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Full Length Research Paper

Internationalization, intangible assets and Taiwanese SMEs' performance: Evidence of an Asian newly-industrialized economy

Yu-Ching Chiao[1]* and Kuo-Pin Yang[2]

[1]Department of Business Administration, National Chung Hsing University, 250 Kuo-Kuang Rd., Taichung 402, Taiwan, R.O.C.

[2]Department of International Business, National Dong Hwa University, 1, Sec. 2, Da-Hsueh Rd., Hualien 974 Taiwan, R.O.C.

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This paper investigates the impact of internationalization and intangible assets on the performance of Small and Medium sized enterprises (SMEs) in newly industrialized economies (NIEs). Examining a sample of 3,194 Taiwanese SMEs, we find that: (1) the relationship between internationalization and performance is characterized by an inverted U-shaped curve; (2) SMEs investing more heavily in research and development achieve greater gains in profitability; and (3) though the hypothesized linear relationship between advertising and profitability is not confirmed, further analysis indicates a U-shaped curvilinearity between the two, suggesting that a minimum level of investment is required if advertising is to be effective.

Key words: Internationalization, intangible assets, performance, SMEs, NIE.

INTRODUCTION

The rapid globalization of markets has both heightened competition among firms and increased firms' operating risks. Under such circumstances, it is imperative that firms aggressively pursue foreign market opportunities and seek to learn from overseas operations. Earlier studies have revealed that multinational corporations (MNCs) pursue internationalization not simply as a means of exploiting their own strengths (Delios and Beamish, 1999; Morck and Yeung, 1991; Qian and Li, 2003), but also as a method of expanding and improving upon their existent capabilities (Buckley and Casson, 1976; Caves, 1996; Kotabe et al., 2002; Lu and Beamish, 2004). Additionally, scholars of international business and strategic management have continued to contribute to the development of internationalization strategies (Hitt et al., 1994; Lu and Beamish, 2001, 2004; Rugman and Verbeke, 2004).

For small and medium sized enterprises (SMEs), geographical expansion is a strategy critical to growth (Barringer and Greening, 1998). SMEs, just like large MNCs, first develop and accumulate firm specific advantages (FSAs) then transfer those FSAs into foreign markets so as to achieve higher profitability during their growth stages (Zahra et al., 2000). Indeed, Taiwanese SMEs, noted for their flexibility and efficiency, are often cited as the most sig-nificant element in Taiwan's so called economic miracle. However, due to the continual rise of operating expenses (see, for example, increases in wages, the price of land, and costs associated with environmental regulatory compliance), and the opening up of the domestic market (Taiwan's entry into the World Trade Organization), Taiwanese manufactures no longer enjoy cost advantages. In addition, a domestic market of limited size also makes it imperative that Taiwanese SMEs pursue international opportunities (Lu and Beamish, 2001; Oviatt and McDougall, 1994). For smaller firms, international expansion often proves tremendously challenging, because these firms often have fewer tangible/intangible resources than large MNCs (Knight and Kim, 2009). Although some studies have indicated that firms will likely benefit from foreign expansion (Hymer, 1976; Vernon, 1966), more recent research on the subject has pointed to problems and potentially threatening risks (Contractor et al., 2003; Hitt et al., 1997; Lu and Beamish, 2001, 2004; Mitchell et al., 1992). After reviewing the related studies of internationalization and firm performance for the

*Corresponding author. E-mail: chiaoy@dragon.nchu.edu.tw. Tel: 886-4-22852849. Fax: 886-4-22858040.

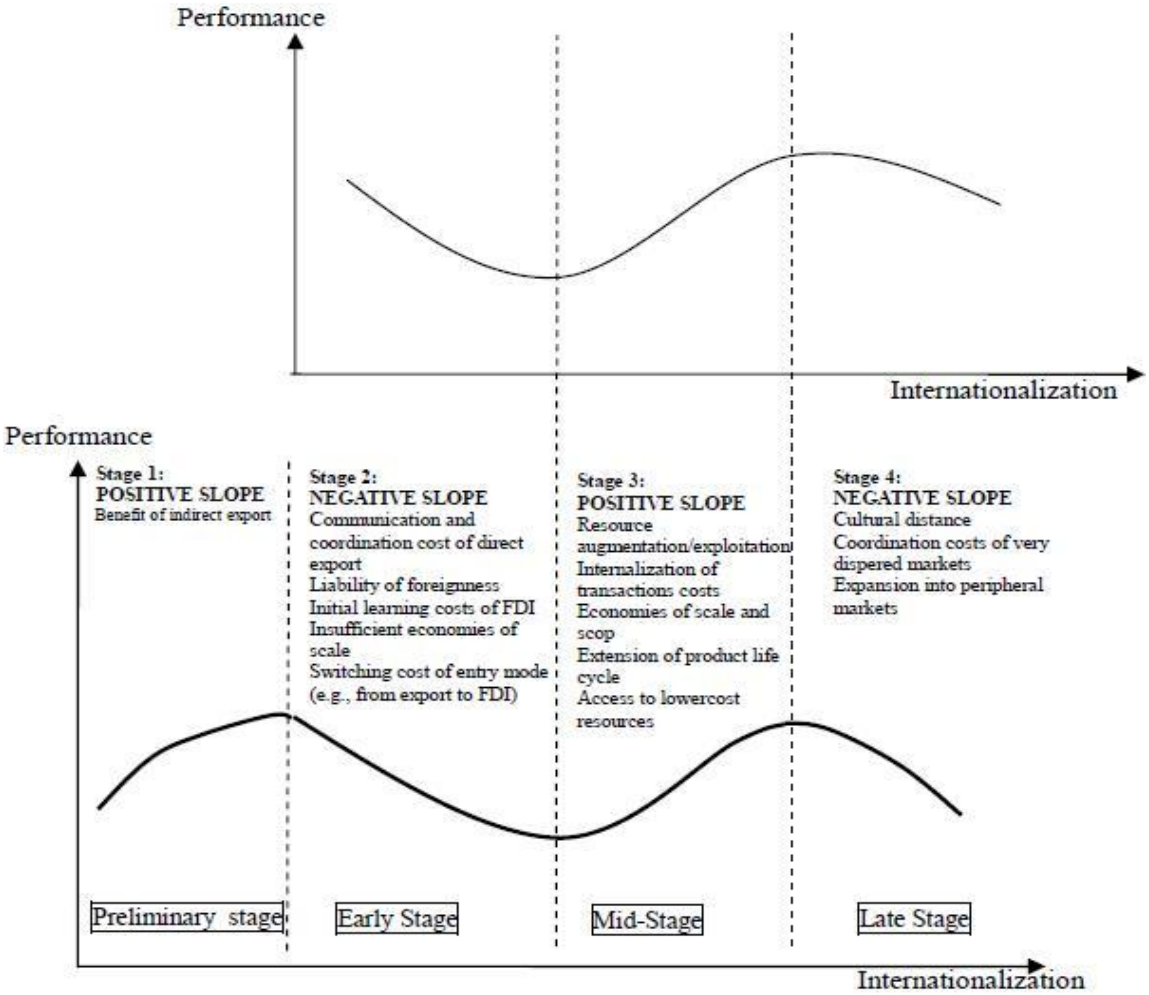

Figure 1. The whole picture of the relationship between internationalization and performance

past three decades, we do find the empirical findings are highly inconsistent. Once a sigmoid (S-shaped) picture proposed by some scholars (Contractor et al., 2003; Lu and Beamish, 2004; Bae et al., 2008), a three-stage theory (that is, the stage 2 to stage 4 in Figure 1) seems clearer to depict the relationship between internationalization and performance. However, the three-staged theory is argued the related benefits and cost in terms of foreign direct investment (FDI), it may be hard to explain for those smaller MNCs from newly-industrialized economies (NIEs) or emerging markets since they are still in the preliminary stage (that is, the stage 1 or from the stage 1 - 2) of export activities not FDI. Based on Contractor et al (2003) three-stage theory, we proposed the more completed picture (Figure 1) to explain the international behavior of SMEs in NIEs. That is, unlike the developed country MNCs, early internationalized SMEs in NIEs only cover the stage 1 and 2 which focused on indirect/direct export activities. Following this arguments, our first specific research question is to investigate the inverted U-shaped relationships between internationalization and SME performance.

Studies on the relationship between internationalization and firm performance have produced highly inconsistent conclusions. Some studies have found a positive association between the extent of a firm's internationalization and firm performance (Gaur and Kumar, 2009; Geringer et al., 1989; Grant et al., 1988; Hsu and Pereira, 2008; Kim et al., 1993; Pangarkar, 2008; Wolff and Pett, 2006;), while others have found this very same relationship to be characterized by a negative association (see, for example, Michel and Shaked, 1986; Siddharthan and Lall, 1982). Even some studies found internationalization doesn't affect firm's performance (see, for example, Morck and Yeung, 1991; Sledge, 2006). Delios and Beamish (1999: 724) made use of the resource based view as a means by which to interpret the relationship between internationalization and firm performance found a positive association between the two. Interestingly, however, Geringer et al. (2000) also making use of the resource based view came up with precisely the opposite result.

In fact, in examining the results of various studies, we identified non-liner relationships, U-shaped curves, inverted U-shaped curves, and S-shaped curves (Aulakh et al., 2000; Contractor et al., 2003; Contractor, Kuman, and Kundu, 2007; Gomes and Ramaswamy, 1999; Hitt et al., 1997; Johnson, Yin, and Tsai, 2009; Lu and Beamish, 2004; Qian, 2002; Qian and Li, 2003; Ruigrok and Wanger, 2003). It should be noted, however, that almost all of these studies focused on MNCs based in developed countries. To generalize the findings of these studies, then, it is necessary to examine the internationalization activities of SMEs and/or firms based in newly industrialized economies (NIEs).

There is no shortage of research examining the relationship between intangible assets[1] (such as R and D and advertising activities) and performance among firms in developed countries (Delios and Beamish, 1999; Geringer et al., 2000; Gomes and Ramaswamy, 1999; Hitt et al., 1997; Kotabe et al., 2002; Lu and Beamish, 2004; Ramírez-Alesón and Espitia-Escuer, 2001). We believe that intangible assets play the same role in SMEs, regardless of whether an SME makes its home in a developed country or an NIE. Because of the increasing importance of SMEs in the global market (Oviatt and McDougall, 1994), this study will examine the relationship between intangible assets and SME performance.

Recently, Lu and Beamish (2001) and Qian (2002) made use of SME samples[2] in developed countries (that is 164 Japanese firms and 71 US firms, respectively), but the characteristics of the SMEs they used were very similar to those of large sized firms[3]. Again, too, it is notable that the only samples examined were those from developed countries (Ramírez-Alesón and Espitia-Escuer, 2001). In contrast, the purpose of this study is to investigate the relationships among internationalization, intangible assets, and SME performance in Taiwan an NIE.

This study makes two specific contributions. First, utilizing a large database maintained by the National Statistical Bureau, R.O.C., this study investigates Taiwanese SMEs in an effort to validate its findings related to internationalization, intangible assets and performance. So far, most such findings have been developed as a result of the examination of MNCs. Second, it augments the current research on internationalization by including NIEs. As a large sample investigation based on SMEs in an Asian NIE, the study complements existing streams of research and helps to generalize the external validity of previous findings.

Following the introduction, the paper will review relevant theories and empirical findings to derive its research hypotheses. Next, the paper will move on to describe its samples and methodology. The statistical results of the study, and a discussion of the study's findings, are presented in the paper's fourth section. The paper's final section contains our concluding thoughts, a discussion of the study's limitations, and suggestions for future research.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Internationalization and performance

The effect of internationalization on firm performance has been examined by numerous researchers in the field of international business and strategic management (Aulakh et al., 2000; Contractor et al., 2003; Geringer et al., 1989; Geringer et al., 2000; Gomes and Ramaswamy, 1999; Hitt et al., 1997; Kotabe et al., 2002; Qian,, 2002; Qian and Li, 2003; Lu and Beamish, 2001, 2004; Ramírez-Alesón and Espitia-Escuer, 2001; Riahi-Belkaoui, 1998; Ruigrok and Wagner, 2003; Tallman and Li, 1996). While researchers in international business tend to use theories of foreign direct investment (FDI) or internalization to interpret international diversification, researchers in strategic management will often take a resource based view, utilize transaction cost economics, or draw upon organizational learning theory. We developed our research hypotheses by incorporating various aspects of these highly heterogeneous perspectives.

Benefits of internationalization

Typically, MNCs are highly capable of engaging in arbitrage, market segmentation, and price discrimination as they seek to improve performance by increasing their geographical presence in the global market. While pursuing new markets, MNCs can exploit both their global scanning capabilities and the distinct advantages and capabilities developed in their home markets (Vernon, 1966; Grant, 1987). Resource seeking MNCs may be able to access low cost materials and labor in host countries (Daniels and Bracker, 1989). They may also learn from operations in host countries, then transfer this knowledge into other marketplaces. In this way, internationalization may bring benefits and advantages to firms. For instance, firms may choose to expand into particular foreign markets to overcome imperfections in their native marketplace (Buckley and Casson, 1976). When market conditions at home are less than optimal, firms tend to exploit their intangible assets (that is advanced technology, patents, copyrights, reputation, learning experience, organizational capacities, and managerial capabilities) abroad. By stretching core competencies into international markets, firms are able to enhance their profitability.

With internationalization comes not simply increased profit, but also the necessity of effectively allocating and transferring resources throughout (sometimes complex) networks of headquarters and subsidiaries. Firms operating internationally that have managed to realize synergies or economies of scope (Grant et al., 1988) or scale (Hitt et al., 1997), or that possess the capability to innovate (Bartlett and Ghoshal, 1989), are often able to achieve higher profitability by sharing, integrating, and

coordinating key resources among headquarters and subsidiaries (Fladmoe-Lindquist and Tallman, 1994). MNCs that have learned and implemented efficacious and efficient methods of intra firm communication and resource sharing are typically able to rapidly amortize fixed costs and R and D expenditures among subsidiaries in different countries (Kogut, 1985).

Costs of internationalization

Internationalization is not without cost or risk. Indeed, compared with firms operating on an entirely local basis, firms operating in foreign markets face high uncertainty and great risk, such as differing consumer and supplier preferences, varying government regulations and policies, and liabilities of foreignness and newness (Mitchell et al., 1992). Moreover, international expansion may lead to problems within an organization itself. For example, increases in firm scale and the corresponding increases in firm complexity lead to higher monitoring costs than would be realized by firms serving domestic markets only (Geringer et al., 1989). In accordance with transaction cost economics, foreign direct investment results in higher expenses for firms, including increases in the costs of information, enforcement, bargaining, detection, delivery, transportation, production, monitoring, and so forth (Hennart, 1991). Internalization theory also argues that FDI results in higher communication costs, political risks, and administrative expenses (Buckley and Casson, 1976).

In sum, increases in communication costs typically result from sociocultural and geographic distance and market unfamiliarity, as such differences often generate misunderstandings. Moreover, political risks may emerge from murky ownership status or the hostility of host governments. Finally, managerial costs may be increased by the need to oversee plants and operations in several countries, and such costs may be further increased as a result of fluctuations in international currencies and exchange rates (Buckley and Casson, 1976). Thus, Buckley and Casson (1976) argued that firms should seek to put a cap on internationalization at the point at which marginal benefits become equal to marginal costs, implying that an optimal level of internationalization does exist, and that beyond this level, its costs may begin to outweigh its benefits.

Benefits and costs of exporting

Previous studies have examined the relationship between internationalization and firm performance mostly by examining FDI activities. Compared with European, US and Japanese MNCs, firms in developing countries or NIEs tend to be less internationally active, and those firms engaging in international activity are typically involved only with exports (that is, in the preliminary stage and early stage in Figure 1). Because the export of goods remains the major international activity of firms in developing countries or NIEs (and especially for SMEs), the next section will discuss the benefits and costs associated with the pursuit of exports.

Exporting SMEs are far more exposed to exchange rate risk than are MNCs, as SMEs' costs are in one currency, while their sales revenues are in another. This can lead to higher transaction costs especially for SMEs with limited financial resources given that exchange rates are volatile and futures foreign exchange markets do not exist for all currencies.

Export sales, however, especially to a variety of markets, generate several benefits to firms. First, by trading in multiple markets with multiple currencies, export diversification generally reduces firms' foreign exchange exposure (Dominguez and Sequeira, 1993). Second, firms can increase the scope of their market and achieve economies of scale for their products or services by focusing on similar customer segments in various countries. This advantage is of particular importance to Taiwanese SMEs, whose products often target niche markets. For such products, one country's market size is likely limited; targeting similar market segments in different countries can expand a firm's overall customer base. Third, as argued by the organizational learning theory (Ruigrok and Wagner, 2003) and the internationalization theory (Johanson and Vahlne, 1977), exporting firms can leverage their international experiences from one market to another, especially when a new market is economically and culturally similar to one with which a firm is familiar. Finally, because they must satisfy a broad range of customer needs, exporting firms tend to have a higher level of market sensitivity, which typically accelerates the development of new products and product innovations (Bartlett and Ghoshal, 1989). The discussion above suggests that exporting firms can stretch their competitive advantages and enhance their performance by targeting their products and services toward numerous foreign markets.

International expansion, of course, can be costly. As pointed out by Hitt et al. (1997), exporting firms face challenges of diversification similar to those faced by MNCs (Aulakh et al., 2000). Firms face rising costs during the initial stages of internationalization because of the 'liability of foreignness' (Buckley and Casson, 1976; Hymer, 1976), diseconomies of scale and scope, and problems caused by cultural distance. As the number of foreign markets served increases, so do the costs of cross border coordination and communication. The uncertainty associated with foreign operations, such as that of institutional deterrence, also increases operational and transactional costs (Mitchell et al., 1992). A higher degree of export diversification scatters firms' management resources throughout different markets, and may diminish the support received by distributors and agencies, thus lowering firm profitability. If firms do not properly adapt and

adjust during the expansion of their export operations, the complexities of management, and the costs associated with such complexities, may reduce the benefits of exporting.

In sum, firms in NIEs compared with European, US and Japanese firms are generally in the initial stages of internationalization, and engage primarily in activities related to exporting. In the initial stages, exporting has a positive effect on firm performance because firms typically pursue a strategy of incremental international expansion, first exporting to culturally similar markets, and gradually penetrating into countries of less cultural similarity. However, as firms start to export to more and more countries, the costs of operation and increased managerial complexities may reduce the benefits of internationali-zation. Accordingly, the impact of internationalization on firm performance is not linear; after a certain point, the impact may turn from positive to negative. Thus we propose the first hypothesis:

H_1: The relationship between the level of internationalization and performance for SMEs from newly industrialized economies is nonlinear, with the slope positive for low and moderate levels of internationalization but negative at high levels of internationalization.

Intangible assets and performance

According to the resource based view (RBV), a firm is a series of resource combinations and capabilities. Firms with resources that are unique, valuable, rare and inimitable may achieve sustainable competitive advantages (Barney, 1991). R&D investments lead firms to innovations, which then become part of firms' cache of core competencies. Therefore, firms that invest more in R&D will perform better than those that do not. In the competitive global environment, in which product life cycles grow shorter and shorter, firms can gain competitive advantages by using innovation as a strategy (Porter, 1990). The RBV holds that there is heterogeneity among firms and that it is the deployment of their unique resources that allows them to achieve sustainable competitive advantages and, in turn, higher levels of performance (Barney, 1991). Caves (1996) pointed out that in most industries, successful firms can claim at least one such asset. Using the term 'proprietary assets' to capture the above listed positive attributes, he suggested that 'intangible assets', 'firm specific assets', and 'monopolistic advantages' are all the same thing.

Caves (1996) further explained the essence of such proprietary assets, calling them the 'capabilities of product differentiation'. Many researchers, in studying internationalization, have followed this conceptualization of proprietary assets by exploring the performance implications of firm specific advantages (Anand and Delios, 2002; Delios and Beamish, 1999, 2001; Harzing, 2002; Kotabe et al., 2002; Lu and Beamish, 2004). In this study, we also follow Caves' notion of proprietary assets, adopting two often used measures to proxy the capability of product differentiation and innovation: that is advertising intensity and R&D intensity.

R&D intensity and performance

Innovative firms can gain higher returns either from product innovation or process innovation (Kotabe et al., 2002). Firms capable of developing new products can enhance differentiation strategies to gain higher returns, while firms possessing capabilities of process innovation can upgrade product quality or lower costs, in turn boosting revenues. Rugman and Verbeke (1992) contended that intangible assets, which are non-location bound, are easily transferred in the global market. Such assets can, with only a few adjustments, improve firms' operational efficiency. Consequently, innovativeness, as measured by R and D intensity, makes firms' operations more efficient (Hitt et al., 1994), and is positively associated with firm performance (Delios and Beamish, 1999; Kotabe et al., 2002).

Studies have found that technical assets, a type of intangible asset embedded in firms' capabilities, build core competency so that firms can compete with rivals in host markets (Caves, 1996). However, researchers have tended to pay more attention to US MNCs during the postwar period, or European firms investing in their colonies. With the globalization of the world market and the reduction of many barriers to entry, more SMEs, whether from developing countries or NIEs, are entering foreign markets.

Firms in NIEs can gain more advanced technological knowledge from developed countries based firms, then develop advantages in host countries through their own innovative, adaptive, and adjustive processes. For example, when firms from developing countries are operating in other developing countries, they may hold an interesting advantage over MNCs from developed countries. Not only will they hold the advantage of understanding (and presumably meeting) local needs, but they will likewise be able to provide technologies more appropriate to small scale productions (Lall, 1983).

When applying standardized technologies from developed countries to less developed countries, firms tend to focus on mature products by moving forward with product and process innovations (Aulakh et al., 2000). Since technologies in general are not bound by location (Anand and Delios, 2002; Rugman and Verbeke, 1992, 2004), firms can often exploit their technological capabilities by transferring them to several countries. In Taiwan, for example, smaller manufactures tended to engage more in process innovations, such as activities to increase productivity and quality at lower costs (MOEA, 2002). SMEs in NIEs have the ability to modify diffuse

technologies imported from developed countries to less developed countries. Similar findings emerged from Lall's (1983) study. We therefore propose that SMEs' R&D intensity is positively associated with firm performance.

H_2: For SMEs from newly industrialized economies, the relationship between R and D intensity and performance is positive.

Advertising intensity and performance

Firms' marketing efforts should stress product or service differentiation. By investing more in advertisements and promotions, firms can attract more customers and generate more sales. In the international context, exporting firms with strong brand names may achieve higher profitability by charging premium prices (Helsen et al., 1993). Firms may not only gain by focusing on customer needs in products and services, but also by using standardized marketing plans in different markets to achieve efficiency and improve bargaining power with distributors and agencies abroad (Levitt, 1983).

Downstream, or marketing, capabilities are regarded as an important set of capabilities within an organization (Hunt and Morgan, 1995); however, research has tended to pay less attention to the role of downstream capabilities (see, for example,, advertisement and distribution) (Anand and Delios 2002), and more to the role of upstream activities (R&D) (Caves, 1996: 9 - 11). However, as internationalization marches on, downstream capabilities are becoming more and more important to firms (Morck and Yeung, 1991).

The applicability of firms' methods of marketing (brands or marketing mix) abroad tends to be limited, with the most successful international marketing occurring among countries of cultural and economic similarity. In contrast with technological capabilities, marketing capabilities are far more location bound, and are not easily transferred abroad. One reason this is true is that customers in different countries have different needs, and understanding such needs requires prolonged interaction. Another reason may be that marketing capabilities such as dealing with local vendors, maintaining distribution networks, and designing promotional campaigns are path dependent. In this respect, when operating in less developed countries, firms from NIEs or less developed countries may have some edge over MNCs, because the MNCs will likely be operating from a greater cultural and/or economic distance. Firms from developing countries have specific marketing and managerial capabilities designed to serve customers in similar environments, including in other less developed countries (Lall, 1983).

In some cases, firms in developing countries can develop differentiated products capable of competing with MNCs' well known brand names. A successful marketing strategy, especially in developing countries, requires not only skillful and well planned promotional strategies, but also frequent interaction with local consumers. Exporting firms from developing countries often develop and keep good long term relationships with local buyers. This enables such firms to rapidly improve and upgrade their marketing advantages, and to identify new customers through established relationships. We therefore suggest that investment in advertising can effectively project NIE based SMEs' marketable assets, and predict that the intensity of advertisement is positively associated with performance.

H_3: For SMEs based in newly industrialized economies, the relationship between advertising intensity and performance is positive.

RESEARCH METHOD

Data and sample

Since most empirical studies have explored the relationship between internationalization and MNC performance, or have examined the successes (or failures) of large firms in developed countries such as the UK (Grant, 1987, Grant et al., 1988), Spain (Ramírez-Alesón and Espitia-Escuer, 2001), the U.S. (Hitt et al., 1997; Kotabe et al., 2002; Qian 2002; Qian and Li, 2003), and Japan (Delios and Beamish, 1999, 2001; Lu and Beamish, 2001; 2004), this study has made SMEs in NIEs the object of its study. Taiwanese SMEs, which account for more than 99% of all firms in Taiwan, and are noted for their performance in international markets, were selected for examination. The samples in the database, maintained by the Taiwanese National Statistics Bureau, were selected from a nation wide survey taken in 1996. To ensure accuracy of representation and credibility, the survey was very carefully planned and executed.

The database contains 8,622 firms, comprised of 7,659 SMEs and 963 large enterprises. The high proportion of SMEs indicates the paramount role that SMEs play in Taiwan. In accordance with the official definition, firms with fewer than 200 employees were categorized as SMEs. This fairly strict definition limits comparison with other studies, in which SMEs are generally classified as firms having fewer than 500 employees. Indeed, this classification is the one used by America's Small Business Administration (SBA).

Based on Taiwan's standard industrial classification (SIC) system, we grouped the samples into five industrial groups: textile, chemical, rubber and plastic, machinery and equipment, and electronics. Among the 3,280 firms within the five industrial groups, 86 firms were not used owing to missing data or the exhibition of outlier characteristics, leaving 3,194 firms for use in our analyses.

Variables and measurements

Performance

The dependent variable in this study was firm performance. Previous research has employed different approaches to measuring firm performance, such as returns on assets (ROA) (Delios and Beamish, 1999; Gomes and Ramaswamy, 1999; Lu and Beamish, 2004; Hitt et al., 1997; Qian and Li, 2003), returns on sales (ROS) (Contractor et al., 2003; Geringer et al., 2000; Tallman and Li, 1996), returns on equity (ROE) (Grant, 1987; Qian and Li, 2003; Wan, 1998), sales growth (Geringer et al., 2000; Kim et al., 1989, Qian and Li, 2003), Tobin's q (Lu and Beamish, 2004; Morck and Yeung, 1991; Ramírez-Alesón and Espitia-Escuer, 2001), and returns on stock price. Different measurements capture different dimensions of firm

performance, and each has its own advantages and disadvantages. Geringer et al. (1989) proposed a compelling argument in favor of sales-based measures in international studies, because such measures act to neutralize the effects of differential measures of asset valuation. They suggested that depreciation adjusts asset values differentially, depending on the date of the investment and on accounting rules. This is particularly relevant to international companies, which face a variety of accounting rules and the performance of which may be significantly affected by the possible use of historical exchange rates. As sales and profits are both reported at current rates, reflecting current operations, we finally have chosen ROS as our measure of performance.

Internationalization

It has been argued that the metric by which internationalization is measured should reflect the relative size and strategic importance of domestic and overseas operations (Grant, 1987). Researchers have measured internationalization in terms of ratio of foreign sales to total sales (see, for example, Geringer et al., 2000; Qian and Li, 2003; Ruigrok and Wagner, 2003), ratio of foreign assets to total assets (see, for example, Daniels and Bracker, 1989), number of foreign subsidiaries (see, for example, Tallman and Li, 1996), number of overseas employees to total employees (Kim et al., 1989), amount of FDI (Delios and Beamish, 1999), and an entropy index weighted by foreign sales (Kim et al., 1993; Hitt et al., 1997; Wan, 1998). Gomes and Ramaswamy (1999) argued that each measure captures a different level and degree of internationalization. More recently, in studying Japanese MNCs, Geringer et al. (2000) used the ratio of export sales to total sales as a proxy of internationalization; they did so for the reason that Japanese multinational firms most often prefer a home based exporting strategy (Bartlett and Ghoshal, 1989). In studying SMEs' internationalization, Dhanaraj and Beamish (2003) also employed the ratio of export sales to total sales as a means by which to capture the degree of internationalization. Aulakh et al. (2000) also indicated that firms from NIEs such as South Korea, Taiwan, and Singapore are moving away from inward oriented import substitution policies toward outward oriented, export led growth. Based on the incremental processes of internationalization (Johanson and Vahlne, 1977), Bartlett and Ghoshal (1989) argued that if a firm's degree of internationalization is to be accurately measured, researchers must take into account the stage of internationalization in which the firm finds itself at the time it is being studied. Because the firms in less developed countries or NIEs are usually only in the initial stages of internationalization, the ratio of foreign sales to total sales, a commonly used measure of internationalization for MNCs, may not be appropriate for these firms. The majority of firms in our study was SMEs, and tended to serve foreign customers by means of exporting. Therefore, export intensity (i.e. the ratio of export sales to total sales, ESR) was an appropriate proxy of internationalization.

Intangible assets

R&D intensity and advertising intensity, very much accepted in the literature as measures of intangible assets (Caves, 1996; Delios and Beamish, 1999; Lu and Beamish, 2004; Morck and Yeung, 1991; Qian and Li, 2003), were used in this study. R&D intensity was derived according to the ratio of annual expenditures on R&D to revenues, and advertising intensity was derived according to the ratio of annual expenditures on advertising to revenues.

Control variables

In accordance with existing studies (Delios and Beamish, 1999; Geringer et al., 2000; Grant et al., 1988; Hitt et al., 1997; Lu and Beamish, 2004; Tallman and Li, 1996; Qian and Li, 2003), we included firm size and debt ratio as control variables. Firm size was measured as a logarithmic function of the number of total employees, and debt ratio was measured by total debts to total assets. Earlier research has also indicated that industry structure is one of the most important factors in explaining firms' performance (Schmalensee, 1985). Accordingly, industry dummies, with the machinery and equipment industry as the base, were used to capture the industry effect.

Data were analyzed using OLS regressions. We first showed the descriptive statistics and correlation matrix. Finally, we tested our hypotheses by hierarchical regression analysis.

EMPIRICAL RESULTS

The descriptive statistics and correlation coefficients are reported in Table 1. As can be discerned from the Table, the low inter-correlations among the variables do not suggest multicollinearity, with the exception of the squared term. We are therefore assured that the regression estimates were not expunged by the presence of collinearity. We also present the ANOVA analysis to understand the comparisons among five different industries. As shown in Table 2, all of the variables such as firm's performance (ROS), internationalization, and other control variables did reach significantly differences among five industries.

We report the hierarchical regression results in Table 3. Model 1 is the baseline model that includes only control variables. As expected, internationalization has a significantly positive effect ($t = 2.501$, $p < 0.05$) on performance, while its squared term has a significantly negative effect ($t = -2.671$, $p < 0.01$). Thus, Hypothesis 1, the inverted U-shaped relationship between internationalization and performance, is supported. Hypotheses 2 and 3 predict that intangible assets have a positive impact on performance. As the findings indicate, R&D intensity exerts a significantly positive influence on performance ($t = 2.962$, $p < 0.01$); however, advertising intensity does not appear to have a significant effect on performance ($t = 0.136$, $p > 0.1$). It is evident, then, that Hypothesis 2 is supported, while Hypothesis 3 is not.

Trying to explore post hoc insights on interaction between variables, we further conducted hierarchical regression analyses to evaluate the influence of interaction terms on model fit. It was observed that the R^2 for model including interaction terms (that is, the interaction term of internationalization and R&D intensity and the interaction term of internationalization and advertising intensity) were statistically insignificant, suggesting that adding interaction terms to the regression model may be against the principle of parsimony (see Hair et al., 1998). Furthermore, even though we added the interaction terms separately in turn into the model, none of the R^2 appeared significant at P-value of 0.05. Again, the results suggest that none of the interaction terms have significant impact on the simple model.

Table 1. Descriptive statistics and correlations (n = 3.194).

Variables	Mean	S.D.	1	2	3	4	5	6	7	8
1.ROS	0.0254	0.0942								
2.Firm size[a]	1.3936	0.5075	0.034							
3.Debt ratio	0.5196	0.3139	-0.324**	0.256**						
4.Internationalization	0.2454	0.3523	-0.022	0.332**	0.150**					
5.(Internationalization) ^{2}	0.1843	0.3238	-0.036*	0.265**	0.128**	0.968**				
6.R and D intensity	0.0026	0.0097	0.088**	0.235**	-0.008	0.109**	0.075**			
7.(R and D intensity) ^{2}	0.0001	0.0006	0.073**	0.149**	0.069**	0.046**	0.905**			
8.Advertising intensity	0.0037	0.0010	0.019	0.053**	0.53**	0.004	-0.005	0.087**	0.052**	
9.(Advertising intensity) ^{2}	0.0001	0.0007	0.043*	0.025	0.025	-0.031	-0.027	0.049**	0.021	0.909**

[a] Firm size = Log of number of employees; 2. *Significance level p < 0.05; **Significance level p < 0.01.

Table 2. ANOVA analysis in different industries.

	ROS	Firm size	Debt ratio	Internationalization	R&D intensity	Advertising intensity	N (%)
Textile	0.018	46	0.556	0.241	0.0010	0.0021	609 (19.1)
Chemicals	0.044	48	0.511	0.161	0.0047	0.0054	420 (13.1)
Rubber and plastic	0.019	42	0.511	0.205	0.0010	0.0024	599 (18.8)
Machinery and equipment	0.030	33	0.489	0.219	0.0018	0.0045	740 (23.2)
Electreical and electronics	0.022	52	0.531	0.344	0.0048	0.0042	826 (25.9)
Average	0.025	44	0.520	0.245	0.0026	0.0038	3,194
F-value	6.78***	18.21***	4.22**	26.01***	25.79***	11.25***	
Post Hoc multiple comparisons of Scheffe test	2>1***	1>4***	1>4**	5>1>2**	2>1***	2>1***	
	2>3***	2>4***		5>3***	2>3***	2>3***	
	2>5***	5>3>4**		5>4***	2>4***	4>1***	
					5>1***	4>3***	
					5>3***	5>3***	
					5>4***	5>3**	

Note = 1. **p < 0.05, ***p < 0.01.

DISCUSSION

Performance and Internationalization

Our study points out the existence of a non-linear relationship between internationalization and firm performance in Taiwanese SMEs. This finding is consistent with the results of numerous earlier studies, including studies of firms in emerging economies (Aulakh et al., 2000), and US SMEs (Qian, 2002). By examining 3,194 Taiwanese SMEs, we find that the relationship between internationalization and performance may be characterized as one of inverted U-shaped curvilinearity. This finding further supports the external validity of

Table 3. Hierarchical regressions of return of sales (ROS) on internationalization and intangible assets (n = 3,194).

	Model 1		Model 2		Model 3	
Independent variable	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Intercept	0.052	9.737***	0.054	9.966***	0.056	10.257***
Firm size	0.023 (1.094)	7.292***	0.019 (1.318)	5.503***	0.020 (1.340)	5.512***
Debt ratio	-0.106 (1.074)	-20.602***	-0.105 (1.085)	-20.364***	-0.104 (1.090)	-20.197***
Textile	-0.008 (1.489)	-1.728*	-0.007 (1.511)	-1.356	-0.008 (1.528)	-1.685*
Chemicals	0.013 (1.373)	2.378**	0.012 (1.390)	2.132**	0.010 (1.419)	1.743*
Rubber and plastic	-0.011 (1.474)	-2.275**	-0.009 (1.495)	-1.921*	-0.011 (1.508)	-2.213**
Electrical and electronics	-0.008 (1.605)	-1.866*	-0.009 (1.627)	-1.965*	-0.009 (1.629)	-2.030**
Internationalization			0.046 (17.684)	2.501**	0.053 (17.891)	2.826**
Internationalization^2			-0.053 (16.886)	-2.671***	-0.059 (17.049)	-2.969**
R&D intensity			0.501 (1.101)	2.962***	0.377 (6.100)	0.948
R&D intensity^2			0.021 (1.021)	0.136	-1.084 (6.055)	-2.836**
Advertising intensity					2.585 (5.765)	0.423
Advertising intensity^2					17.283 (6.016)	3.182***
F-value	76.645***		47.894***		40.875***	
Adjusted R^2	0.124		0.128		0.130	
≥Adjusted R^2			0.004**		0.002***	

The machinery and equipment industry was the control group in the industry dummy variable. Numbers in parentheses are variance inflation factors. *Significance level < 0.1; ** Significance level < 0.05; ***Significance level < 0.01.

external validity of the relationship. However, it should be cautious to generalize our findings to others, perhaps firms in the early stage of internationalization, SMEs, or firms in emerging economies have better application.

We used the ratio of export sales to total sales (ESR) as a proxy for internationalization. We then partially differentiated ESR to get the critical point of 44.81%, which reflects the optimal relationship between internationali-zation and performance. In order to get a robust result, we divided the samples into two groups: those higher and those lower than 44.81%. Table 4 shows that when the other variables remain constant, internationalization is

Table 4. Results of robust analysis of the curvilinear relationship between internationalization and ROS.

	Subgroup 1		Subgroup 2	
Independent variables	**Coefficient**	**t-statistics**	**Coefficient**	**t-statistics**
Intercept	0.051	9.49***	0.097	4.942***
Firm size	0.019	4.664***	0.020	2.598***
Debt ratio	-0.102	-17.359***	-0.115	-10.199***
Internationalization	0.029	1.670*	-0.049	-3.000***
R&D intensity	0.826	1.586	0.123	0.210
Advertising intensity	-1.022	-2.262**	-1.265	-1.757*
Internationalization^2	-5.336	-0.653	8.513	0.339
Advertising intensity^2	17.197	2.779***	21.629	1.690*
F-value	47.532***		20.090***	
Adjusted R^2	0.120		0.141	

Subgroup 1 is low internationalization with sample size = 2,382; subgroup 2 is high internationalization with sample size = 812. Dummy variables for industry were included but not reported. *Significance level < 0.1; ** Significance level < 0.05; ***Significance level<0.01

positively associated with firm performance (t = 1.67, p < 0.10) in subgroup 1 (that is the less internationalized group), whereas internationalization is negatively associated with firm performance (t = -3.00, p < 0.01) in subgroup 2 (that is, the more internationalized group). In other words, when the degree of internationalization surpasses 44.81%, performance begins to decline. That is, beyond 44.81%, the marginal costs of internationalization surpass the marginal benefits, leading to a negative impact on performance. The implication of this non-liner relationship is that internationalization does benefit firms, but that a 'ceiling' exists, above which internationalization ceases to positively affect firm performance. Hence, when managers choose to engage their firms in international activities, they need to carefully examine and monitor their overseas expansion. Managers may also work to continuously refine and improve their international management capabilities as the firm moves along the path to internationalization.

To our knowledge, there is so limited an amount of empirical evidence regarding optimal levels of internationalization. Gomes and Ramaswamy (1999) argued that most of studies did not rigorously examine the curvilinear relationship, except Hitt et al. (1997). We furthermore estimated the optimal composed by Hitt et al. (1997) by the same method we employed in this study, and found that the critical point for the sample in terms of medium and large companies is 55%. Because there is so limited an amount of empirical evidence regarding optimal levels of internationalization, we are only to conjecture so far. This unsolved puzzle could be a direction for future research. About the implications of the critical point for SMEs' internationalization, our findings only suggest that an SME should not stray too for from that optimal point. We are in no position to suggest what, precisely, an SME should do as they approach that optimal point. We also leave this issue for future research.

The internationalization process perspective holds that when firms begin to internationalize, they do so with little involvement and low commitment; thus exporting is usually the mode by which they begin to serve foreign clients (Johanson and Vahlne, 1977). The incremental process implies that SMEs, with limited international experience and few commitments in foreign markets will typically start with exports, only moving to foreign production later on. Compared with MNCs from developed countries, which often have many plants abroad, most Taiwanese SMEs are still exporting to foreign markets. Thus, it is more reasonable to use export activity as a measure of internationalization than it is to use FDI. The expansion of export activities, of course, has its costs. SMEs will undoubtedly face rising costs as they become more involved in foreign markets; such involvement forces engagement with a far more expansive network of distributors and agencies. Therefore, a relationship characterized by inverted U-shaped curvilinearity makes sense in the context of SMEs.

Performance and R&D intensity

The R&D orientation of small businesses in Taiwan has been described as 'grass roots' (Shieh, 1992), meaning that Taiwanese SMEs have directed their R and D efforts toward increasing productivity and raising quality while lowering costs. It is quite common, for instance, for Taiwanese companies to adopt practices such as quality control circles; such practices generally involve group learning and an effort at continuous improvement (Chen, 1999). These practices also fit neatly into the notion of 'process innovation' (Utterback and Abernathy, 1975). Compared with 'product innovation' (which is generally regarded as a Western style of innovation), process innovation is thought to encourage such beneficial results as cost reduction, expanded production capacity, improved quality, and among other benefits, the development

of standard operating procedures. Moreover, in considering SME export strategies, Namiki (1988) indicated that even SMEs with a relatively narrow resource base could garner sustainable competitive advantages through strong technology and product innovations. Even relatively small firms and newly established firms have the capacity for R&D, and may therefore reap the performance benefits of R&D. Still, Taiwanese firms tend to engage in activities related to process innovation. Owing to the higher risks associated with product innovation, SMEs would rather improve their manufacturing processes to obtain more immediate profits.

Since we argued our samples are early internationalized SMEs in only cover the Stages 1 and 2 (Figure 1) which focused on indirect/direct export activities, the R&D locations of these SMEs were most focused on home country. Unlike those large MNCs which in the Stage 4 may have their R&D organizations go internationalization with different types (Gassmann and Zedtwitz, 1999; Zedtwitz and Gassmann, 2002), it should be cautious to generalize the findings of this study to different stages of firms' internationalization which have different types of R&D internationalization.

Further exploration of the relationship between advertising intensity and performance

Employing large sized MNCs as samples, some studies (Jung, 1991, Morck and Yeung, 1991), have found support for the positive relationship between advertising intensity and performance; this relationship is not supported by our research. Some recent empirical studies on the subject have also been inconclusive. While some researchers found that advertising intensity has a negative impact on a subsidiary's performance (Delios and Beamish, 2001), others found that marketing efforts have no significant influence on performance one way or the other (Delios and Beamish, 1999; Qian and Li, 2003). Given these very mixed results, it is our intention to discuss the effect of advertising intensity on the performance of Taiwanese SMEs from the firm perspective.

The notion of economies of scale, as it applies to marketing investment, implies that one or two advertisements won't stimulate consumers to action; rather, it takes time for word to spread among consumers (Scherer, 1980). Additionally, foreign firms must to adapt to different cultural and socio-economic environments in host countries (Beamish, 1988), and must adapt to meet the new set of preferences prevalent among customers and suppliers (Abrahamson and Fombrun, 1994). Delios and Beamish (2001) argued that this sort of adaptation is especially critical and difficult when it comes to marketing. Though both technical and marketing capabilities are transferable, the complexities of transferring marketing capabilities are far greater than those associated with technical capabilities. Compared with technical capabilities, marketing capabilities (brands and selling ability) tend to be very much limited by location (and, implicitly, culture) (Anand and Delios, 2002). One reason this is so may be that far more consumer-producer interactions are required for marketing to function properly that is, marketing capabilities are highly path-dependant. Technologic or operating functions, on the other hand, are hardly dependent on the consumers of a given geographic region. Also, different marketing capabilities are transferable to different extents. For example, owing to their intangible nature, brand names are difficult to successfully transfer (Anand and Delios, 2002). Moreover, brands and marketing channels are often embedded within the local cultural and economic background, making adaptation and transfer complicated, not to say impossible (Dierickx and Cool, 1989). Similarly, Rugman and Verbeke (1992) argued that advertising investment is location bound. Based on the above arguments, then, and taking into account the low advertising intensity of our sample (the advertising intensity was 0.37%, far lower than the prevailing levels among US and Japanese firms), we have concluded that the investments in advertising by Taiwanese SMEs in general may not reach the threshold at which benefits begin to be realized.

As demonstrated by Model 3 in Table 3, advertising intensity is negatively associated with firm performance ($t = -2.836$, $p < 0.05$), while the squared term of advertising intensity is positively associated with firm performance ($t = 3.182$, $p < 0.01$), thereby demonstrating the curvilinear effect of advertising intensity on firm performance. That is, before reaching the critical point (3%, as shown in Figure 2), the impact of advertising intensity on performance is negative; however, the impact on performance becomes positive beyond the critical point. When the other variables are held constant, investment in advertisement by Taiwanese SMEs has a positive effect once the advertising intensity passes the threshold of 6.27%.

We further analyzed the relationship between advertising intensity and performance by dividing the total sample into two groups, according to whether they fell above or below the threshold of the critical point (i.e. the low advertising subgroup, with 3,113 firms, and the high advertising subgroup, with 81 firms). Table 5 shows the robustness of the results. We found that advertising intensity has a significantly negative ($t = -2.440$, $p < 0.05$) effect on performance in the low advertising subgroup, and a significantly positive effect ($t = 1.815$, $p < 0.10$) in the high advertising subgroup. Thus, the U-shaped curviliearity between advertising intensity and performance is again supported.

Our findings suggest that, when allocating resources among marketing activities, firms must bear in mind that investments in advertising do not result in immediate profit; rather, such marketing efforts require time and commit-ment before their benefits become manifest (Anand and Delios, 2002). The competitive strength of Taiwanese SMEs is largely based on highly refined manufacturing capabilities. For this reason, managers of Taiwanese SMEs must carefully consider whether, and when they wish to

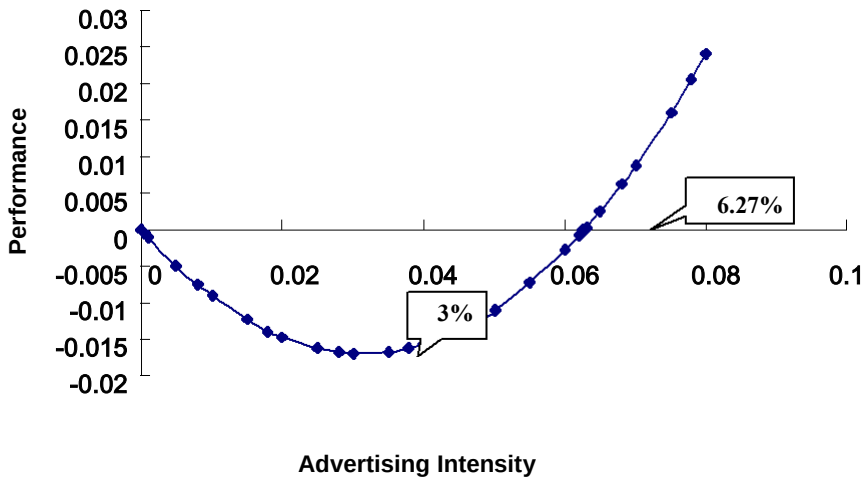

Figure 2. The relationship between Advertising intensity and performance.

Table 5. Results of robust analysis of the curvilinear relationship between advertising intensity and ROS.

Independent variable	Subgroup (1)		Subgroup (2)	
	Coefficient	t-statistic	coefficient	t-statistic
Intercept	0.056	10.270***	0.052	0.641
Firm size	0.020	5.596***	0.005	0.141
Debt ratio	-0.103	-20.032***	-0.205	-3.380**
Internationalization	0.049	2.648**	0.221	1.132
Internationalization squared	-0.056	-2.848**	-0.150	-0.686
R&D intensity	0.594	3.515***	-1.295	-0.866
Advertising intensity	-0.893	-2.440**	1.462	1.815*
F-value	47.555***		2.413**	
Adjusted R^2	0.130		0.150	

Subgroup (1) is low advertising intensity with sample size = 3,133; subgroup (2) is high advertising intensity with sample size = 81. Dummy variables for industry were included but not reported. *Significance level < 0.1; ** Significance level < 0.05; ***Significance level < 0.01.

when, they wish to extend their cost based advantages into differentiation based advantages such as those sought through advertisement. Due to the investment threshold associated with advertising, SMEs would be well advised to stay focused on cost cutting activities as a means to boost profitability if investment in advertising will likely be unsustainable. Because most Taiwanese SMEs chose to invest very limited resources in advertising (the average advertising intensity was 0.37% in our study), it seems that they may already be fully aware of the challenges associated with advertising.

CONCLUSION AND SUGGESTION

Studies in international business have placed great emphasis on understanding the relationships among internationalization, intangible assets and firm performance (Freel and Robson, 2004; Lu and Beamish, 2004; Qian and Li, 2003; Rugman and Verbeke, 2004; Woff and Pett, 2006). Recently, small and medium sized enterprises have been receiving increased attention as the subjects of research (Freel and Robson, 2004; Lu and Beamish, 2001; Qian, 2002; Qian and Li, 2003; Woff and Pett, 2006) especially those firms in Asian countries or NIEs (Makino et al., 2002).

Examining a sample of 3,194 Taiwanese SMEs, we find that: (1) the relationship between internationalization and performance is characterized by an inverted U-shaped curve; (2) SMEs investing more heavily in research and development achieve greater gains in profitability; and (3) though the hypothesized linear relationship between advertising and profitability is not confirmed, further analysis indicates a U-shaped curvilinearity between the two, suggesting that a minimum level of investment is required for advertising to be effective. In light of the lack of

empirical evidence on the internationalization of SMEs from newly industrialized economies, this study aimed to contribute to the research on internationalization and on investment in intangible assets by examining a sample of 3,194 Taiwanese SMEs. To shed some light on this very broad issue, this study departed from existing research in several ways. First, our sample contained more than 3,000 SMEs, a size rarely seen in studies on the internationalization of SMEs. Second, studies focusing on either NIEs or SMEs are quite common, but studies on SMEs in NIEs are few and far between. Third, we not only examined the effects of internationalization and intangible assets on firm performance, but we also explored the U-shaped relationship between advertising intensity and firm performance. Finally, we simultaneously derived optimal levels and threshold values for internationalization and advertising intensity, respectively, for Taiwanese SMEs. These derivations had some quite interesting and useful implications, with regards to internationalization strategies and advertising policies.

Though we pursued our research in as rigorously scientific a manner as was possible, readers should be aware of several limitations. With regards to the generalizability of our findings in terms of 3,194 Taiwanese SMEs in year 1996, it should be noted that this study limited itself to the distinctive context of a newly industrialized economy, and to SMEs. Taiwanese SMEs may not accurately represent their counterparts in other developing countries because of Taiwan's highly export-oriented island economy. In situations such as this, researchers (Delios and Beamish, 1999; Gomes and Ramaswamy, 1999; Lu and Beamish, 2001, 2004; Ramírez-Alesón and Espitia-Escuer, 2001) have generally suggested that evidence also be gathered from other countries. Caution should also be exercised in interpreting the relationships among variables, and in particular, readers should understand that the optimal levels and threshold values derived in this study may not hold in contexts other than Taiwan. Furthermore, different industries may have different internationalization track on their performance implication (Chiao et al., 2006), it should be caution to generalize this findings to different industries.

Several research directions can be proposed from our research findings. International expansion is a way to exploit competitive advantages. Therefore, the causal relationship might be expressed as: 'capabilities (advantages), internationalization, and then performance.' However, some researchers (Dess et al., 1995; Hitt et al., 1994) have argued that firms acquire advantages only after engaging in internationalization. The possibility of such causality should be investigated by means of time series data. In addition, the antecedent variables related to internationalization should be discussed in future studies. For example, networking linkages may affect firms' internationalization (Johanson and Mattson, 1988; Chen and Chen, 1998). Furthermore, we did not address the
moderating effect of intangible assets on firm performance, a relationship recently pointed out by researchers (Kotabe et al., 2002; Lu and Beamish, 2004). Hence, the interaction effect of intangible assets and internationalization on performance should also be addressed. Moreover, the inverted U-shaped curvilinearity is generally supported by researchers (Aulakh et al., 2000; Gomes and Ramaswamy, 1999; Hitt et al., 1997; Qian, 2002), but some studies have found more complex relationships, such as U-shaped (Ruigrok and Wagner, 2003) and S-shaped (Contractor et al., 2003; Lu and Beamish, 2004).

Therefore, future studies should analyse the relationship between internationalization and performance in greater detail. Finally, the average size of Taiwanese SMEs in our study (i.e. 44 employees) was much smaller than the SME samples typical of other studies. In Lu and Beamish's Japan based study (2001), for instance, the average SME size was 321 employees. Hence, comparison of the behaviours of SMEs in other countries, and with more similar definitions, deserves investigation. The lack of empirical evidence regarding issues of internationalization related to SMEs does not imply a lack of importance. Some researchers (Daniels and Bracker, 1989: 53) have indeed understood this lack as a research limitation; most, however, have taken it as an indication of the need for future research in this direction (Delios and Beamish, 1999: 723; Gomes and Ramaswamy, 1999: 185). Lu and Beamish (2001) mentioned that that it is difficult to find public data on large sample sizes of SMEs. Therefore, Lu and Beamish (2001: 582) suggested that using smaller or micro-sized firms to examine the relationship between internationalization and performance would be a worthwhile endeavor for researchers. We hope that this study has measured up to their standards.

Finally, among the very mixed results of the relationship between advertising intensity and firm's performance in previous studies, sample firms in different stage of internationalization maybe a critical issue. In Delios and Beamish's (1999) Japan-based study, the average advertising intensity is 1.1%; and in Kotabe et al. (2002) US-based study, the average advertising is 2.5%. However, the average advertising intensity of our SMEs sample is only 0.37%, which is much lower than those MNCs of developed countries. Therefore, it deserves to continuously explore this issue since our sample firms may grow up and in the later stage of internationalization and further involve more in advertising activities after one decade later.

Notes

Kotabel et al. (2002) indicated that previous studies took intangible assets as control variables.

Lu and Beamish (2001) and Qian (2002) defined SMEs as employee less than 500.

For example, in the studies used Japanese firms as samples, the R&D intensity and advertising intensity in SMEs, which were 1.4 and 2.4% respectively (Lu and Beamish, 2001), were similar with those in large sized firms, which were 2.4 and 1.1%, respectively (Delios and Beamish,1999); in the studies used US firms as samples, the R and D intensity and advertising intensity in SMEs, which were 7.15 and 3.1%

respectively (Qian, 2002), were similar with those in large sized firms, which were 5.1 and 2.5%, respectively (Kotabe et al., 2002). Whereas the R& D and advertising intensities in our study, 3,194 Taiwanese SMEs, are 0.26 and 0.37% respectively, makes a big difference with the previous samples of developed countries.

To assure the appropriateness of the questionnaire, the Statistics Bureau conducted two pre-interviews. Two hundred and fifty companies in Taipei were chosen as pre-interview targets to validate the content, terminology, definitions, and applicability of the questionnaire. After the initial revision, a second pre-interview was held simultaneously in eight cities in Taiwan, covering 1,200 SMEs, to finalize the content of the questionnaire and the procedures of the survey. The sampling procedure was based on a stratified sampling plan, which computed required sample sizes by industries and then allotted to each city and county. The firms chosen for each city and county were selected at random.

The criterion for defining SMEs varies among countries. For example, the Netherlands defines SMEs as firms with fewer than 100 employees, and Belgium's definition of SMEs is even more strict fewer than fifty employees.

Among the original 22 industries, we deleted some industries if there was only one firm in the industry, no firms engaging in international activity, and so on. Finally, we left 8 industries; namely (1) textile mill products; (2) apparel and accessories manufacturing; (3) chemicals manufacturing; (4) chemical products manufacturing; (5) rubber products manufacturing; (6) plastic products manufacturing; (7) machinery and equipment, and manufacturing and repairing; (8) electrical and electronic, and machinery manufacturing and repairing. However, since some industries have similar characteristics, we combined some industries into five groups, in terms of firm size, debt ratio, and so on by using t-test.

Observations that have values of ROS beyond –1 or 1, or advertising intensity/R&D intensity higher than 0.3 were regarded as outliers and were excluded from analyses.

∂ firm performance/ ∂ ESR = 0, $\Rightarrow$ 0.118ESR-0.121ESR^2 = 0, $\Rightarrow$ESR = 44.81% (Model 2,Table 3).

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