# 國際化歷程特性與績效關係之探討：國際化程度、速度與韻律

## A Study of the Relationship between the Characteristics of Internationalization Course and Performance: The Degree, Velocity, and Rhythm of Internationalization

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**摘要：**過去學者研究國際化與績效間之關係時，多將焦點置於國際化程度之探討，而較少論及廠商國際化的其他程序特性，如擴張速度或規律性。本研究嘗試綜合探討企業國際化程度、速度及韻律三者之績效意涵，驗證廠商進行國際擴張時之最適歷程特性。本研究以台灣上市上櫃製造業廠商為研究樣本，採取綜合橫斷面(929 家)與縱斷面 (2000-2004) (panel data) 之資料進行分析。實證結果顯示，廠商國際化程度與績效間呈現先遞減、後遞增、最後再遞減的三階段 S 型曲線關係，最適區間為 1.3 至 4.6 家海外子公司。在海外擴張速度上，採取較慢 (平均超過 14 年增加一家海外子公司) 或較快 (平均少於 4 年增加一家海外子公司) 之國際化速度的企業，具有較佳之績效；速度趨中的國際擴張並無助於績效提升。最後，在海外市場採取規律擴張模式的廠商，其績效優於採取不規律擴張之廠商。綜合上述研究發現結果顯示：

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國際企業宜採取或慢、或快的擴張速度，以規律穩定之韻律步調，將國際化程度維持於最適水準區間以利其績效。本研究除彌補國際化文獻缺口外，對企業從事國際化活動亦具有重要之管理意涵。

**關鍵字**：國際化程度；國際化速度；國際化韻律；績效

**Abstract**：While past studies focusing on the relationship between internationalization and firm performance are abundant, most researchers simply captured the relationship between the degree of internationalization and firms' performance but neglected such process characteristics as pace and volatility of international expansion. This study aims to demonstrate an optimal portfolio of internationalization characteristics in terms of the degree, velocity, and rhythm. Using a sample of 929 Taiwanese listed manufacturing firms, this study traced sample firms' FDI activities from 2000 to 2004 and examined the relationship between the three characteristics of internationalization and firm performance. Empirical results show that the relationship between internationalization degree and performance could be graphically depicted as a three-staged S-shaped curve. MNEs with either deliberate or fast expansion on international markets outperformed those with a moderate pace. In addition, an unstable rhythm (high volatility) in setting up foreign subsidiaries could do harm to firms' performance. Based on the findings above, an optimal portfolio of internationalization characteristics suggests that MNEs maintain their internationalization degree on the second stage, without under-developing or over-expanding their international markets. Meanwhile, on the way to the target degree of internationalization, we suggest that MNEs expand either slowly with thorough deliberation or quickly in pursuing time economy while stabilizing their expansion. Managerial implications are provided, and suggestions are made for future studies.

**Keywords**：Degree of internationalization; Velocity of internationalization; Rhythm of internationalization; Performance

# 1. Introduction

Under the tide of globalization and regional economic integration, boundaries between countries are blurring and competition in global markets is becoming more intense than ever before. Taiwan, a typical island economy, has substantially relied on exports and outward FDI to sustain its economic growth. According to the annual report of Investment Commission, MOEA, Taiwan (2007), the compounded annual growth rate of outward FDI capital was more than forty percent during the years between 1991 and 2001. Although the figure slightly decreased thereafter, internationalization seems an inevitable trend for firms in emerging markets to grow and survive when domestic demand is limited.

As internationalization pertains to resource allocation and future commitment, it bears strategic importance and performance implications. Firms can gain benefits from internationalization, including cheap and advantageous production factors (Jung, 1991; Porter, 1990), the extension of product life cycle (Vernon, 1966), and opportunities to arbitrage with discriminant pricing across markets, among other things. Nevertheless, these benefits can be offset by the complexities, costs, and managerial challenges arising from further internationalization (Hitt, Hoskisson, and Kim, 1997). The tradeoff between the costs and benefits of internationalization, therefore, becomes a paradigmatic framework employed by researchers to examine the relationship between firm internationalization and performance (e.g., Contractor, Kundu, and Hsu, 2003; Lu and Beamish, 2004).

Although there are a number of studies focusing on the relationship between internationalization and performance, the findings are far from conclusive: some studies concluded that a linear relationship existed (e.g., Grant, 1987), while other studies supported nonlinearity (e.g., Geringer, Beamish, and daCosta, 1989). More recently, researchers (Contractor *et al.*, 2003; Lu and Beamish, 2004) suggested a three-staged framework (or a sigmoid curve model), which depicts that firms bear more costs than benefits from initially low levels of internationalization, and firm performance is negatively associated with the

degree of internationalization until a certain degree of internationalization is reached. Afterward, internationalization begins to bring net positive contributions to performance up to a certain level of internationalization, but performance again declines with a high level of internationalization. Because this framework integrates all patterns of the relationship (positive, negative, U-shape, and inverted U-shape) found in literature and reconciles the disconformities among related studies, it is an important framework explaining and predicting the relationship between foreign expansion and firm performance. Nevertheless, this exploratory framework still calls for more rigorous examination of its external validity, especially its robustness in emerging markets.

A major proportion of internationalization literature investigated how a firm's involvement in international markets affects its profitability. Studies of this sort generally suggest that firms maintain their international involvement to a certain degree or within an optimal zone (e.g., Chiao, Yang, and Yu, 2006). Such a viewpoint derives the performance implications of internationalization simply from a static snapshot but fails to recognize firm internationalization as a dynamic process that has long been asserted (Johanson and Vahlne, 1977) and empirically validated. Under the process view, scholars suggested that, in addition to the degree of internationalization, the relationship between internationalization and performance take into account such process characteristics as velocity or rhythm (Vermeulen and Barkema, 2002; Wagner, 2004). Without simultaneously considering these characteristics, the normative implications of firm internationalization are incomplete.

Conceptually, internationalization velocity refers to the speed at which a firm reaches its internationalization level during a time period in the past. While internationalization degree measures the extent to which a firm is involved in international markets at a specific time, internationalization velocity gauges the changing rates of a firm's internationalization levels within a time period (Wagner, 2004). Therefore, velocity reflects the pace of a firm in its historical internationalization course, rather than provides a static snapshot as measured by the degree of internationalization. Because one of the dimensions of internationalization activities is about resource allocation in international markets,

velocity, as a reflection of the concentration rate of resource commitment, possesses important implications in the internationalization-performance relationship in terms of the efficiency of resource allocation (Vermeulen and Barkema, 2002).

During the process of moving toward the target degree of internationalization, the velocity is not necessarily kept constant; it may be fast during some times and slow during others. The regularity of international expansion velocity has been conceptualized as the rhythm of internationalization (Vermeulen and Barkema, 2002). A series of constant international expansion velocities constitute a stable or regular rhythm of internationalization; conversely, an unstable or irregular rhythm represents a series of fluctuated velocities of a firm's international expansions. Irregular rhythm of internationalization deteriorates the learning capability of a firm in absorbing international experience (Cohen and Levinthal, 1990) and thus is harmful for firm performance. The impact of rhythmic characteristic, therefore, should not be ignored when examining the internationalization-performance relationship.

Although the path characteristics of internationalization such as velocity and rhythm have been developed in the literature, only a few studies have investigated their influences on firm performance (Vermeulen and Barkema, 2002; Wagner, 2004). Moreover, the empirical evidences of these studies were mainly drawn from western developed countries such as the United States and Germany. Whether the findings of the studies are applicable to the Asian newly industrialized Asian economies, where internationalization agendas are highly condensed, still calls for more empirical inquiry. In addition, past studies generally suggest firms strive toward an optimal or target degree of internationalization for best performance (e.g., Chiao *et al.*, 2006); however, these studies rarely provide any other suggestions regarding the speed and regularity that firms should adjust themselves toward in their target degrees of internationalization. On the contrary, for those studies examining the performance implications of internationalization velocity and rhythm (such as Vermeulen and Barkema, 2002), none have indicated an optimal degree of internationalization for firms to stride toward. In sum, because no specific study, to our knowledge, has

examined the relationship between internationalization and performance, while simultaneously considering the path characteristics of degree, velocity, and rhythm, the normative implications suggested by past studies may be constrained, incomplete, and even biased.

In light of this literature gap, this study aims to examine the internationalization-performance relationship within a framework that integrates thorough characteristics of the course of internationalization, such that an optimal internationalization path that leads firms to pursue maximum benefits can be ascertained. Specifically, the objectives of this study are as follows: first, to empirically validate the most recently developed S-curve model of the internationalization-performance relationship in the context of a newly industrialized economy; second, to separately examine the influences of internationalization velocity and rhythm, in addition to the degree of internationalization, on firm performance; and third, to systematically examine the linkages between internationalization process characteristics, namely degree, velocity, and rhythm, and firm performance to delineate an optimal internationalization course that maximizes net benefits.

# 2. Literature

## 2.1. Internationalization Degree and Performance

Researchers have based the internationalization-performance relationship on a variety of related theories. These theories are reviewed chronologically as followed. International Product Life Cycle (IPLC) theory (Vernon, 1966) depicts that each product and its associated technologies go through three stages of evolution: introduction, growth, and maturity. As the product goes through its life cycle, comparative advantage in its production tends to shift from country to country. To take comparative advantages, firms internationalize their production bases around the world for better performance. Hymer (1976) rationalized firms FDI on the basis of firm-specific advantages such as technological and product differentiation capability instead of national comparative advantages. The exploitation of monopolistic advantages across countries can result in superior

performance for firms. Internalization Theory (Buckley and Casson, 1976) contrasts the benefits and costs of retaining key business activities within the firm (i.e., FDI) against arm-length foreign entry strategies such as exporting. When the intermediary product markets are imperfect, the benefits of internalization outweigh its associated costs. For profit maximization, it is the firm, rather than its products, that crosses country borders. Drawing from various theoretical perspectives, Dunning (1988) proposed the eclectic paradigm as a framework for determining the extent and pattern of the value-chain activities that firms own abroad. Dunning's framework integrated the ownership advantage, internalization advantage, and location advantage to explain firms' FDI. Its performance implication is that those who based their FDI decisions on this framework will perform better than those who did not. The Transaction Cost Theory was one of the dominant theories explaining firms' FDI in the 1990s. For example, Hennart (1991) argued that monopolistic advantage is not a necessary condition for FDI as long as the coordination cost is lower in a hierarchical arrangement than in the market transaction. As a result, the internationalization benefits arise primarily from the reduced transaction costs and increased efficiency gained from internalization (i.e., FDI).

The resource-based view emphasizes the organizational capabilities and implicit knowledge of the firm (Teece, Pisano, and Shuen, 1997). Researchers argued that MNEs can gain benefits from international markets through the sharing of proprietary knowledge and resources (Fladmoe-Lindquist and Tallman, 1994). Dunning (1993) pointed out that when a firm possesses ownership advantages that are embedded within the organization, the firm is likely to exploit the advantages across countries by FDI to ensure the most efficient uses of its proprietary resources (Buckley, 1988). Along with the expansion of international markets, firms accumulate more resources, which in turn are committed to their later foreign entries, thereby producing sustainable performance (Geringer, Tallman, and Olsen, 2000). Organizational learning perspective regards internationalization as an opportunity for firms to gain international experiences and to diversify their businesses (Kim, Hwang, and Burger, 1993). Organizational learning perspective is in accordance with the incremental process school (the

U-school) of internationalization (Johanson and Vahlne, 1977) in that both perspectives view each foreign investment as relevant and interdependent, differing from other theories such as transaction cost economics that view each foreign entry as an independent transaction.

While the relationship between firms' internationalization and profitability received much attention in academia, the findings are mixed (Contractor *et al.*, 2003). Contractor *et al.* (2003) reviewed twenty-three internationalization-performance articles and classified the patterns into four relationship categories: positive (Grant, 1987), negative (Collins, 1990; Siddharthan and Lall, 1982), U-shaped (Qian, 1997; Ruigrok and Wagner, 2003), and inverted U-shaped (Daniels and Bracker, 1989; Geringer *et al.*, 1989; Hitt *et al.*, 1997). Until recently, few researchers (Contractor *et al.*, 2003; Lu and Beamish, 2004) established a sigmoid (S-shaped) curve model to integrate all types of relationship found in past studies. The three-staged curve model postulates that multinationality is detrimental to firms' profitability at the initial stage of internationalization, but such harm will be counteracted by the benefits gained from higher degrees of multinationality after a threshold level. When firms' multinationality increases to an optimal level, at which multinationality produces maximum net benefits, further international expansion again becomes detrimental to firms' performance.

During the first stage of internationalization, MNEs face the challenges of liability of foreignness (Zaheer, 1995), higher transaction cost (Hennart, 1991), far cultural distance (Davidson, 1980), diseconomies of low scale (Kogut, 1985), and incapability of cross-border administration (Gomes and Ramaswamy, 1999). Although MNEs may also enjoy locational advantages such as cheap production factors or tax incentives, the costs tend to outweigh the benefits, which turns the slope of the relationship negative.

In the second stage, the stage model (Johanson and Vahlne, 1977) contends that while the lack of local knowledge deters MNEs from international expansions, such hindrances are gradually mitigated when MNEs incrementally deepen their foreign involvement. In this stage, MNEs become familiar with local markets and institutional environments. Thus, the liability of foreignness they faced in their early entries is largely reduced (Johanson and Vahlne, 1977). Meanwhile,

knowledge about foreign markets begins to disseminate throughout the entire organization (Ruigrok and Wagner, 2003), and the capabilities of administration, coordination, communication, and logistics are also expected to advance with the progress of foreign expansion (Kim *et al.*, 1993). Geographical diversification facilitates cross-border arbitrage, discriminant pricing, inside transfer, tax shielding, market scanning (Grant, 1987), and so on. MNEs also foster their ability to govern various ownership structures, which reduces the transaction costs (Hennart, 1991). All of these factors contribute to the profitability of MNEs that maintain moderate levels of internationalization.

The marginal costs brought by firms' internationalization may exceed the marginal benefits when MNEs over-expand their foreign markets (Contractor *et al.*, 2003). For one reason, over-expansion urges MNEs to enter into less or under developed economies of low market potential; another reason is that firms' capabilities for administrating a number of geographically diversified subsidiaries may not keep ahead of the complexities arising from their further foreign expansions (Grant, 1987). The negative impacts of excessive foreign expansion were supported by other researchers (Hitt *et al.*, 1997; Tallman and Li, 1996) and empirical evidence from emerging markets (Chiao *et al.*, 2006; Chiao, Yu, and Lin, 2002).

The theoretical basis for the performance implications in the three stages of internationalization are summarized in Table 1. Based on the three-staged model of internationalization, we propose *H1*:

*H1:* ***The relationship between internationalization degree and firm performance is nonlinear, with the slope being negative at low levels, positive at moderate levels, and negative again at high levels of internationalization.***

**Table 1**

**A summary of Influential Factors of Firm Performance Under Different Stages of Internationalization**

| Theoretical grounds[1] | Influential factors | Stage 1 (Negative) | Stage 2 (Positive) | Stage 3 (Negative) | Supported literature |
|---|---|---|---|---|---|
| SM | Liabilities of foreignness | − | | | Buckley and Casson (1976); Johanson and Vahlne (1977); Zaheer (1995) |
| OL；SM | Learning costs and effectiveness | − | + | + | Ruigrok and Wagner (2003); Johanson and Vahlne (1977) |
| IO | Economies of scale | − | + | − | Hitt *et al.* (1997); Kogut (1985) |
| IO | Economies of scope | | + | − | Grant, Jammine, and Thomas (1988); Rugman (1981) |
| OLI | Ownership advantages | + | | | Dunning (1988); Hymer (1976); |
| RBV；OL | Resource accumulation and exploitation | | + | | Fladmoe-Lindquist and Tallman (1994); Johanson and Vahlne (1977) |
| RBV；OL | Capabilities | | + | | Kim *et al.* (1993); Johanson and Vahlne (1977) |
| TC；IT | Transaction costs | − | + | − | Hennart (1991) |
| IPLC | Extension of PLC | + | | − | Vernon (1966); Contractor *et al.* (2003) |
| OLI | Production factor advantages | + | | | Daniels and Bracker (1989)；Dunning (1988) |
| NT；SM | Market and opportunities | | + | + | Grant (1987) |
| SM | Cultural distance | − | | | Davidson (1980); Evans and Mavondo (2002); Johanson and Vahlne (1977) |
| RBV；OL | Management & coordination | − | + | − | Gomes and Ramaswamy (1999); Grant (1987) |
| Empirical studies (Taiwan) | ∪-shaped | − | + | | Sun and Hsiao (2008) |
| | ∩-shaped | | + | − | Chiao *et al.*, (2006); Chiao *et al.* (2002) |
| | Total effect | − | + | − | Contractor, Kundu, and Hsu (2003); Lu and Beamish (2004) |

(1)IO: Industrial Organization; IPLC: International Product Life Cycle; IT: Internalization Theory; NT: Network theory; OL: Organizational Learning; RBV: Resource-based View; SM: Stage Model; TC: Transaction Cost Theory

## 2.2. Internationalization Velocity and Performance

Internationalization velocity refers to how much foreign expansion a firm undertakes in a certain period of time (Vermeulen and Barkema, 2002). A high degree of velocity indicates that a firm commits a great deal of resources in foreign markets within a short time period. Past studies focusing on the performance implications of internationalization velocity are few, with limited perspectives mainly on economic decisions (Vermeulen and Barkema, 2002), organizational learning (Wagner, 2004), and strategic viewpoint (Wagner, 2004).

In terms of economic view, scholars argued that managers, being constrained by bounded rationality and limited scope of recognition (Simon, 1959), tend to make suboptimal decisions under time pressure. The diseconomies of time compression accrue to firms that undertook a series of FDIs within a short period of time (Dierickx and Cool, 1989). The other researcher (Wagner, 2004) also contended that firms expanding into foreign countries at a high speed will be unable to fully seize the profit potential of new expansions as discussed in the previous three-staged model because some tacit benefits are interactive-based (i.e., knowledge development) and demand time to assimilate. Basing their view on time compression diseconomies (Dierickx and Cool, 1989) and limited absorptive capacity (Cohen and Levinthal, 1994), Vermeulen and Barkema (2002) further proposed that a rushed pace of internationalization will negatively moderate the relationship between multinationality and profitability.

The organizational learning perspective, in echoing the internationalization process view (Johanson and Vahlne, 1977), recognizes that internationalization benefits can be accumulated through the process of international expansion and be disseminated across organizational boundaries. However, firms with an appropriately high pace of internationalization may be overloaded with knowledge and experiences that are beyond firms' absorptive capacity (Cohen and Levinthal, 1994). As Eisenhardt and Martin (2000) put it: "Experience that comes too fast can overwhelm managers, leading to an inability to transform experience into meaningful learning." A highly internationalized company demands a sound communication and coordination mechanism that facilitates the flow of corporate

culture, policies, and information (Birkinshaw and Hood, 1997), thereby building mutual trust among member companies. This is especially imperative for firms whose foreign subsidiaries are situated in a highly uncertain environment and are required a high degree of local responsiveness (Jacobs, 1974). In this case, time pressure owing to a high pace of internationalization could lead to miscommunication among organizational members and control leakages between parent firms and foreign subsidiaries (Huber, 1991). As a result, a condensed internationalization schedule is disadvantageous in absorbing the benefits from knowledge learning and effective communication, while a moderately slow schedule of internationalization allows adequate time for parent firms to build up a mechanism for communication and coordination and for foreign subsidiaries to fulfill their mandates (Vermeulen and Barkema, 2002).

A particular type of international business, the so-called born global firms or international new ventures (INVs), has emerged in the global economy since the late 1980s. Oviatt and McDougall (1994) defined an INV as "A business organization that, from inception, seeks to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries." Because INVs, by definition, achieve high levels of internationalization within a short period of time from inception, generally within two or three years, they appropriately represent the business of a high internationalization velocity. The emergence of INVs can be attributed to three factors (Madsen and Servais, 1997): entrepreneurs who possess high international initiative and capabilities to overcome the liabilities of foreignness, organizational routines such as pre-export activities, which foster the capability of start-ups to transact across borders (Korhonen, Loustarinen, and Welch, 1996), and technological advancement and environmental changes that facilitate international business (Gabrielsson and ManekKirpalani, 2004). All of these factors contribute to INVs and allow them to overcome the difficulties arising from early internationalization. In mapping the three-staged (S-curve) model of internationalization-performance, INVs may be able to bypass the first stage of the negative relationship and quickly go into the second stage of the positive segment (Zahra, Ireland, and Hitt, 2000). Wagner (2004) argued that international business can gain both tangible benefits such as

tax and cost savings and intangible benefits such as the exploitation of firm-specific advantages. Thus, for some firms like INVs, speedy internationalization positively contributes to firm performance.

In sum, the performance implication of internationalization velocity may vary with different types of firms. Inexperienced firms pursuing international expansion at a slow pace can deliberately deploy their resources in foreign markets and develop an effective inter-organizational learning and communication mechanism. Meanwhile, adequate time should be allowed for parent companies to coordinate strategic objectives across subunits and for subsidiaries to adapt themselves to be responsive to local markets. When these benefits outweigh the opportunity costs due to slow pace of internationalization, firms still gain net positive benefits from sluggish internationalization. In contrast, for international businesses such as INVs, these entities may seek to quickly exploit their advantages across countries and aim to seize foreign market potential in a short period of time. In these cases, speedy international expansion can improve firm performance when market benefits are more than enough to offset the time compression diseconomies. Therefore, we hypothesize *H2*:

> *H2: Firms that internationalize at a low or fast pace outperform those that internationalize at a moderate pace; that is, the relationship between internationalization velocity and firm performance exhibits a U-shaped curve.*

## 2.3. Internationalization Rhythm and Performance

Internationalization rhythm refers to the regularity of the pace of international expansions during a certain period of time. The distribution of various internationalization speeds over time reflects the volatility or rhythm of firm internationalization (Vermeulen and Barkema, 2002). Taking two firms as an example, suppose that firm A and firm B established ten foreign subsidiaries during the past five years, which indicates the same internationalization speed for the two firms during this period of time. However, while firm B steadily established two foreign subsidiaries each year, firm A increased the number of its foreign bases at a different rate by establishing ten subsidiaries in the first two

years and then undertaking no additional expansion in the following three years. Therefore, an irregular pattern of foreign expansion (i.e., firm A) can be observed in which a high peak of rapid expansion is followed by a long period of inactivity (Vermeulen and Barkema, 2002). In a word, while internationalization speed measures the average pace of a firm's international expansion, internationalization rhythm captures the variance of the paces of internationalization.

Senge (1992) argued that whether organizations can successfully assimilate knowledge and experience from the past determines the effectiveness of organizational learning in the future; that is, there exists an organizational learning spiral in which the reservoir for accumulated knowledge and experience is the fundamental basis for future learning. In light of this view, absorptive capacity is the key factor for firms in assimilating knowledge (Cohen and Levinthal, 1989). In the case of an irregular internationalization rhythm, volatile expansions can bring firms overloaded experiences that are difficult for firms to absorb from their recent past (Cohen and Levinthal, 1989; Barkema, Shenkar, Vermeulen, and Bell, 1997). On the one hand, overloaded firms become ineffective in accommodating their additional foreign subsidiaries to current routines (Huber, 1991; Vermeulen and Barkema, 2002). On the other hand, periods of stagnancy reduce firms' absorptive capacity (Cohen and Levinthal, 1989; Eisenhardt and Martin, 2000) because firms gradually fail to recall what they have learned long ago as well as what they must learn in the future (Bailey, 1989). In addition, inertia locks firms into existing structures and systems with rigid mentality (Bettis and Prahalad, 1995; Lewin, 1936). Based on the organizational learning perspective, we infer that a volatile internationalization rhythm characterized by rush peaks and stagnancy will be detrimental to firm performance. Therefore, we propose *H3*:

> *H3: Firms that internationalize in a mode of regular (stable) rhythm outperform those that internationalize in a mode of irregular (unstable) rhythm.*

## 2.4. The Optimal Characteristics of Internationalization Course

Based on the three characteristics of internationalization, this study establishes a typology that classifies MNEs into eight clusters as shown in Table 2. According to the three previous hypotheses, a firm that is involved in international markets, either incrementally with thorough deliberation or speedily in pursuing time economy while stabilizing their adjustments toward the moderate target degree of internationalization (the type eight firms in Table 2) will outperform other MNEs that do not demonstrate such internationalization characteristics. Therefore, we propose *H4*:

*H4: MNEs that maintain their internationalization degree on the second (positive) stage by either expanding slowly with thorough deliberation or by speedily in pursuing time economy while stabilizing their expansion perform better than other MNEs that demonstrate a different portfolio of internationalization characteristics.*

**Table 2**
**The Combination of Internationalization Characteristics:**
**Degree, Velocity, and Rhythm**

| Rhythm | Degree | Velocity | |
|---|---|---|---|
| | | **Moderate** | **Fast/Slow** |
| Regular | | 6. Moderate degree<br>2. High/low degree | 8.Moderate degree<br>4. High/low degree |
| Irregular | | 5. Moderate degree<br>1. High/low degree | 7. Moderate degree<br>3. High/low degree |

# 3. Methodology

## 3.1. Sample and Data

The sample list for this study was obtained from the Taiwan Economic Journal (TEJ) Data Bank, which provides the most comprehensive financial

profiles of listed companies in Taiwan. During the time frame considered in our analysis (i.e., between 2000 and 2004), there were 929 listed firms in the TEJ, which constituted 4,645 observations. When counting the numbers of foreign subsidiaries, firms without any foreign subsidiaries and subsidiaries located in tax heavens or being held without physical outputs were also excluded, leaving 3,650 observations. Those that displayed significant abnormalities (i.e., claiming financial crisis), or missing financial data for any of the five years of interest were also eliminated. The final sample contained 3,541 observations, representing unbalanced longitudinal panel data for testing *H1* and *H2*. As the measure of internationalization rhythm requires time series data to capture the dynamic of the pace of internationalization over time, 199 firms were further eliminated due to incomplete data, which left 730 sample firms for testing *H3*. Of the 730 sample firms, 683 demonstrated a complete set of internationalization characteristics and were retained for testing *H4*.

## 3.2. Measurement

### 3.2.1. Dependent Variables

Past related studies often employed financial ratios as performance indicators, with only few exceptions utilizing non-financial proxies. Researchers considered that the consequences of strategy implementation can generally be reflected through the use of financial indicators (Grant, Jammine, and Thomas, 1988). Because this study aims to examine the performance implications of internationalization, we chose to use return on assets (ROA) (Grant *et al.*, 1988; Hitt *et al.*, 1997) and return on equity (ROE) (Buhner, 1987) as measures of firm profitability. ROA was calculated as the ratio of after-tax net income to total assets and ROE was calculated as the ratio of after-tax net income to the net value of outstanding common stock.

### 3.2.2. Independent Variables

(1) Internationalization degree

Several indicators have been used in past studies to measure the degree of firm internationalization, including export ratio (Lu and Beamish, 2001), foreign

sales ratio (Geringer *et al.*, 1989; Grant *et al.*, 1988), foreign assets ratio (Daniels and Bracker, 1989), the number of foreign countries where the firm operates in (Kogut, 1985), and the number of the firm's foreign subsidiaries (Morck and Yeung, 1991), among others. Because measures like the export ratio, foreign sales ratio and foreign assets ratio can be greatly affected by global logistics and internal transfers in multinational enterprises, these measures may be biased and lose their validity in reflecting firms' international involvement. However, the establishment of foreign subsidiaries not only demonstrates a firm's commitment to international markets, but this number can also be easily identified and calculated. Accordingly, this study adopted the number of foreign subsidiaries[2] as the proxy of internationalization degree, as has often been done in prior studies (Vermeulen and Barkema, 2002).

(2) Internationalization velocity

Internationalization velocity measures the average changes in internationalization degree within a time frame. Two measurement issues arise: the proxy of internationalization degree and the selection of the observation time frame. In accordance with our previous design in measuring the degree of internationalization and along with past literature (Vermeulen and Barkema, 2002), we observed the change in numbers of foreign subsidiaries as a proxy for change in the degree of internationalization. In setting up the observation time frame, we employed the conceptual definition of an international new venture (INV) (Oviatt and McDougall, 1997) and observed how much time a firm took since its inception to reach its current degree of internationalization. We calculated the ratio of the number of foreign subsidiaries to the firm's age as a proxy for internationalization velocity; the higher the ratio, the faster a firm's internationalization speed.

(3) Internationalization rhythm

Internationalization rhythm measures the volatility of the international expansions, which can be observed from the change of the number of a firm's foreign subsidiaries within a specific time period. If a firm engaged in rapid

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[2] Foreign subsidiaries outside three layers were excluded; Stock holding subsidiaries and those located in tax heavens such as British Virginia Island were also excluded.

international expansions and then became stagnant, the distribution of changes in number of foreign subsidiaries will exhibit a high peak as a reflection of this rapid international expansion. On the contrary, if a firm steadily expanded its foreign subsidiaries at a regular pace, there should be a uniform distribution instead. Thus, Vermeulen and Barkema (2002) utilized the kurtosis of the distribution of the change in numbers of foreign subsidiaries as a measure of internationalization rhythm. In this study, we have adopted the same kurtosis measure devised by Vermeulen and Barkema (2002)[3], where a high value of kurtosis indicates more volatility in the internationalization rhythm.

### 3.2.3. Control Variables

To control for the impact of firm size on profitability, we used the natural logarithm of the number of total employees, a proxy commonly used in related literature (Gomes and Ramaswamy, 1999), as a surrogate for firm size. Capital structure was highly correlated with firm profitability (Jensen, 1986). Consistent with prior studies (Hitt *et al.*, 1997), this study employed the debt ratio, as measured by the ratio of total liabilities to total assets, into its models. Internationalization studies have discovered the moderating effect of such firm-specific advantages as research and development (R&D) capability on the internationalization-performance relationship (Kotabe, Srinivasan, and Aulakh, 2002). Thus, we have incorporated R&D intensity, as measured by the ratio of R&D expenditures to total sales, into the models. Diversification has long been regarded as a strategy for growing profits (Hoskisson and Hitt, 1990). We controlled for the effects of two types of diversification strategies on profitability, namely, total product diversification (TD) and unrelated product diversification (UD). The entropy indices of total and unrelated product diversification were calculated according to Jacquemin and Berry (1979)[4]. Finally, to contrast the

---

$$kurtosis = \left\{ \frac{n(n+1)}{(n-1)(n-2)(n-3)} \sum \left( \frac{x_i - \overline{x}}{s} \right)^4 \right\} - \frac{3(n-1)^2}{(n-2)(n-3)}$$

    n=number of years observed; $x_i$ =foreign subsidiaries expanded in year *i*;

    s =standard deviation of $x_i$

[4]  Degree of total diversification (TD) =Degree related div. (RD) +Degree of unrelated div. (UD) ：

manifestation of sigmoid curve models in different industries, this study, based on the Industry Classification Standards of the Taiwanese government, classified all sample firms into four major industries: information and electronics, chemicals and plastics, metal and machinery, and food, textile, and others (FTO).

## 3.3. Statistical Models

The three-staged sigmoid curve (*H1*) and the U curve (*H2*) were examined using a panel (cross-sectional & time-series) of data analysis. This panel data analysis generated statistical results for the three models (i.e., OLS, fixed-effect, and random-effect). By conducting a series of tests, including the *F*-test, Hausman test, and Lagrange Multiplier test, we determined the best model of the three. We examined the internationalization rhythm hypothesis (*H3*) using multiple regression models of ordinary least squares (OLS) to analyze the cross-sectional data. The examination of *H4* was based on a multivariate analysis of variance (MANOVA).

Because the models for testing *H1* and *H2* contained the original variables (i.e., internationalization degree in *H1* and velocity in *H2*) as well as their squared and cubic terms, multicollinearity in the regression models is a legitimate concern. To mitigate such concern, we followed the procedures suggested by Aiken and West (1991) to standardize the variables for internationalization degree/velocity and their squared/cubic terms in corresponding models.

# 4. Results

## 4.1. Descriptive Statistics

Table 3 shows the industrial heterogeneities of the variables studied. Of all sample firms, 72.4% were information and electronics (I&E) firms, followed by plastics and chemicals firms (11.6%). Industrial differences exist in almost all

---

$$TD = \sum_{i=1}^{N} p_i \times \ln\left(1/p_i\right), \quad UD = \sum_{j=1}^{M} p^j \times \ln\left(1/p^j\right) = TD - RD,$$

$N$ : # of product categories     $P_i$ : sales ratio of product $i$     $M$ : # of industries engaged;
$P^j$ : the sales percentage of each product category $i$     $P_i^j$ : the sales percentage of sector $j$

attributes, except for the internationalization degree and rhythm. Possibly due to their shorter industrial ages, I&E firms did not demonstrate a higher degree of internationalization compared to firms in other industries. What is particularly noteworthy is the significantly higher internationalization velocity and profitability of I&E firms among all industries. Meanwhile, I&E firms also demonstrate the highest R&D intensity among all industries, which supports the argument for the features of international new ventures that technological advantages facilitate firm internationalization (Knight and Cavusgil, 1996; Oviatt and McDougall, 1999). I&E firms were also characterized by their significantly higher degrees of unrelated diversification and lower levels of debt.

Means and standard deviations of variables and their correlations for the panel data analysis (**H1** and **H2**) are summarized in Table 4. Table 5 shows the cross-sectional data analysis (**H3**). As shown in Table 4, the correlation coefficients for explanatory variables are moderate to high (0.50~0.83). To mitigate the concern of multicollinearity, we standardized all the explanatory variables as suggested by Aiken and West (1991). The correlation structure of Table 5 is quite similar to that of Table 4. Considering the potentially high correlation between ROA and ROE, we adopted the MANOVA to test **H4**.

## 4.2. Results for Hypothesis Testing

Table 6 shows the regression results of the panel data analysis pertaining to the internationalization-performance relationship. The significance of the $F$-test ($F = 6.250$, $p < 0.01$), LM test ($LM = 1,549.18$, $p < 0.01$) and Hausman test ($H = 132.32$, $p < 0.01$) in the ROA model indicates that the fixed-effect model is best fitted with the data, which explains 62.1% of the ROA variance. The fixed-effect model also has the best fit in the ROE model, which explains 55.2% of ROE variance. As exhibited in the fixed-effect model of Table 6, internationalization degree of the first order is negatively correlated with ROA ($t = -7.079$, $p < 0.01$); its squared term is positively correlated with ROA ($t = 2.741$, $p < 0.01$); and its cubic term is negatively correlated with ROA ($t = -1.744$, $p < 0.1$). Therefore, the three-staged sigmoid curve model is supported. The statistical results are highly robust in the ROE model. Therefore, **H1** is supported and the external validity of

## Table 3
## Mean Differences of Industrial Attributes

| Attributes / Industry | ROA | ROE | Int'l degree | Int'l velocity | Int'l rhythm[a] | Firm size | Debt ratio | Total diver. | Unrelated diver. | R&D intensity | Sample size[b] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.Food, textile & others | 0.045 | -0.016 | 3.873 | 0.130 | 1.672 | 2.695 | 0.443 | 1.066 | 0.186 | 0.008 | 377 (68) |
| 2.Plastics & chemicals | 0.072 | 0.070 | 4.255 | 0.140 | 0.801 | 2.547 | 0.384 | 1.152 | 0.222 | 0.018 | 411 (76) |
| 3.Metal & machinery | 0.089 | 0.092 | 3.229 | 0.117 | 1.364 | 2.706 | 0.441 | 0.970 | 0.161 | 0.009 | 188 (36) |
| 4.Information & electronics | 0.092 | 0.102 | 3.837 | 0.252 | 0.991 | 2.487 | 0.399 | 0.860 | 0.304 | 0.041 | 2,565 (550) |
| Grand mean | 0.084 | 0.085 | 3.857 | 0.219 | 1.053 | 2.528 | 0.404 | 0.921 | 0.275 | 0.033 | 3,541 (730) |
| $F$-value | 27.807** | 37.434** | 1.661 | 43.356** | 1.048 | 29.106** | 14.691** | 55.203** | 29.675** | 64.615** | |
| Post Hoc Test | 4 > 1** | 4 > 1** | | 4 > 1** | | 3 > 2** | 3 > 2** | 3 > 4** | 4 > 1** | 4 > 1** | |
| | 4 > 2** | 4 > 2* | | 4 > 2** | | 3 > 4** | 3 > 4** | 2 > 3** | 4 > 2** | 4 > 2** | |
| | 3 > 1** | 3 > 1** | | 4 > 3** | | 1 > 2** | 1 > 2** | 2 > 4** | 4 > 3** | 4 > 3** | |
| | 2 > 1** | 2 > 1** | | | | 1 > 4** | 1 > 4** | 1 > 4** | | | |

** $p < 0.01$, * $p < 0.05$

a Sample size for each variable was 3,541, with the exception that the sample size for internationalization rhythm was 730.

b Numbers in parentheses indicate sample sizes for internationalization rhythm sample subset; A Chi-square test shows no differences between the two proportion distributions ($\chi^2 = 3.162$, $p > 0.1$)

**Table 4**

**Mean, SD, and Correlation Matrix for the Sample Subsets of Internationalization Degree and Velocity**

| Variables | Mean | S.D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.ROA | 0.084 | 0.099 | 1.000 | | | | | | | | | | |
| 2.ROE | 0.085 | 0.206 | $0.868^{**}$ | 1.000 | | | | | | | | | |
| 3.Int'l degree | 3.857 | 5.314 | $-0.049^{**}$ | -0.012 | 1.000 | | | | | | | | |
| 4.Int'l degree $^2$ | 43.105 | 233.66 | -0.030 | 0.010 | $0.828^{**}$ | 1.000 | | | | | | | |
| 5.Int'l degree $^3$ | 1194.04 | 14927.32 | -0.022 | 0.014 | $0.654^{**}$ | $0.953^{**}$ | 1.000 | | | | | | |
| 6.Int'l velocity | 0.219 | 0.287 | $0.056^{**}$ | $0.065^{**}$ | $0.750^{**}$ | $0.615^{**}$ | $0.502^{**}$ | 1.000 | | | | | |
| 7.Int'l velocity $^2$ | 0.130 | 0.713 | 0.020 | $0.045^{**}$ | $0.567^{**}$ | $0.685^{**}$ | $0.654^{**}$ | $0.786^{**}$ | 1.000 | | | | |
| 8.Firm size (log) | 2.528 | 0.494 | 0.013 | -0.020 | $0.395^{**}$ | $0.230^{**}$ | $0.132^{**}$ | $0.266^{**}$ | $0.153^{**}$ | 1.000 | | | |
| 9.Debt ratio | 0.404 | 0.157 | $-0.347^{**}$ | $-0.331^{**}$ | 0.018 | 0.003 | -0.006 | -0.028 | -0.002 | $0.116^{**}$ | 1.000 | | |
| 10.Total diver. | 0.921 | 0.502 | $-0.116^{**}$ | $-0.091^{**}$ | $0.121^{**}$ | $0.084^{**}$ | $0.047^{**}$ | -0.015 | 0.010 | $0.056^{**}$ | $0.080^{**}$ | 1.000 | |
| 11.Unrelated diver. | 0.275 | 0.318 | 0.025 | 0.033 | $0.045^{**}$ | 0.022 | 0.006 | 0.020 | 0.006 | $-0.116^{**}$ | $0.049^{**}$ | $0.354^{**}$ | 1.000 |
| 12.R&D intensity | 0.033 | 0.056 | -0.011 | -0.033 | $-0.052^{**}$ | $-0.040^{*}$ | -0.029 | $0.063^{**}$ | 0.000 | $-0.093^{**}$ | $-0.286^{**}$ | $-0.056^{**}$ | 0.001 |

$**p < 0.01$, $*p < 0.05$ ; n = 3,541

**Table 5**
**Mean, SD, and Correlation Matrix for the Sample Subset of Internationalization Rhythm**

| Variables | Mean | S.D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| 1.ROA | 0.089 | 0.077 | 1.000 | | | | | | |
| 2.ROE | 0.092 | 0.177 | $0.772^{**}$ | 1.000 | | | | | |
| 3. Int'l rhythm | 1.053 | 3.409 | -0.035 | -0.056 | 1.000 | | | | |
| 4.Firm size (log) | 2.518 | 0.494 | -0.006 | $-0.084^{*}$ | -0.070 | 1.000 | | | |
| 5.Debt ratio | 0.398 | 0.146 | $-0.297^{**}$ | $-0.285^{**}$ | -0.065 | $0.126^{**}$ | 1.000 | | |
| 6.Total diver. | 0.916 | 0.457 | $-0.155^{**}$ | $-0.121^{**}$ | -0.009 | 0.065 | $0.097^{**}$ | 1.000 | |
| 7.Unrelated diver. | 0.288 | 0.286 | 0.033 | 0.049 | 0.020 | $-0.143^{**}$ | 0.053 | $0.367^{**}$ | 1.000 |
| 8.R&D intensity | 0.034 | 0.052 | 0.061 | 0.026 | 0.034 | $-0.086^{*}$ | $-0.355^{**}$ | $-0.099^{**}$ | -0.036 |

$**p < 0.01$, $*p < 0.05$ ; n = 730

the S-curve model developed from the Western developed economies (Contractor *et al.*, 2003; Lu and Beamish, 2004) is validated in an emerging market.

Table 7 summarizes the empirical results of the relationship between internationalization velocity and firm performance. Similarly, the significance of the three model fit tests ($F = 6.310$, $p < 0.01$; $LM = 1,514.33$, $p < 0.01$; Hausman test $= 171.80$, $p < 0.01$) lent support to the fixed-effect model, which provides 62% of explanatory power in ROA variance. Because ROA is negatively correlated with internationalization velocity ($t = -6.842$, $p < 0.01$) and positively correlated with the squared term ($t = 3.345$, $p < 0.01$), the U-shaped curvilinear relationship is validated. The analysis derived highly robust results in the ROE model ($t = -6.704$, $p < 0.01$ for the first order term; $t = 3.052$, $p < 0.01$ for the second order term). Consequently, *H2* is supported.

The empirical evidence examining the relationship between internationalization rhythm and performance is reported in Table 8. The results consistently reveal that firm profitability is negatively correlated with the measure (kurtosis) of the internationalization rhythm in both ROA and ROE models (ROA: $t = -1.849$, $p < 0.1$; ROE: $t = -2.414$, $p < 0.05$). The results indicate that a volatile rhythm of internationalization pace could be detrimental to firm performance. Therefore, the results support our *H3* and are in accordance with the findings of the literature (Vermeulen and Barkema, 2002).

As for the control variables, debt level, total diversification, and R&D intensity consistently and significantly demonstrate their negative influences on firm profitability. In accordance with Table 3, information and electronics firms possessed superior profitability than firms in other industries.

*H4* integrates the first three hypotheses and postulates that firms fit within the normative criteria of internationalization characteristics will have better performance than those that do not. In examining *H4*, we first classified all sample firms by quartiles of the three internationalization attributes into eight clusters, each representing a portfolio of different internationalization characteristics. The quartiles for internationalization degree, velocity, and rhythm are listed in Table 9. Considering the three-staged S model, firms that have moderate levels of internationalization degree (the middle fifty percentiles) should

outperform the rest of the internationalized firms. On the contrary, firms that either deliberately (below and in the first quartile) or speedily (above or in the third quartile) internation-alized their operations and markets will have superior performance as opposed to those that internationalize at a moderate pace (the middle fifty percentiles). Finally, firms that have a regular rhythm (lower kurtosis) in international expansions are expected to perform better than those with unstable paces (i.e., explosive expansion followed by stagnancy). Accordingly, firms that simultaneously demonstrate moderate degrees, slow or fast speeds, and regular rhythms of internationalization (i.e., cluster 8 in Table 10) should have the highest internationalization performance compared to firms in the other clusters. Table 10 shows the sample sizes of the eight classified clusters and their corresponding average profitability. As hypothesized, the eighth cluster containing the firms that best fit in the normative prescriptions suggested by the first three hypotheses demonstrates the significantly highest profitability among all clusters. Therefore, *H4* is supported.

# 5. Conclusion

## 5.1 Discussion

In light of the theoretical gaps encountered in internationalization literature, this study develops a framework that integrates multiple facets of internationalization characteristics for comprehensively examining the relationship between internationalization and firm performance. The empirical results well support our hypotheses, which are summarized as follows. First, this study adopted the most recent S-curve model that postulates the relationship between internationalization and performance as a three-staged curvilinearity in which firm performance decreases with initially low levels of internationalization but becomes positively correlated with moderate levels of internationalization and decreases again at high levels of internationalization. The empirical results of this study support this three-staged sigmoid curve model in an emerging economy. The S-curve model not only reconciles all the various patterns of the relationship

**Table 6**
**Results for Internationalization Degree-Performance Relationship**
(n = 3,541)

| | ROA | | | ROE | | |
|---|---|---|---|---|---|---|
| **Model** | **1** | **2** | **3** | **4** | **5** | **6** |
| **Variable** | OLS model | Fixed effect model | Random effect model | OLS model | Fixed effect model | Random effect model |
| **Control variables** | | | | | | |
| Firm size | 0.023 *** | 0.083 *** | 0.035 *** | 0.024 ** | 0.228 *** | 0.060 *** |
| | (6.545) | (8.546) | (6.989) | (3.265) | (10.435) | (5.728) |
| Debt ratio | -0.244 *** | -0.240 *** | -0.257 *** | -0.486 *** | -0.595 *** | -0.552 *** |
| | (-24.110) | (-16.070) | (-21.902) | (-22.913) | (-17.578) | (-21.891) |
| Total diver. | -0.018 *** | -0.017 *** | -0.020 *** | -0.027 *** | -0.031 ** | -0.032 *** |
| | (-5.401) | (-2.958) | (-4.789) | (-3.858) | (-2.354) | (-3.566) |
| Unrelated diver. | 0.024 *** | 0.004 | 0.013 ** | 0.041 *** | -0.001 | 0.022 * |
| | (4.538) | (0.586) | (2.244) | (3.683) | (0.049) | (1.703) |
| R&D intensity | -0.262 *** | -0.845 *** | -0.534 *** | -0.628 *** | -1.635 *** | -1.050 *** |
| | (-9.096) | (-17.545) | (-15.043) | (-10.398) | (-14.985) | (-13.855) |
| Food, textile & others | -0.043 *** | -3.311 | -0.057 *** | -0.111 *** | 4.667 | -0.134 *** |
| | (-8.300) | (-0.000) | (-6.389) | (-10.230) | (0.000) | (-7.571) |
| Plastics & chemicals | -0.022 *** | -4.367 | -0.030 *** | -0.041 *** | 6.012 | -0.049 *** |
| | (-4.441) | (-0.000) | (-3.352) | (-3.949) | (0.000) | (-2.938) |
| Metal & machineries | -0.001 | -2.983 | -0.011 | -0.006 | 3.428 | -0.020 |
| | (-0.092) | (-0.000) | (-0.916) | (-0.398) | (0.000) | (-0.870) |
| **Independent variables** | | | | | | |
| Int'l degree | -0.015 *** | -0.030 *** | -0.024 *** | -0.023 *** | -0.062 *** | -0.043 *** |
| | (-4.939) | (-7.079) | (-6.904) | (-3.537) | (-6.521) | (-5.682) |
| Int'l degree $^2$ | 0.003 ** | 0.004 *** | 0.004 *** | 0.007 *** | 0.009 *** | 0.008 *** |
| | (2.509) | (2.741) | (2.895) | (2.727) | (2.724) | (2.941) |
| Int'l degree $^3$ | -0.000 * | -0.001 * | -0.000 ** | -0.000 ** | -0.001 * | -0.000 ** |
| | (-2.078) | (-1.744) | (-2.019) | (-2.158) | (-1.818) | (-2.131) |
| $F$-value | 69.380 *** | 8.240 *** | | 64.690 *** | 6.440 *** | |
| Adjusted-$R^2$ | 0.175 | 0.621 | | 0.165 | 0.552 | |
| $F$ test | | 6.250 *** | | | 4.850 *** | |
| LM test | | 1,549.18 *** | | | 1,016.61 *** | |
| Hausman test | | 132.32 *** | | | 154.05 *** | |

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$; $t$-values are in parentheses ; Information and electronics industry is set as the reference group for industry contrast.

## Table 7
## Results for Internationalization Velocity-Performance Relationship
$(n = 3,541)$

| | ROA | | | ROE | | |
|---|---|---|---|---|---|---|
| **Model** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Variables** | OLS model | Fixed effect model | Random effect model | OLS model | Fixed effect model | Random effect model |
| **Control variables** | | | | | | |
| Firm size | 0.013 *** | 0.083 ** | 0.027 *** | 0.012 * | 0.232 *** | 0.048 *** |
| | (4.040) | (8.522) | (5.564) | (1.742) | (10.553) | (4.692) |
| Debt ratio | -0.241 *** | -0.244 *** | -0.257 *** | -0.483 *** | -0.603 *** | -0.554 *** |
| | (-23.732) | (-16.303) | (-21.906) | (-22.741) | (-17.846) | (-21.948) |
| Total diver. | -0.019 *** | -0.015 *** | -0.021 *** | -0.028 *** | -0.026 ** | -0.033 *** |
| | (-5.720) | (-2.607) | (-4.918) | (-3.935) | (-1.982) | (-3.678) |
| Unrelated diver. | 0.022 *** | 0.002 | 0.011 * | 0.038 *** | -0.005 | 0.018 |
| | (4.156) | (0.272) | (1.793) | (3.468) | (-0.309) | (1.372) |
| R&D intensity | -0.260 *** | -0.846 *** | -0.530 *** | -0.628 *** | -1.637 *** | -0.977 *** |
| | (-8.959) | (-17.547) | (-14.863) | (-10.359) | (-15.010) | (-13.699) |
| Food, textile & others | -0.040 *** | -3.325 | -0.059 *** | -0.106 *** | 5.148 | -0.138 *** |
| | (-7.529) | (-0.000) | (-6.511) | (-9.598) | (0.000) | (-7.667) |
| Plastics & chemicals | -0.021 *** | -4.385 | -0.032 *** | -0.040 *** | 6.640 | -0.056 *** |
| | (-4.210) | (-0.000) | (-3.803) | (-3.747) | (0.000) | (-3.340) |
| Metal & machineries | 0.003 | -2.978 | -0.011 | -0.000 | 3.867 | -0.022 |
| | (0.473) | (-0.000) | (-0.957) | (-0.023) | (0.000) | (-0.935) |
| **Independent variables** | | | | | | |
| Int'l velocity | 0.003 | -0.021 *** | -0.009 *** | 0.005 *** | -0.005 *** | -0.017 *** |
| | (1.316) | (-6.842) | (-3.542) | (0.979) | (-6.704) | (-3.038) |
| Int'l velocity$^2$ | -0.000 * | 0.001 *** | 0.000 | 0.000 | 0.002 *** | 0.001 * |
| | (-1.064) | (3.345) | (1.545) | (0.577) | (3.052) | (1.772) |
| *F*-value | 72.730 *** | 8.220 *** | | 70.160 *** | 6.450 *** | |
| Adj-$R^2$ | 0.169 | 0.620 | | 0.163 | 0.552 | |
| F test | | 6.310 *** | | | 4.878 *** | |
| LM test | | 1,514.33 *** | | | 985.57 *** | |
| Hausman test | | 171.80 *** | | | 189.64 *** | |

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; *t*-values are in parentheses ; Information and electronics industry is set as the reference group for industry contrast.

## Table 8
## Results for Internationalization Rhythm-Performance Relationship
(n = 730)

| Variables | ROA | ROE |
|---|---|---|
| Intercept | 0.172 *** | 0.350 *** |
| **Control variables** | | |
| Firm size | 0.056 | -0.028 |
| | (1.541) | (-0.763) |
| Debt ratio | -0.398 *** | -0.371 *** |
| | (-10.477) | (-9.682) |
| Total diver. | -0.104 *** | -0.074 * |
| | (-2.611) | (-1.834) |
| Unrelated diver. | 0.076 ** | 0.063 |
| | (1.920) | (1.579) |
| R&D intensity | -0.093 *** | -0.133 *** |
| | (-2.408) | (-3.435) |
| Food, textile & others | -0.118 *** | -0.131 *** |
| | (-3.170) | (-3.499) |
| Plastics & chemicals | -0.068 | -0.054 |
| | (-1.820) | (-1.425) |
| Metal & machineries | 0.027 | -0.038 |
| | (0.760) | (-1.043) |
| **Independent variables** | | |
| Int'l rhythm | -0.065 * | -0.086 ** |
| | (-1.849) | (-2.414) |
| *F*-value | 16.205 *** | 14.439 *** |
| Adj-$R^2$ | 0.166 | 0.150 |

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$; *t*-values are in parentheses ; Information and electronics industry is set as the reference group for industry contrast.

## Table 9
## The Quartiles of Internationalization Degree, Velocity and Rhythm
(n = 683)

| | Int'l degree* | Int'l velocity* | Int'l velocity |
|---|---|---|---|
| First quartile (Q1) | 1.33 | 0.07 | -1.29 |
| Second quartile (Q2) | 2.60 | 0.14 | 1.74 |
| Third quartile (Q3) | 4.60 | 0.27 | 4.99 |

* Average across observation time period

**Table 10**
**Performance Differences of Firm Groups by Characteristics of**
**Internationalization Course: Degree, Velocity, and Rhythm**

| Firm group | # of firms | Int'l degree | Int'l velocity | Int'l rhythm | ROA Mean | ROA Rank | ROE Mean | ROE Rank |
|---|---|---|---|---|---|---|---|---|
| 8 | 69 | moderate | Slow/fast | regular | $0.111^a$ | 1 | $0.130^a$ | 1 |
| 7 | 42 | moderate | Slow/fast | irregular | $0.101^b$ | 2 | $0.061^c$ | 7 |
| 6 | 116 | moderate | moderate | regular | $0.096^b$ | 3 | $0.110^b$ | 2 |
| 5 | 110 | moderate | moderate | irregular | $0.084^b$ | 5 | $0.090^b$ | 4 |
| 4 | 95 | low/high | Slow/fast | regular | $0.080^b$ | 7 | $0.077^b$ | 5 |
| 3 | 133 | low/high | Slow/fast | irregular | $0.081^b$ | 6 | $0.076^b$ | 6 |
| 2 | 61 | low/high | moderate | regular | $0.069^c$ | 8 | $0.053^c$ | 8 |
| 1 | 57 | low/high | moderate | irregular | $0.089^b$ | 4 | $0.096^b$ | 3 |
| Wilk's Lamda | | | | | | | $0.963^{**}$ | |
| *F*-value | | | | | $2.292^{**}$ | | 1.447 | |

[a,b,c] homogeneous subsets ($\alpha = 0.05$); $**p < 0.05$

between internationalization and performance encountered in past studies but also accentuates the existence of both a threshold level and an optimal level of firm internationalization. This implies that higher and lower degrees of internationalization beyond these threshold and optimal levels can be harmful to firm performance.

Second, the empirical evidence of this study also supports the proposed U-shaped pattern of the relationship between internationalization velocity and firm performance. The result means that firms that either deliberately internationalize their markets or speedily expand international operations can reap net positive benefits from internationalization; conversely, the benefits will not be salient if firms undertake international involvement at a moderate pace without demonstrating a specific strategic intent. Finally, this study builds on the research of Vermeulen and Barkema (2002) and further confirms that firms can directly benefit from a regular rhythm of internationalization as opposed to a volatile one. Therefore, this study plays a more significant role in describing the effects of internationalization rhythm on firm performance than the past study does (Vermeulen and Barkema, 2002). Furthermore, our findings also suggest that

maintaining a stable internationalization rhythm may be more important for firms in emerging economies than for those in the Western developed economies.

To conclude, the empirical evidence of this study has helped to delineate an optimal portfolio of internationalization characteristics that firms can benefit from. Firms with such an optimal portfolio of internationalization characteristics should outperform those that do not possess these optimal characteristics. Our study also corroborates this internationalization-performance logic through a grouping analysis that derives a highly consistent conclusion.

## 5.2. Theoretical Contributions and Managerial Implications

Theories concerning firm internationalization such as IPLC (Vernon, 1966), stage model (Johanson and Vahlne, 1977), organizational learning (Ruigrok, and Wagner, 2003) and network theory (Johanson and Mattson, 1988) all regard firm internationalization as an incremental process in which every entry decision is interdependent. This theoretical perspective implicitly suggests that it is inadequate to scrutinize the internationalization-performance relationship solely based on a static examination, as has often been done in past studies. Another gap of internationalization literature lies in the failure to consider other internationalization characteristics beyond the degree of internationalization. When considering internationalization on a time basis, the influences of process characteristics such as velocity and rhythm on firm performance should be taken into account. Nevertheless, few studies have probed this particular issue (Vermeulen and Barkema, 2002; Wagner, 2004). Furthermore, few, if any, studies simultaneously integrate these multiple facets of the internationalization process into a comprehensive examination that outlines an optimal course of internationalization for firms to follow. Specifically, in light of this literature gap, this study has successfully depicted an optimal combination of internationalization characteristics that leads firms to attain their best performance. The contributions of this study are salient, not only because they replace the static perspective with a dynamic view of firm internationalization, but they also provide more comprehensive implications of internationalization when compared with contributions of past studies.

Past studies have failed to confirm the direct effect of internationalization velocity on firm performance, but have only discovered its role in moderating the internationalization-performance relationship (Vermeulen and Barkema, 2002). These studies mostly based their arguments on the perspectives of organizational learning and absorptive capacity and suggested that a slack schedule of internationalization is important in order to develop the learning mechanism that facilitates the dissemination of knowledge and experience across organizational boundaries. Therefore, a low speed of internationalization helps firms reap the benefits from international expansions. While accommodating these learning perspectives, this study also incorporates other theoretical rationales to address the role of internationalization velocity. We argue that the wisdom regarding internationalization speed derived from organizational learning theory is confronted by the strategic perspective (i.e., advantages of early entry timing) and the phenomenon of international new ventures. This study reconciles the contradictions of different theoretical perspectives by proposing a U-shaped relationship between internationalization velocity and firm performance. Through the validation of the empirical evidence, this study extends the pattern of the relationship between internationalization velocity and performance and, thus, deepens academia's understanding of the performance implications of internationalization velocity.

The three-staged S-curve model, postulated from evidence in Western developed economies, receives support from this current study. However, this S-curve model conflicts with the findings of previous Taiwanese studies that have shown an inverted U-shaped relationship between internationalization degree and firm performance (Chiao *et al.*, 2002; 2006). The rationales for the differences are discussed as follows. First, the samples in this study are all large-scale listed firms while the previous study (Chiao *et al.*, 2006) focused on small and medium-sized enterprises. Second, the internationalization activities of Taiwanese firms are in a transitional stage where FDI has started to increase beyond exports. In the study of Chiao *et al.* (2006), the internationalization degree was measured by the export ratio, while this study focuses on FDI activities. The difference should not be merely considered as a measure issue but rather as a reflection of dissimilar

developmental stages of firm internationalization. Apparently, FDI calls for greater resource commitment, higher risk bearing, and better managerial capability from firms when compared to exporting. These conditions may not pose challenges to firms that initially focus on exporting but are difficult for inexperienced firms at early stages of FDI. This disparity partly explains the negative slope of the first segment of the S curve. Third, this study establishes a cross-sectional and longitudinal dataset for empirical analysis that explains variance in profitability as high as 55%, at least. In contrast, utilizing only a cross-sectional research design generally results in much less explanatory power, as can be observed from past related studies (i.e., Chiao *et al.*, 2002; 2006).

This study provides important implications for international managers. There are two turning points along the S curve. The first turning point lies between the first segment with negative slope and the second segment with positive slope. This turning point represents a threshold level that internationalizing firms should surpass to obtain net positive gains from international expansions. Firms whose international involvement is below this level will incur more costs than benefits. However, positive gains cannot increase infinitely. The second turning point that lies between the second segment with positive slope and the third segment with negative slope represents an optimal level that internationalizing firms should target in order to maximize their internationalization benefits. Internationalization levels exceeding this turning point result in the marginal cost of internationalization being larger than the marginal benefit. Further international expansion can only do harm to firm performance. Therefore, international managers should ensure that their firm's international involvement does not exceed this turning point. Accordingly, this study suggests that managers explore their firm's specific S curve with the two turning points such that a comfort zone of internationalization can be established to guide their firms toward better performance. For Taiwanese listed firms, this comfort zone averagely ranges from 1.33 to 4.6 subsidiaries, which is calculated from the middle fifty percent of firms that represent those staying on the second positive sloped segment of the S curve.

Based on the conclusion regarding internationalization velocity, this study also suggests that managers align their internationalization pace with strategic

intents. Firms should either deliberately allow themselves more time in order to wait for the maturation of organizational capabilities of managing cross-border issues, or to speedily expand their international markets to take the advantages of early entries. According to Table 9, a velocity that is slower than 0.07 or faster than 0.27 is beneficial for firm performance; that is, the average time interval between each new establishment of a foreign subsidiary should be either shorter than four years (1/0.27) or longer than fourteen years (1/0.07). In addition, when considering the regularity of the pace of internationalization, this study suggests that firms should plan their activities on a longer time span because a short time frame may lead to a highly volatile internationalization rhythm that has been proven to be detrimental to firm performance. In sum, for greater internationalization performance, managers should attempt to maintain their internationalization degree on the second (positive) stage, expand either slowly with thorough deliberation or speedily in pursuing time economy, and stabilize their expansion paces.

## 5.3. Limitations and Suggestions

Several limitations of this research are noted in our concluding remarks. Because our samples exclude firms that were merged/acquired, bankrupted, or delisted during the observation time frame, a survival bias may exist. In addition, the listed sample firms may constrain the generalizability of this study, especially in terms of their ages, large sizes and abundant resources. Future studies should extend their research interest to small and medium-sized enterprises.

We hypothesize the S-curve model as a general paradigm for all kinds of MNEs in this study. However, the emergence and prosperity of international new ventures have posed challenges to traditional internationalization theories such as the stage model (Johanson and Vahlne, 1977). The INVs are expected to possess the capabilities (Madsen and Servais, 1997) to bypass the first disadvantageous stage of internationalization. As a result, the performance implications of the degree of internationalization might be different for this particular type of firm and the applicability of the S-curve model may be limited. Future studies are suggested to investigate this issue. Finally, a measurement issue arises from our

proxy design of internationalization activities. Some researchers believed that export activity is an adequate indicator to measure the international involvement of firms in newly industrialized economies (Bartlett and Ghoshal, 1989). Researchers could reexamine the conclusions of this study by focusing on other facets of firm internationalization. Meanwhile, the focus on a single theoretical ground (i.e., organizational learning), which is different from the multi-theory rationales examined in this study could deepen academia's understanding of the internationalization-performance relationship.

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