

Breadth	= Number of foreign countries in which a MNC has at least one majority-owned subsidiary;
Depth	= Number of foreign subsidiaries per foreign country;
Type I	= MNCs whose breadth and depth are greater than sample medians;
Type II	= MNCs whose breadth is lower and depth is greater than sample median;
Type III	= MNCs whose breadth and depth are lower than sample medians;
Type IV	= MNCs whose breadth is greater and depth is lower than sample median.

We posit that the net effect of the benefits of operational flexibility and agency and transaction costs will be positive for high-breadth, low-depth (HB, LD) MNCs, and negative for low-breadth, high-depth (LB, HD) MNCs. Therefore, expect the ERC of Type IV (HB, LD) MNCs to be greater, and the ERC of Type II (LB, HD) MNCs to be smaller, than the ERC of domestic firms. Further, we expect the ERC of Type IV MNCs to be greater than the ERC of other types of MNCs.

We predict the ERC for Type II MNCs to be even smaller than that of domestic firms because, for these MNCs, the costs associated with operational flexibility exceed the benefits. Consequently, the net effect of these costs and benefits is negative. Domestic firms have no benefit from this type of operational flexibility, but they also do not incur the costs of managing a network of foreign subsidiaries. The net effect is zero for domestic firms.

For Type I MNCs, both breadth and depth are high, and for Type III MNCs, both breadth and depth are low. For both these MNC types, the effect of operational flexibility on ERC is likely to be offset by comparable costs. The direction of the net effect on ERC for these firms is, however, unclear and is therefore not posited here.

METHODOLOGY AND DATA

Model

Three regression models are used to test the conceptualization of operational flexibility. First, the ERCs of each of the four types of MNCs and domestic firms are compared using the model:

$$\tilde{CAR}_{it} = a_0 + \sum_{p=1}^{4} a_p T_p + b_0 \Delta E_{it} + \sum_{p=1}^{4} b_p T_p \Delta E_{it} + \tilde{x}_{it} \quad (1)$$

Where:

$\tilde{CAR}_{it}$ = unexpected stock returns for firm i for year t cumulated from two days after prior year earnings announcement to two days after current-year earnings announcement;

p = the index for type of MNC, which takes a value of 1, 2, 3, or 4 (representing the four types of MNCs that vary with respect to breadth and depth of operations);

T_p = dummy variable, which is 1 if firm is a type p MNC, and 0 if it is domestic;

ΔE_{it} = changes in annual earnings from year t -1 to year t for firm i that belongs to type p; and

$\tilde{x}_{it}$ = a mean-zero disturbance term.

The parameter β_0 represents the ERC of domestic firms, and $\beta_0 + \beta_p$ represents the ERC of MNCs that belong to type *p*. Accordingly, β_p represents the difference in ERC between type *p* MNCs and domestic firms.

Next, the ERC of the domestic firms is compared with a pooled sample of MNCs using the model:

$$\tilde{CAR}_{it} = a_0 + a_1 M + b_0 \Delta E_{it} + b_1 M \Delta E_{it} + \tilde{x}_{it} \quad (2)$$

Where:

M = a dummy variable that takes a value 0 if a firm is domestic, and 1 if it is multinational.

The parameter β_1 captures the average difference in the ERCs of domestic and multinational firms. All other variables in equation 2 are as previously defined.

Finally, the impact of breadth and depth on the ERC of all the MNCs is examined using the model:

$$\tilde{CAR}_{it} = a_0 + a_1 B + a_2 D + a_3 BD + b_0 \Delta E_{it} + b_1 B \Delta E_{it} + b_2 D \Delta E_{it} + b_3 BD \Delta E_{it} + \tilde{x}_{it} \quad (3)$$

Where:

B = a dummy variable that takes a value 1 if the breadth is greater than the sample median breadth, and 0 otherwise; and

D = a dummy variable that takes a value 1 if the depth is greater than the sample median depth, and 0 otherwise.

All other variables are as previously defined. The interaction term (*BD*) is intended to capture the possible effect of any interaction between breadth and depth.

The ERC of the pooled MNC sample is given by the partial derivative of the dependent variable ($\tilde{CAR}_{it}$) with respect to the independent variable (ΔE_{it}), and is expressed as follows:

$$ERC = b_0 + b_1 B + b_2 D + b_3 BD \quad (4)$$

The ERCs for the four types of MNCs are derived from equation 4 as follows:

ERC for low-breadth (B = 0) and low-depth (D = 0) Type III MNCs: β_0
ERC for high-breadth (B = 1) and low-depth (D = 0) Type IV MNCs: $\beta_0 + \beta_1$
ERC for low-breadth (B = 0) and high-depth (D = 1) Type II MNCs: $\beta_0 + \beta_2$
ERC for high-breadth (B = 1) and high-depth (D = 1) Type I MNCs: $\beta_0 + \beta_1 + \beta_2 + \beta_3$

Because the ERC of Type IV (HB, LD) MNCs is expected to be larger and the ERC of Type II (LB, HD) MNCs is expected to be smaller than the ERC of domestic firms, in equation 1, we expect $\beta_4 > 0$ and $\beta_2 < 0$. In equation 3, we expect $\beta_1 > 0$ and $\beta_2 < 0$, which implies that Type II (LB, HD) MNCs have a smaller and Type IV (HB, LD) MNCs have a larger ERC than Type III (LB, LD) MNCs. We expect the ERC of Type I and Type III MNCs will not differ significantly. Therefore, in equation 3, we expect β_3, which captures the difference in ERC between Type I (HB, HD) MNCs and Type III (LB, LD) MNCs, to be zero.

Note that predicting $\beta_3 = 0$ in equation 3 is different from predicting $\beta_3 = 0$ in equation 1. In equation 3, β_3 captures the difference in ERC between Type I and Type III MNCs, while in equation 1, β_3 captures the difference in ERC between Type III MNCs and domestic firms.

Measurement of Variables

The dependent variable in all regression models is the cumulative abnormal return ($\tilde{CAR}_{it}$) for a test period starting from the third day after the previous year's earnings announcement date through the second day after the current year's earnings announcement date, and is measured as follows:

$$\tilde{CAR}_{it} = \sum_{d=a-1+3}^{a+2} (Ret_{id} - \hat{g}_{io} - \hat{g}_{i1} Ret_{md}) \quad (5)$$

Where:
a = current year's (year t) earnings announcement date;
a - 1 = previous year's earnings announcement date;
Ret_{id} = rate of stock return of firm *i* for day *d*;
Ret_{md} = the value-weighted rate of return for the market on date d; and
$\hat{g}_{io}$ and $\hat{g}_{i1}$ = the regression estimates of the capital asset pricing model (CAPM) parameters.

The CAPM parameters are estimated using stock and market returns over an estimation period beginning with the third day after the earnings announcement date of year *a - 2* to the second day after the earnings announcement date of year *a - 1*.

The independent variable, DE_{it}, the change in current earnings, is computed as follows:

$$\Delta E_{it} = (EPS_t - EPS_{t-1}) / P_{it-1} \quad (6)$$

Where:

EPS_{it} and EPS_{it-1} = the actual earnings per share for the current and the prior fiscal year; and

P_{it-1} = the price per share of stock for firm i at the beginning of the current fiscal year.

Consistent with many previous studies, we deflate earnings changes by the beginning stock price in order to measure unexpected earnings (e.g., Dhaliwal and Reynolds, 1994; Easton and Zmijewski, 1989).

Sample, Earnings, and Returns Data

A firm is classified as an MNC if it has at least one majority-owned foreign subsidiary and as a domestic firm if it has none. A firm's foreign operation is classified as a subsidiary if the firm has an ownership stake of 50% or more. Less-than-majority ownership limits the parent firm's influence on the subsidiary's operating and financial policies, so minority-owned subsidiaries are not considered.

The initial sample of firms is from the National Register's 1996 *Directory of Corporate Affiliations*, which provides information about foreign subsidiaries. Earnings information is from accounting data on Standard & Poor's 1998 *COMPUSTAT* files. We require that a firm be a U.S. company and have three consecutive non-missing earnings announcement dates before June 30, 1996, to be included in our sample. The intersection of the data sets from the *Directory of Corporate Affiliations* and *COMPUSTAT* files represents 1,478 firms.

Daily stock returns and the value-weighted market return indexes are obtained from the Center for Research in Security Prices (CRSP) 1998 returns file. We require at least 80 non-missing daily returns available for the estimation period to estimate CAPM parameters, and for the test period to compute the dependent variable $\tilde{CAR}_{it}$. This requirement results in a sample of 1,378 firms. After deleting any non-manufacturing firms, the final sample consists of 1,280 firms, of which 589 are multinationals.

Table 1

Network Structure of MNCs

Panel A: Complete MNC Sample (589 Firms)

	Number of Foreign Subsidiaries	Number of Foreign Countries (Breadth)	Number of Subsidiaries Per Foreign Country (Depth)
Median	4	4	1.0455
Mean	11.871	7.796	1.3239
Minimum	1	1	1
Maximum	169	90	5
Standard Deviation	19.030	9.875	0.5387

Panel B: MNC Sample by Type

		Low Depth			**High Depth**		
		Number of Subs	Breadth	Depth	Number of Subs	Breadth	Depth
Breadth* > *4		***Type IV***: 62 Firms			***Type I***: 199 Firms		
	Median	8	8	1	17	12	1.400
	Mean	11.758	11.710	1.002	27.462	16.100	1.593
	Std. Dev.	9.120	9.009	0.008	25.581	11.538	0.577
Breadth* = *4		23 Firms			13 Firms		
	Median	4	4	1	5	4	1.250
	Mean	4	4	1	5.571	4	1.393
	Std. Dev.	0	0	0	1.399	0	0.350
Breadth* < *4		***Type III***: 210 Firms			***Type II***: 82 Firms		
	Median	1	1	1	3	2	1.5
	Mean	1.671	1.671	1	3.427	2.037	1.819
	Std. Dev.	0.765	0.765	0	1.267	0.777	0.683
Total		295 Firms			294 Firms		
	Median	2	2	1	11	8	1.5
	Mean	3.972	3.963	1.001	19.742	11.617	1.646
	Std. Dev.	5.871	5.831	0.004	23.777	11.480	0.609

Note: There is one firm whose depth equals the median depth (1.0455). This firm is arbitrarily included in the low-depth groups. As a result, the number of low-depth firms (295) exceeds the number of high-depth firms (294) by one firm.

Sample Characteristics

Table 1 provides descriptive statistics of the network structure of the MNCs. Panel A, which displays the statistics for the entire MNC sample, indicates that the breadth and the depth of the network structure vary. The number of foreign subsidiaries ranges from 1 to 169, the number of countries where these subsidiaries are located from 1 to 90, and the number of subsidiaries per foreign country from 1 per country to 5. The median MNC in our sample operates in 4 (median breadth) foreign countries with 1.0455 (median depth) subsidiaries per country.

Panel B of Table 1 shows the network structure for different types of MNCs. The MNC sample is divided into different groups based on whether an MNC's breadth and depth are less than, equal to, or greater than sample medians. We first divide the MNC sample into two groups: low-depth firms (295 firms whose depth is less than or equal to sample median depth) and high-depth firms (294 firms whose depth is greater than sample median depth). There is one firm whose depth equals the sample median depth; we arbitrarily include this firm in the low-depth group. Next, we divide the low- and high-depth firms into high-breadth firms (62 + 199 = 261 firms whose breadth is greater than sample median breadth); median-breadth firms (23 + 13 = 36 firms whose breadth is equal to sample median breadth); and low-breadth firms (210 + 82 = 292 firms whose breadth is less than sample median breadth). The 36 median-breadth firms are excluded from the rest of analysis. We discuss later whether our results change if these firms were to be classified as high-breadth firms or as low-breadth firms.

There are more observations in the Type I and III groups (199 + 210 = 409) than in the Type II and IV groups (62 + 82 = 144). This is because the two variables, breadth and depth, are positively correlated. Firms with high breadth also tend to have high depth, and *vice versa*. Grouping firms by median breadth and depth will not result in an equal number of firms in the four quadrants when breadth and depth are correlated. However, it will result in equal column and row totals in the absence of median firms (firms whose breadth and/or depth equal the sample medians).

Panel A of Table 2 provides selected descriptive statistics for the overall firm sample and the different subsamples. These statistics show that the sales, total assets, market value, return on assets, and gross profit margin of MNCs are higher than those of domestic firms. Among MNCs, Type I MNCs are the largest firms and Type III the smallest. A comparison of the profitability measures (return on assets and gross profit margin) indicates that Type I and Type IV MNCs are more profitable than other MNCs. Since profitability is affected by many different factors such as industrial composition, size, financial policy, the profitability numbers are useful only for descriptive comparisons. Panel B of Table 2, which displays the industrial classification of the sample, shows that major manufacturing industries are well represented in each of the sample groups, and there are no major differences in industry concentration among different groups of the sample.

Table 2

Descriptive Statistics and Industry Representation of Sample Firms

Panel A: Descriptive Statistics

	Complete Sample	Domestic Firms	All MNCs	MNCs by Type			
				Type I	Type II	Type III	Type IV
Number of Firms	1,280	691	589	199	82	210	62
Sales ($ mil.)	249	136	535	2,718	367	222	548
	1,988	443	3,798	8,949	1,068	618	1,962
Total Assets ($ mil.)	202	103	476	2,559	277	173	597
	2,139	407	4,168	10,310	961	541	1,595
Market Value of Stocks	175	88	439	2,264	244	169	516
($ millions)	1,718	326	3,349	7,813	1,182	533	2,264
Net Income on Assets	0.0528	0.0418	0.0616	0.0624	0.0488	0.0609	0.0733
(ROA)	0.0377	0.0209	0.0565	0.0615	0.0479	0.0513	0.0669
Operating Income on	0.0804	0.0638	0.0926	0.1018	0.0826	0.0829	0.1041
Sales (GPM)	0.0544	0.0209*	0.0918	0.1080	0.0872	0.0751	0.1026

Panel B: Number of Firms in 2-Digit Industry Codes

2-digit SIC	Industry Description	Comp. Sample	Domestic Firms	All MNCs	MNCs by Type			
					Type I	Type II	Type III	Type IV
01-09	Agriculture Products	10	8	2	1	0	1	0
10-14	Mining, Oil & Gas, Minerals	69	46	23	4	3	15	1
15-17	Construction	23	16	7	2	2	3	0
20	Food Products	60	38	22	10	4	5	2
21	Tobacco Products	3	1	2	1	0	1	0
22-23	Textile Mill Products	61	44	17	3	6	5	1
24-25	Lumber & Furniture	46	26	20	4	6	8	0
26-27	Paper, Printing, Publishing & Allied Prods.	62	34	28	11	3	10	3
28	Chemicals & Allied Products	132	55	77	36	9	14	15
29	Petroleum Refining & Related Products	23	7	16	9	3	3	0
30	Rubber & Plastic Products	47	30	17	5	2	3	3
31	Leather & Products	13	10	3	0	1	2	0
32	Stone, Clay, Glass, & Concrete	21	14	7	3	1	3	0
33-34	Primary & Fabricated Metals, Machinery	105	67	38	11	4	19	2
35	Industrial & Commercial Machinery	184	75	109	35	15	39	16
36-37	Electric & Transportation Equipment	254	135	119	34	19	46	9
38-39	Photo, Watch, Jewelry & Sporting Products	167	85	82	30	4	33	10
Total		1280	691	589	199	82	210	62

Notes: ROA = return on assets; GPM = gross profit margin; 2-digit SIC = first 2 digits of the Standard Industrial Classification (SIC) Code.

Numbers in the first pair of numbers in each row in Panel A (highlighted) for all statistics are medians. Those in the second row are means. All numbers are statistically significant at the 5% confidence level, except those marked with *, which are not significant. The test for means is the *t*-test, and for medians is the Wilcoxon signed-rank test.

RESULTS

Difference in ERC between MNCs and Domestic Firms

Test statistics for differences in the ERC of MNCs and domestic firms are shown in Table 3. Panel A displays parameter estimates for equation 1 comparing each MNC group with domestic firms. The results support our hypothesis. The results indicate that the ERC of Type II (LB, HD) MNCs is smaller and the ERC of Type IV (HB, LD) MNCs is greater than the ERC of domestic firms.

The estimate of $\beta_{0,}$ which represents the ERC of domestic firms, is positive and significant (0.4968, $p < 0.05$) in each of the four models. The estimate of β_2,which represents the difference in ERCs between domestic firms and Type II MNCs, is negative and significant (-0.8890, $p < .05$), and the estimate of β_4, which represents the difference in ERCs between domestic firms and Type IV MNCs, is positive and significant (0.9307, $p < 0. 05$). Together these results suggest that Type IV MNCs have significantly greater ERC and Type II MNCs have significantly smaller ERC than domestic firms.

The estimates of β_1, which represents the difference in ERCs between Type I MNCs and domestic firms, and β_3, which represents the difference in ERCs between Type III MNCs and domestic firms, are not significant.

Table 3

Regression Estimation for Differences in ERC between Domestic Firms and MNCs

Panel A: Type of MNCs Compared to Domestic Firms

$$\tilde{CAR}_{it} = a_0 + \sum_{p=1}^{4} a_p T_p + b_0 \Delta E_{it} + \sum_{p=1}^{4} b_p T_p \Delta E_{it} + \tilde{x}_{it}$$

Parameter	Predicted Sign	All Types of MNCs	Each Type of MNC Compared to Domestic Firms			
			Type I	Type II	Type III	Type IV
α_0		-0.0314	-0.0349	-0.0349	-0.0349	-0.0349
		(-1.391)	(-1.438)	(-1.339)	(-1.365)	(-1.354)
α_1		-0.0186	-0.0151			
		(-0.380)	(-0.293)			
α_2		-0.0718		-0.0683		
		(-1.015)		(-0.856)		
α_3		-0.0304			-0.0269	
		(-0.624)			(-0.498)	
α_4		-0.0231				-0.0196
		(-0.284)				(-0.216)
β_0	+	0.5044	0.4968	0.4968	0.4968	0.4968
		(6.151*)	(5.765*)	(5.370*)	(5.474*)	(5.431*)
β_1	?	-0.2792	-0.2717			
		(-0.795)	(0.738)			
β_2	-	-0.8965		-0.8890		
		(-2.477*)		(-2.183*)		
β_3	?	0.1616			0.1691	
		(0.318)			(0.302)	
β_4	+	0.9232				0.9307
		(2.225*)				(2.016*)
Adjusted R^2		0.0417	0.0368	0.0385	0.0341	0.0502
F-Value		6.119*	11.250*	10.237*	10.520*	13.156*

Panel B: Average Difference in ERC between MNCs and Domestic Firms

$$\tilde{CAR}_{it} = a_0 + a_1 M + b_0 \Delta E_{it} + b_1 M \Delta E_{it} + \tilde{x}_{it}$$

Parameter	Predicted Sign	Estimate	t-Value	Probability
α_0		-0.0349	-1.502	0.1331
α_1		-0.0186	-0.542	0.5881
β_0	+	0.4968	6.024	0.0001
β_1	?	-0.0696	-0.335	0.7378
Adjusted R^2	0.0316	F-Value:	13.865*	

Notes:

Type I = MNCs whose breadth and depth are greater than sample medians;

Type II = MNCs whose breadth is lower and depth is greater than sample median;

Type III = MNCs whose breadth and depth are lower than sample medians;

Type IV = MNCs whose breadth is greater and depth is lower than sample median.

$\tilde{CAR}_{it}$ = unexpected stock returns for firm i for year t cumulated from two days after prior-year earnings announcement to two days after current-year earnings announcement;

p = the index for type of MNC, which takes a value of 1, 2, 3, or 4 (representing the four groups of MNCs that vary with respect to breadth and depth of operations);

T_p = dummy variable, which is 1 if firm is a type p MNC, and 0 if it is domestic;

ΔE_{it} = changes in annual earnings from year t -1 to year t for firm i; and

$\tilde{x}_{it}$ = a mean-zero disturbance term.

For Panel A, numbers in the first row of each variable (highlighted) are estimated parameters, and numbers in the second row (in parentheses) are t-values for these estimates.

- Significant at conventional 5% level for one-tailed test, and 2.5% level for two-tailed test.

Panel B of Table 3 displays the regression estimates for equation 2. This regression model combines all MNCs and compares the ERCs of the pooled MNC sample with the ERCs of domestic firms. The parameter β_0, which represents the ERC of domestic firms, is positive and significant (0.4968, p = 0.0001), and the parameter β_1, which represents the difference in ERC between domestic firms and all MNCs, is not (-0.0696, p = 0.7378). This result, together with the results obtained from equation 1, shows that not taking the differences in the network structure of MNCs into consideration conceals the differences in earnings valuations between MNCs and domestic firms.

Impact of Breadth and Depth on ERC

Table 4 displays the regression estimates for equation 3 computed using the MNC sample only. The parameter β_0, which represents the ERC for Type III (LB, LD) MNCs, is significant (0.7209, p = 0.0202). Recall that the ERC of Type IV firms is $\beta_0 + \beta_1$ and the ERC of Type II firms is $\beta_0 + \beta_2$. The results in Table 4 show that β_1 is positive and significant (0.6702, p = 0.0295) and β_2 is negative and significant (-1.1404, p = 0.0003). These results indicate that Type II (LB, HD) MNCs have a smaller ERC and Type IV (HB, LD) MNCs have a greater ERC than Type III (LB, LD) MNCs. The ERCs of Type I (HB, HD) MNCs and Type III (LB, LD) MNCs are not significantly different. The parameter β_3, which represents the interaction of breadth and depth, is not significant.

Table 4

Regression Estimates for Impact on ERC by Breadth and Depth

$$\tilde{CAR}_{it} = a_0 + a_1 B + a_2 D + a_3 BD + b_0 \Delta E_{it} + b_1 B \Delta E_{it} + b_2 D \Delta E_{it} + b_3 BD \Delta E_{it} + \tilde{x}_{it}$$

Parameter	Predicted Sign	Estimate	t-Value	Probability
α_0		-0.0628	-1.872	0.0617
α_1		0.0094	0.135	0.8924
α_2		-0.0403	-0.646	0.5188
α_3		0.0434	0.465	0.6424
β_0	+	0.7209	2.329	0.0202
β_1	+	0.6702	2.183	0.0295
β_2	-	-1.1404	-3.616	0.0003
β_3	?	-0.1443	-0.226	0.8211
Adjusted R^2: 0.0470		F-Value: 4.470		

Notes:

$\tilde{CAR}_{it}$ = unexpected stock returns for firm i for year t cumulated from two days after prior-year earnings announcement to two days after current-year earnings announcement;

B = a dummy variable measuring the magnitude of breadth, which takes a value 1 if breadth is greater than the sample median breadth, and 0 otherwise;

D = a dummy variable measuring the magnitude of depth, which takes a value 1 if depth is greater than the sample median depth, and 0 otherwise;

ΔE_{it} = changes in annual earnings from year t -1 to year t for firm i; and

$\tilde{x}_{it}$ = a mean-zero disturbance term.

Sensitivity Analysis

The descriptive statistics in Table 2 reveal that the four types of MNCs and domestic firms differ with respect to size (sales/market value/total assets). These differences may raise concerns about whether the results are driven by differences in firm size. Researchers have documented a negative relationship between ERC and firm size (Atiase, 1985; Collins *et al*., 1987). The ERC is negatively related to firm size because more non-accounting information (such as reports by analysts or news media) is available between the release of accounting earnings for large firms than for small firms. The availability of such information prior to earnings announcements means that stock prices capture some of the information embodied in accounting earnings before the earnings are announced. As a result, the stock price reaction to earnings announcements is less pronounced for large firms than for small firms.

It is clear from our findings that the ERCs of Type IV MNCs are not driven by a firm-size effect. We find the ERC for Type IV MNCs to be larger than the ERC for domestic firms. If firm size has any effect, it should work against finding a larger ERC for Type IV MNCs because these MNCs are larger than domestic firms. For Type II MNCs, however, the impact of firm size on the ERC results is less clear. As predicted, we find the ERC for Type II MNCs to be smaller than the ERC for domestic firms. However, Type II MNCs are larger than domestic firms, which should contribute toward finding a smaller ERC for these MNCs when compared to domestic firms.

To examine the size effect and the robustness of our results, we include firm size as a control variable in regression equations 1 and 3. We use the logarithm of sales as a proxy for firm size (Berger and Ofek, 1995; Lang and Stulz, 1994). The results of the size-controlled regressions are shown in Table 5. Panel A of Table 5 presents size-controlled estimates for equation 1 and panel B for equation 3.

Consistent with prior research, the coefficients of the firm size variable are negative and significant in both regressions (-0.0322, $p = 0.0039$; and –0.0259, $p = 0.0560$). A comparison of the size-controlled results in Table 5 with the same regression results when size effect is not controlled (Tables 3 and 4) shows that the direction, magnitude, and significance level of all variables remain largely unaltered. This comparison suggests that our results are robust with respect to firm size effect.

We also test the robustness of the results with respect to industry membership of each group of firms. We create dummy variables for each of the two-digit SIC codes shown in Panel B of Table 2 and include them in our regression model. The results, not reported, indicate that the industry effect on our results is negligible since all coefficients of the study variables remain significant and of the predicted sign.

Finally, we test whether the classification of the 36 median-breadth firms has any significant impact on our results. In all test results reported these 36 firms were excluded from the analysis. As a sensitivity analysis, we run two additional tests: one with the 36 median-breadth firms included as low-breadth firms, and the other with these firms included as high-breadth firms. The results, not reported, indicate that the effect of different treatments of median-breadth firms is minor and does not affect the main results.

Table 5

Sensitivity of Results When Controlling for Firm Size:
Regression Estimation for Differences in ERC Between Domestics and MNCs

Parameter	Predicted Sign	Estimate	t-Value	Probability
Panel A: Type of MNCs Compared to Domestic Firms – Size Controlled				
$\tilde{CAR}_{it} = a_0 + \sum_{p=1}^{4} a_p T_p + b_0 \Delta E_{it} + \sum_{p=1}^{4} b_p T_p \Delta E_{it} + \tilde{x}_{it}$				
α_0		0.1307	2.164	0.0307
α_1		0.0726	1.250	0.2115
α_2		-0.0420	-0.589	0.5558
α_3		-0.0168	-0.344	0.7309
α_4		0.0229	0.278	0.7809
β_0	+	0.4942	6.040	0.0001
β_1	?	-0.2714	-0.775	0.4383
β_2	-	-0.8706	-2.411	0.0160
β_3	?	0.1265	0.250	0.8026
β_4	+	0.9023	2.181	0.0294
Size	-	-0.0322	-2.892	0.0039
Adjusted R^2 0.0479		F-Value: 6.375		
Panel B: Regression Estimates for Impact on ERC by Breadth and Depth – Size Controlled				
$\tilde{CAR}_{it} = a_0 + a_1 B + a_2 D + a_3 BD + b_0 \Delta E_{it} + b_1 B\Delta E_{it} + b_2 D\Delta E_{it} + b_3 BD\Delta E_{it} + \tilde{x}_{it}$				
α_0		0.0782	0.967	0.3341
α_1		0.0358	0.507	0.6124
α_2		-0.0271	-0.432	0.6658
α_3		0.0662	0.705	0.4810
β_0	+	0.6946	2.247	0.0250
β_1	+	0.6652	2.172	0.0303
β_2	-	-1.1063	-3.511	0.0005
β_3	?	-0.1703	-0.268	0.7891
Size	-	-0.0259	-1.915	0.0560
Adjusted R^2: 0.0534		F-Value: 6.445		

Notes:

$\tilde{CAR}_{it}$ = unexpected stock returns for firm i for year t cumulated from two days after prior-year earnings announcement to two days after current-year earnings announcement;

p = the index for type of MNC, which takes a value of 1, 2, 3, or 4 (representing the four groups of MNCs that vary with respect to breadth and depth of operations);

T_p = dummy variable, which is 1 if firm is a type p MNC, and 0 if it is domestic;

ΔE_{it} = changes in annual earnings from year t -1 to year t for firm i;

B = a dummy variable measuring the magnitude of breadth, which takes a value 1 if breadth is greater than sample median breadth, and 0 otherwise;

D = a dummy variable measuring the magnitude of depth, which takes a value 1 if depth is greater than the sample median depth, and 0 otherwise;

$\tilde{x}_{it}$ = a mean-zero disturbance term; and

Size = logarithm of firm sales.

SUMMARY AND CONCLUSIONS

We find that the securities market responds more to the earnings changes of multinational firms that have subsidiaries in many countries but limit their concentration in any one foreign country than it does to the earnings changes of domestic firms and other multinational firms. The market is less responsive to the earnings changes of multinational firms whose subsidiaries are highly concentrated in a few countries than it is to the earnings changes of other multinational firms and domestic firms. When the differences in network structure are ignored and all multinationals are grouped together, the market's response to earnings changes of multinational firms does not differ from that of domestic firms. These patterns of the market's response to earnings changes can be attributed to differences in operational flexibility that a firm derives from its multinational network of subsidiaries.

Multinational firms with a broad and less concentrated network have a positive net value impact of operational flexibility and associated costs, whereas those with a narrow but highly concentrated network have a negative net value impact. For the former type of multinational firms, investors view earnings to be more persistent and more likely to grow, and hence they are more responsive to the earnings changes of these firms. For the latter type, investors view earnings to be less persistent and less likely to grow, and hence they are less responsive to the earnings changes of these firms.

In a direct test of the link between the breadth and depth of the multinational network and ERC, we find the breadth of the network is associated with a greater ERC and the depth of the network is associated with a smaller ERC. This result further reinforces the findings obtained from testing the ERC differences among different groups of firms.

Our results show that the market recognizes and incorporates the value of operational flexibility. If the market perceives a broad network of multinational subsidiaries as contributing to earnings persistence and earnings growth, managers ought to consider the economic value of such a network when they make decisions to locate or close foreign subsidiaries.

Our study assumes that firms exploit the operational flexibility opportunities that their multinational networks provide. In fact, firms vary in their recognition and exploitation of operational flexibility capabilities (Kogut, 1989). Firms need to be organized and managed appropriately to derive the benefits of operational flexibility, but a firm can exercise the flexibility option only if it possesses it, and it can possess it only if it has the appropriate network structure.

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