Information-processing demands and the multinational enterprise: a comparison of foreign and domestic earnings estimates

Laszlo Tihanyi*, Wayne B. Thomas

Price College of Business, University of Oklahoma, 307 West Brooks, Norman, OK 73019, USA

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Abstract

We examine the information-processing demands top managers of the multinational enterprise (MNE) deal with in their portfolio of international operations by comparing the accuracy of foreign and domestic earnings estimates. Results indicate that the increase in information-processing demands is due to the complexity of managing foreign operations of the MNE. We also find greater information processing demands in foreign operations for managers of smaller multinational firms, firms with relatively low performance, and firms with lower levels of intangible assets. We use these results to develop implications for information-processing theory and practice.

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1. Introduction

When economic activities are internalized in the international environment, one of the most important costs multinational enterprises (MNEs) face is their increased communication cost (Buckley and Casson, 1976). The much greater communication cost in the internalized market is due to an increased flow of accounting and control information, the requirements of confidentiality of firm specific information, and the importance of checking information through expensive on-the-spot visits. However, obtaining accurate information about business activities may lead to enhanced firm value through better managerial decisions and thus researchers from different theoretical perspectives have considered information processing as an underlying factor in their theoretical models (e.g., Egelhoff, 1991; Henderson and Fredrickson, 1996; Madhavan and Prescott, 1995). Prior studies have noted that information-processing demands for managers, the requirement to gather and transform data into information, and the communication and storage of information (Galbraith, 1973) may increase in the international environment for several reasons (e.g., Ghoshal et al., 1994; Hansen, 2002; Schulz, 2001). For one, dissimilarities in language and the business environment contribute significantly to the increased demand of information processing. Distance between regions and discrimination by local governments against MNEs also raise the importance of information processing. In addition to external factors, the ability of the MNE’s management to manage multiplant corporate accounting is central from the information-processing perspective (Birkinshaw et al., 2001; Buckley and Casson, 1976).

A body of prior research emphasized the cognitive element of information processing in the international context and studied a wide range of factors that may be relevant for MNE management. Information-processing demands are presented in these studies in line with general cognitive abilities of managers to make strategic decisions when influenced by different environmental conditions or organizational contexts (Wood and Bandura, 1989). For example, research considered information-processing demands as central factors in the design of efficient MNE organizations (Wolf, 1997). Other recent studies (e.g., Birkinshaw et al., 2001; Wolf and Egelhoff, 2002) offered organizational solutions to improve information processing in MNEs. However, prior research did not focus on where increased information-processing demands emerge in MNEs. Meanwhile, other studies in this area indicated the importance of...
this inquiry by showing the relevance of improved information processing for MNE strategies and performance. Along this line, the role of information processing has been demonstrated in knowledge acquisitions (Hansen, 2002; Schulz, 2001) and in strategic implementation (Kim and Mauborgne, 1995).

Managers may enhance MNE strategies and performance by identifying the sources and conditions of increased information-processing needs. Past academic literature, however, provided limited assistance in these directions. Most prior studies linked high information-processing demands with overall organizational complexity and high costs of bureaucratic coordination in MNEs. Although increasing organizational complexity is a constant managerial challenge, we suggest that the sources of increased information processing within the MNE should be identified and thus the way top managers perceive the MNE’s portfolio of operations is relevant for research. For instance, managers can mobilize resources (e.g., information technology, experts) to areas with high information-processing needs, such as foreign subsidiary operations. It is likely that international environments in particular represent uncertain business conditions that managers can find difficult to navigate through and in which they may make erroneous predictions about business operations. This study makes steps in these directions by examining which component of the MNE’s operations (domestic or foreign) leads to greater information-processing demands for top managers.

Beyond the source of increased information-processing demands in MNEs, we examine organizational contexts that may significantly affect managers’ perception and thereby may alter strategic actions in the MNE. Limited empirical evidence in domestic settings indicates that certain environmental and organizational contexts influence information processing and, through managerial decisions, firms’ strategies (Madhavan and Prescott, 1995; Haunschild and Miner, 1997). Organizational characteristics should be even more relevant for the information processing in MNEs. Managers of large multinationals, for instance, may have access to expertise on uncertain foreign markets. Therefore, we examine important organizational moderators, such as MNE size, performance, and the level of intangible assets from the perspective of information-processing theory.

To investigate the information-processing demands for the MNE’s management, we rely on the estimates of leading financial analysts obtained directly from top managers of the MNE. Prior studies used analysts’ estimates as a proxy for the management’s forecast of the firm’s performance in the domestic context and thus suggested the validity of our approach (e.g., Puffer and Weintrop, 1991; Madhavan and Prescott, 1995; Haunschild and Miner, 1997). Thus, by contrasting the forecast accuracy of earnings in the domestic and foreign businesses within the MNE, we extend prior research and provide a new perspective on information processing in the international context. We begin by developing hypotheses on the information-processing demands of domestic and foreign operations and the effects of organizational contexts. Next, methods and results are presented. We conclude by providing implications for theory and practice and recommendations for future research.

2. Hypotheses

Managers are faced with high information-processing demands in numerous situations owing to the ambiguity of environmental factors and the complexity of organizational activities (Ungson et al., 1981). Indeed, prior research in domestic settings found that the information-processing requirements are considerably higher for top managers when they manage a complex set of diverse businesses (Haunschild and Miner, 1997). Operating in international markets has been also known to increase significantly the information-processing demands for top managers (Egelhoff, 1991; Hansen, 2002; Kim and Mauborgne, 1995; Roth, 1995). The increased information-processing demands are related to the differences between the domestic and foreign environment, such as governmental regulations, national cultures, market conditions, and customer habits (Birkinshaw et al., 2001; Dunning, 1993). International expansion may also lead to increased information-processing demands because of the more complex organizational forms of MNEs, communication problems, and the increased physical distance between the headquarters and foreign subsidiaries (Roth and O’Donnell, 1996; Wolf, 1997; Wolf and Egelhoff, 2002). Managers will be required to use greater cognitive efforts and incur incremental information search costs to assess their foreign operations (Schulz, 2001). Recent research in the international management area has focused on the effects of increased information processing demands on top management team composition, board structure, CEO compensation (Sanders and Carpenter, 1998), knowledge acquisition (Hansen, 2002), and international diversification strategy (Roth, 1995). Table 1 provides a summary of selected empirical studies and their results on MNEs from the information-processing theory perspective.

Although there is an agreement about the increased information-processing demands for managers in the international environment, little research has focused on the sources of the information-processing needs. Internalization of cross-border production may lead to increased information costs (e.g., Buckley and Casson, 1976) but managers in general are assumed to be involved in international diversification when they have accurate information about their MNE’s capabilities and therefore their decisions can lead to higher performance and shareholder value (Caves, 1996).

We propose that, as their firm expands internationally, top managers face higher information-processing demands because of the uncertainties associated with their foreign operations. The core of our hypothesis is that for managers of MNEs, the foreign component of earnings is expected to be more difficult to predict than the domestic component of
earnings. The domestic source of earnings comes from a single country influenced by business factors that are familiar to the management of the MNE. In addition, top managers may possess an intimate knowledge about the links between the firm’s capabilities and the factors of the domestic environment (Dierickx and Cool, 1989). While international expansion may lead to expectations of an increase in overall organizational complexity, we argue that the complexity is primarily originated in the foreign business portfolio. Thus, because of the greater information-processing demands and cognitive efforts required to understand the foreign business environment, making accurate assessment of foreign operations is likely to be more difficult than forecasting domestic operations (Birkinshaw et al., 2001). Under uncertain conditions in the international environment, managers may omit important factors, filter information, rely on routine cues that are often misleading, or develop a greater tolerance for error (Huber and Daft, 1987; Weick, 1995). In the process, they may oversimplify the decision situation and increase the errors of prediction (Hayward and Hambrick, 1997). The increased information-processing demands presented by international expansion may lead to increased difficulties for top managers to make an accurate assessment of their MNE’s foreign operations. This suggests the following hypothesis:

H1: The information-processing demands for top managers will be higher in the MNE’s foreign operations than in its domestic operations.

Even though we expect that foreign operations in general increase the information-processing demands for top managers more than do domestic operations, we suggest that this effect differs across firms. In fact, the examination of relevant organizational contexts may help to understand the factors associated with increased information-processing demands and thus enhance the theory of the MNE. We consider three organizational contexts that potentially have moderating effects on the differential information-processing demands of top managers: (1) firm size, (2) performance, and (3) level of intangible assets. Of these contexts, firm size has been considered an important factor in international expansion (Wolf, 1977; Dunning, 1993). Foreign direct investment often requires large sums of capital for new plants, human resources, and information systems because of the increased organizational complexity (Birkinshaw et al., 2001; Buckley and Casson, 1976). Thus, large firms may have a greater ability to operate successfully in foreign markets. In addition, because of some negative aspects of size in the home environment, such as oligopoly constraints, large firms may favor international expansion over the risks of growth in the domestic market (Caves, 1996).

The preference of internationalization to facilitate the growth of large firms suggests that it is beneficial for these firms to collect accurate data on foreign operations. Managers of large MNEs tend to enjoy some important information-processing benefits over managers of small firms in the international environment (Wolf, 1997). For example, larger MNEs tend to have the resources to deal with increased information-processing demands by hiring managers with international experience or appropriate education (Sambharya, 1996; Tihanyi et al., 2000). Because of the access to these additional resources and managerial expertise, the difference in the predictability of domestic and foreign operations for larger MNEs is expected to be relatively small. On the other hand, smaller MNEs may have managers with limited international experience and therefore the ambiguities associated with foreign operations can be higher in these firms. In addition, small MNEs may have limited resources and capabilities in the area of information systems and lack prior experience in managing foreign operations. As a result, we expect greater information-processing demands from foreign operations (compared to domestic operations) in smaller MNEs. Thus,

H2: The difference between the information-processing demands of foreign and domestic operations will be higher for top managers in smaller MNEs.

In addition to firm size, prior literature noted the importance of MNE performance in the context of international

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### Table 1

<table>
<thead>
<tr>
<th>Study</th>
<th>Data</th>
<th>Data source</th>
<th>Areas of contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birkinshaw et al. (2001)</td>
<td>106 managers of 16 MNEs</td>
<td>Mail survey</td>
<td>Global account management structures</td>
</tr>
<tr>
<td>Egelhoff (1982)</td>
<td>34 MNE managers</td>
<td>Interviews</td>
<td>Fit between MNE strategy and organizational structure</td>
</tr>
<tr>
<td>Ghoshal et al. (1994)</td>
<td>248 senior managers at two MNEs</td>
<td>Mail survey</td>
<td>MNE interunit communication</td>
</tr>
<tr>
<td>Hansen (2002)</td>
<td>120 managers at one MNE</td>
<td>Mail survey</td>
<td>Knowledge acquisition in projects</td>
</tr>
<tr>
<td>Kim and Mauborgne (1993)</td>
<td>180 managers at 19 MNEs</td>
<td>Mail survey, longitudinal study</td>
<td>Procedural justice and strategic implementation</td>
</tr>
<tr>
<td>Kim and Mauborgne (1995)</td>
<td>221 managers at 19 MNEs</td>
<td>Mail survey</td>
<td>Procedural justice and global strategic objectives</td>
</tr>
<tr>
<td>Roth (1995)</td>
<td>74 MNE CEOs</td>
<td>Mail survey</td>
<td>CEO characteristics and international interdependence</td>
</tr>
<tr>
<td>Sanders and Carpenter (1998)</td>
<td>258 MNEs</td>
<td>Archival data</td>
<td>Information-processing demands and corporate governance</td>
</tr>
<tr>
<td>Schulz (2001)</td>
<td>97 MNE subsidiaries</td>
<td>Mail survey</td>
<td>Organizational learning processes in MNE subunits</td>
</tr>
<tr>
<td>Wolf (1997)</td>
<td>83 subsidiaries of 48 MNEs</td>
<td>Mail survey</td>
<td>Organization of international human resource management units within MNEs</td>
</tr>
<tr>
<td>Wolf and Egelhoff (2002)</td>
<td>Managers at 95 MNEs</td>
<td>Mail survey</td>
<td>MNE strategy-structure fit, including intracompany transfers and foreign R&amp;D</td>
</tr>
</tbody>
</table>

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diversification. Some studies suggest that firms favor international diversification when their performance is good and others contend that increased international involvement helps MNEs mitigate against the problems in their domestic businesses (Caves, 1996; Ghoshal et al., 1994). Therefore, the test through the lens of information-processing theory might help to better understand the relationship between performance and international diversification. Whereas studies from the information-processing perspective consider managerial decisions within the firm generally ill-structured, there is an agreement in this stream of literature that the uncertainty for managers further increases in the case of performance problems (Weick, 1995). Poor performance may be the result of organizational deficiencies, such as missed business opportunities, suboptimal decisions, and communication problems. On the other hand, poor performance may lead to increased ambiguities for managers and difficulties in their decision making (Ungson et al., 1981; Egelhoff, 1982).

Managers of poor performing firms may have a particularly difficult task of making correct assessment of their businesses in the international environment. As these top managers need to understand and address the organizational problems that are signaled by the poor performance, they also need to cope with increased information requirements. In fact, poor organizational performance may originate in the uncertainty associated with the management of foreign operations in MNEs (e.g., Mitchell et al., 1992; Kim and Mauborgne, 1995). In any case, it is expected that the accurate assessment of foreign operations is an increasingly difficult task for the top management of poorly performing MNEs. Therefore,

**H3:** The difference between the information-processing demands of foreign and domestic operations will be higher for top managers in MNEs with low performance.

Besides firm size and performance, the firm’s asset portfolio may have an important effect on the managerial assessment of the MNE’s business operations. Prior research showed that the unique combination of tangible and intangible assets helps firms to sustain their competitive advantage (Amit and Schoemaker, 1993). Of the asset portfolio, intangible assets are specifically important from the information-processing point of view because of their long-term potential (Dierickx and Cool, 1989). Intangible assets are thought to include long-term firm capabilities, such as R&D, corporate culture, reputation, and growth potential (Fama and French, 1993; Lakonishok et al., 1994). Lack of intangible assets, on the other hand, may be the indications of weak market potential, failed innovative efforts, and problems with other strategies, such as diversification (Hill and Hansen, 1991; Woo et al., 1992).

We expect that low levels of intangible assets are even more problematic for the MNE. Intangible assets, such as R&D and management capabilities, have been known to have positive effects on international expansion (Buckley and Casson, 1976). Possessing these important assets helps top managers to create synergies between domestic and foreign operations and thus may provide the MNE with competitive advantage in uncertain foreign markets (Hansen, 2002). Some managerial resources, such as international work experience and the knowledge of foreign markets are, in fact, important intangibles that may help the MNE’s management to deal more efficiently with increased information-processing demands in the international environment (Tihanyi et al., 2000). The lack of such intangible assets may make it difficult for managers to understand and continuously replicate the MNE’s capabilities during international diversification and thereby hinder the potential of the business portfolio, particularly the value of foreign operations (Schulz, 2001). For these reasons, we expect that foreign operations relative to domestic operations will have greater information-processing requirements for top managers of MNEs with low levels of intangible assets. Thus,

**H4:** The difference between the information-processing demands of foreign and domestic operations will be higher for top managers in MNEs with lower levels of intangible assets.

### 3. Methods

#### 3.1. Sample

The sample of firms was selected from the COMPU-STAT tapes and the Institutional Brokers Estimate System (IBES) database from 1986 to 1998. First, we eliminated observations if foreign earnings were not reported or if less than three analysts provided earnings per share estimate in IBES. To control for the influence of extreme observations in absolute forecast error, domestic or foreign earnings, the top 1% of the distributions were eliminated. These steps resulted in a sample of 6868 firm/year observations.

#### 3.2. Measures

**3.2.1. Dependent variable**

Previous research suggests that when managers face increased information-processing demands in their businesses, the errors of their prediction will increase (Weick, 1995; Hayward and Hambrick, 1997). We used the magnitude of absolute forecast error of earnings reported in IBES to measure the level of information-processing demands for the top managers of the MNE, a similar estimate to the ones used in prior studies in the U.S. domestic setting (e.g., Puffer and Weintrop, 1991; Haunschild, 1994; Madhavan and Prescott, 1995). A number of studies suggest that the disclosure of corporate information to financial analysts is more common than direct public announcements, the forecasts are relatively stable over time, and are likely to be used
by various stakeholders to assess firm performance (Keane and Runkle, 1998; Madhavan and Prescott, 1995). Financial analysts consider interviews with top managers (primarily the Chief Financial Officer) as their most important information source (Foster, 1986). Managers tend to provide accurate information to analysts to increase the visibility of their firm’s stock, increase credibility in the stock market, and convey positive signal about the firm’s market value (Puffer and Weintrop, 1991). Absolute forecast error was measured as the absolute difference between IBES reported earnings per share in year $t$ and the mean forecast of earnings per share for year $t$.

3.2.2. Independent variables

Absolute domestic earnings was defined as the absolute value of pretax domestic income less federal income taxes, state income taxes, other income taxes, federal deferred taxes, and state deferred taxes. Absolute foreign earnings was defined as the absolute value of pretax foreign income less foreign income taxes and foreign deferred taxes.

3.2.3. Moderating variables

Large (small) MNEs are defined as those with market capitalization in year $t - 1$ above (below) the sample median for the year. Firm performance was measured as a firm’s return on sales in year $t - 1$. Those with performance above (below) the median were assigned to the high (low) performance sample. The level of intangible assets was measured as the ratio of market value of equity divided by book value of equity in year $t - 1$. The extent to which stock price exceeds accounting book value provides an estimate of how the market perceives intangible assets that are not currently accounted for in book value (Lakonishok et al., 1994). MNEs with ratios greater (less) than the yearly median were considered to have higher (lower) levels of intangible assets.

3.2.4. Control variables

Prior studies show that forecast error is positively related to forecast dispersion (Brown et al., 1987). We measured this variable as the standard deviation in individual analysts’ forecasts divided by the absolute value of forecasted earnings per share. Prior research also documents a relation between prior stock returns and forecast errors (Elgers and Lo, 1994). We included the firm’s annual stock return for the previous fiscal year, measured as the log of one plus the firm’s 12-month buy-and-hold stock return in year $t - 1$ less the log of one plus the equally weighted market return over the same 12-month period. We also controlled for the number of analysts following the firm.

Madhavan and Prescott (1995) found that information-processing demand varies across industries, a finding that might be relevant in the international context as well. To control for industry membership, indicator variables were included for each industry that contained at least 100 of the sample observations. Seventeen industries met this criterion (SIC codes 13, 20, 26, 27, 28, 29, 30, 33, 34, 35, 36, 37, 38, 39, 50, 51, and 73). Prior studies also suggest that forecasting next year’s earnings is likely to be more difficult when current earnings are negative (Ettredge et al., 1996). Thus, sign indicator variables and their interaction with earnings were included to control for the differential impact of positive and negative earnings.

3.3. Model

The model used to test the hypotheses follows:

$$
\text{AFE}_t = \alpha_0 + \alpha_1 \text{ADOMX}_{t-1} + \alpha_2 \text{AFORX}_{t-1} + \sum_{i=1}^{n} \beta_i \text{Controls}_{it-1} + \nu_t
$$

where $\text{AFE}_t$ is the absolute forecast error of total earnings per share in year $t$, $\text{ADOMX}_{t-1}$ is the absolute domestic earnings per share in year $t - 1$, $\text{AFORX}_{t-1}$ is the absolute foreign earnings per share in year $t - 1$. To control for scale differences in earnings per share across firms, $\text{AFE}_t$, $\text{ADOMX}_{t-1}$, and $\text{AFORX}_{t-1}$ are scaled by book value per share at the end of year $t - 1$. $\alpha_1$ and $\alpha_2$ represent the incremental impact of the earnings components on forecast accuracy of total earnings. If $\alpha_2$ is greater than $\alpha_1$, then this would suggest that the magnitude of foreign earnings has a greater incremental impact on forecast error of total earnings. Controls is a vector of $n$ control variables in year $t - 1$. The purpose of this study is to predict which MNEs will have greater forecast errors of total earnings in year $t$ based on their reported amounts of domestic and foreign earnings in year $t - 1$. Thus, we measured the relation between earnings components in year $t - 1$ with forecast errors in year $t$. The model used in this paper employs absolute values of domestic and foreign earnings (along with sign indicator variables) to provide a direct method for estimating the relation between forecast accuracy and the domestic and foreign components of earnings.

4. Results

Table 2 provides descriptive statistics for the variables used to estimate the model. For comparability purposes, estimates of our model and tests of all hypotheses are combined in Table 3. The first column of results includes only the control variables and shows that each variable is significantly related to absolute forecast error. MNEs with higher forecast dispersion, lower number of analyst following, and higher absolute market adjusted returns in the year $t - 1$ have higher forecast errors in year $t$. The second column of results includes the domestic and foreign components of earnings and sign indicator variables. None of the sign indicator variables is significant. Both the domestic and foreign components in year $t - 1$ are significantly
positively related to forecast errors in year \( t \), and in support of the first hypothesis, the coefficient on foreign earnings (.092) is greater than the coefficient on domestic earnings (.067). This difference is significant at less than the .01 level (\( F = 12.8 \)). The \( R^2 \) in this model increases to .157 and this increase is significant (\( F = 28.5; P < .01 \)).

The remaining results in Table 3 provide tests after partitioning the sample based on our three moderating variables. The results provide strong support for the hypotheses. The impact of foreign earnings on forecast errors of total earnings is greater than the impact of domestic earnings for MNEs that are smaller (H2), have lower performance (H3), and have lower levels of intangible assets (H4). The coefficient on foreign earnings is significantly greater than the coefficient on domestic earnings at less than the .01 level for each of these samples. On the other hand, for larger MNEs, MNEs with better performance, and MNEs with higher intangible assets, no evidence is found that domestic and foreign earnings differentially impact forecasts of total earnings. This suggests that top managers of these MNEs are able to process information on foreign operations with the same ability as they do domestic operations. Collectively, the results in Table 3 support the notion that foreign operations, relative to domestic operations, increase the information-processing demands of top managers of MNEs, and this increase is moderated based on certain firm characteristics.

### 5. Discussion

The results of this study indicate that top managers of MNEs deal with increased information-processing demands during their expansion, supporting the findings of prior literature in the domestic (e.g., Henderson and Fredrickson, 1996; Haunschild and Miner, 1997) as well as limited investigation in the international context (e.g., Wolf and Egelhoff, 2002). This study extends prior literature by separating information-processing demands of foreign and domestic operations within the same MNE, relying on the forecasts of domestic and foreign earnings. Although results confirm the expectations of prior literature by indicating the uncertainties associated with MNEs (e.g., Birkinshaw et al., 2001; Egelhoff, 1991; Schulz, 2001), this study also suggests that the increase in information-processing demands is due to the uncertainties of foreign operations within the MNE. This result is important, as prior research only implies that the increased information-processing requirements are the results of overall complexity, size, and bureaucratic organizational structure of MNEs (Ghoshal et al., 1994; Duru and Reeb, 2002). There are several possible factors

### Table 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. AFE</td>
<td>0.043</td>
<td>0.063</td>
<td>.09*</td>
<td>.067</td>
<td>.080</td>
<td>.031</td>
<td>.098</td>
</tr>
<tr>
<td>2. ADOMX ( x )</td>
<td>0.122</td>
<td>0.097</td>
<td>.09*</td>
<td>.067</td>
<td>.080</td>
<td>.031</td>
<td>.098</td>
</tr>
<tr>
<td>3. AFORX ( x )</td>
<td>0.048</td>
<td>0.050</td>
<td>.06*</td>
<td>.019</td>
<td>.017</td>
<td>.017</td>
<td>.017</td>
</tr>
<tr>
<td>4. Forecast</td>
<td>0.129</td>
<td>0.203</td>
<td>.31*</td>
<td>.04*</td>
<td>.04*</td>
<td>.04*</td>
<td>.04*</td>
</tr>
<tr>
<td>5. Number of analysts ( x )</td>
<td>13.3</td>
<td>9.10</td>
<td>-.12</td>
<td>-.06*</td>
<td>.17*</td>
<td>-.03</td>
<td>.04</td>
</tr>
<tr>
<td>6. Absolute log market-adj return ( x )</td>
<td>0.288</td>
<td>0.253</td>
<td>.16*</td>
<td>.04*</td>
<td>.20*</td>
<td>-.12*</td>
<td>.087</td>
</tr>
</tbody>
</table>

\( n = 6868 \).

* All forecast and earnings variables are scaled by book value of equity at the end of year \( t - 2 \).

* Significant at the .01 level.

### Table 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Full sample</th>
<th>Firm size ( _1 )</th>
<th>Return on sales ( _1 )</th>
<th>Price ( _1 )/book ( _1 ) ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.034</td>
<td>.024</td>
<td>.011*</td>
<td>.026*</td>
</tr>
<tr>
<td>Forecast dispersion( x )</td>
<td>.090</td>
<td>.084</td>
<td>.079*</td>
<td>.084*</td>
</tr>
<tr>
<td>Number of analysts ( _1 \times 100 )</td>
<td>-.066</td>
<td>-.080</td>
<td>-.031*</td>
<td>-.062</td>
</tr>
<tr>
<td>Absolute log market-adj return ( x )</td>
<td>.019</td>
<td>.017</td>
<td>.021*</td>
<td>.011</td>
</tr>
<tr>
<td>Absolute domestic earnings ( x )</td>
<td>.068</td>
<td>.067*</td>
<td>.080*</td>
<td>.097*</td>
</tr>
<tr>
<td>Absolute foreign earnings ( x )</td>
<td>.132</td>
<td>.092*</td>
<td>.208*</td>
<td>.123*</td>
</tr>
<tr>
<td>Sign domestic earnings ( x )</td>
<td>.005</td>
<td>.007</td>
<td>.004</td>
<td>.008</td>
</tr>
<tr>
<td>Sign domestic earnings ( x ) ( \times ) ( \times )</td>
<td>.000</td>
<td>-.048</td>
<td>-.002</td>
<td>.021</td>
</tr>
<tr>
<td>Absolute domestic earnings ( x )</td>
<td>.004</td>
<td>-.001</td>
<td>.008</td>
<td>.005</td>
</tr>
<tr>
<td>Sign foreign earnings ( x )</td>
<td>-.032</td>
<td>.019</td>
<td>-.090</td>
<td>-.090</td>
</tr>
<tr>
<td>Absolute foreign earnings ( x )</td>
<td>.186</td>
<td>.157</td>
<td>.126</td>
<td>.158</td>
</tr>
<tr>
<td>( F ) test overall</td>
<td>33.5*</td>
<td>33.4*</td>
<td>12.9*</td>
<td>16.8*</td>
</tr>
<tr>
<td>( F ) test of hypothesis</td>
<td>12.8</td>
<td>2.02</td>
<td>14.4*</td>
<td>1.85</td>
</tr>
</tbody>
</table>

* Each model includes annual indicator variables and industry indicator variables (not reported).

* All forecast and earnings variables are scaled by book value of equity at the end of year \( t - 1 \).

* \( F \) test that the coefficient on absolute domestic earnings equals the coefficient on absolute foreign earnings.

* Significant at the .01 level using a two-tailed \( t \) test (or \( F \) test).
that may contribute to the increased information-processing demands, such as differences in cultures, governmental regulations, competition, labor relations, tax laws, business practices, and market conditions across nations.

Even more importantly, the examination of moderating factors, such as firm size, performance, and level of intangible assets helps to better understand the conditions in which increased information-processing demands present a challenge for top managers in the international environment. The result of relatively higher information-processing demands of foreign operations for smaller MNEs suggests that these MNEs may lack the resources and skills to deal with the increased information-processing demands of the international environment. We also found that top managers of poorer performing MNEs in particular have difficulties in making accurate assessment of their international operations. This result is potentially interesting considering the belief of some practitioners that international expansion might be a remedy for performance problems. This study indicates a quite opposite scenario: managers of poorer performing MNEs may deal with increased uncertainties during continued international expansion and thus their erroneous forecasts may lead to a further deterioration in firm performance. The results indicate that when MNEs have lower levels of intangible assets, managers have difficulties in creating synergies between domestic and foreign operations and thereby the assessment of foreign operations becomes relatively difficult. This result underlines the important role of intangible assets, such as knowledge and managerial talent to deal with uncertainty in the international environment (e.g., Hansen, 2002; Sambharya, 1996).

These results may have several important implications. Prior research has focused almost exclusively on environmental and organizational characteristics as criteria for competitiveness in international markets. Managerial perception of the environment and business operations, however, may also affect strategic actions and should therefore be considered as an integral part of MNE success (Caves, 1996). Along this line, results of this study indicate that additional research should be dedicated to the sources of uncertainty in overseas operations. For example, empirical studies should be extended to foreign subsidiary operations. Researchers of MNEs should also consider information processing as an alternative theoretical explanation for international diversification. Since managers cope with increased information-processing demands in their foreign operations, they may consider international diversification as a particularly complex alternative to domestic strategies, such as acquisitions and alliances. The managerial evaluation of these strategic options and tradeoffs in the MNE has not been explored thoroughly in the literature.

Another theoretical implication of this study is the importance of organizational contexts for increased information-processing demands. A growing number of studies focus on the international expansion of smaller or entrepreneurial firms. Researchers should uncover effective means of overcoming increased information-processing demands by managers of smaller firms. The importance of intangible assets in MNEs is another area for future research. Despite the little attention received by these resources, it appears that the presence of intangible assets modifies managerial information processing and thereby MNE success in overseas markets.

The results have important implications for MNE managers as well. For one, the results indicate that managers need to allocate additional resources in the area of information technology to their subsidiaries to improve the flow of information from and to the headquarters. Managers should also pay extra attention to the staffing of foreign operations (e.g., Wolf, 1997). Although this area tends to be viewed as a peripheral area within the MNE, subsidiary managers who are knowledgeable about the local market environment might be critical in improving the effectiveness of information processing. Another means to reduce information-processing demands in foreign operations are rotation of subsidiary management from the MNE headquarters, use of country experts, improvements in communication systems and technology, and continuing international training of top management.

Potential limitations of this study include the relative complexity of business decisions in the international context and the difficulties associated with the measurement of such decisions and their outcomes. Although our measure of increased information-processing demands for top managers is based on surrogates that have been used in prior literature in the domestic context, decision making in the international environment is a complex process that may require the assessment of different factors. Future research should consider additional characteristics of foreign operations, such as the fit with the local institutional environment and the contribution of this fit to the organization as a whole.

Future studies should explore the multifaceted process of gathering and processing information by the top management of MNEs. Beyond managers’ cognitive abilities, it is likely that information gets lost or distorted in the communication channels between headquarters and subsidiaries. Studies, therefore, should continue to focus on how MNE managers can deal effectively with increasing information-processing demands in the international context. Interviews with top managers and subsidiary personnel could reveal the process of gathering, transmitting, and understanding information about subsidiary performance.

In summary, the results of this study extend prior research from the information-processing perspective to the context of international management. The results highlight the complexity of international expansion for the MNE by showing that managers cope with increased information-processing demands on the foreign operations’ side of the firm. Furthermore, these demands tend to be higher for smaller MNEs and for MNEs with relatively low performance and low levels of intangible assets. These results may
help to refine thinking about the importance of foreign operations for the management of MNEs.

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