

**Internationalization Revisited:
Distinguishing between the Internationalization of Inputs and Outputs**

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Abstract

The paper contributes to the understanding of "internationalization" by introducing a conceptual framework for examining the relationships between internationalization of the firm's internalized inputs and outputs, the level of technological knowledge and cumulative foreign experience. Results show that more technological knowledge is associated with a higher level of internationalization of both internalized inputs and outputs. Cumulative foreign experience is associated with a higher level of internationalization of outputs, albeit with a lower level of internationalization of internalized inputs. Furthermore, technological knowledge is shown to intensify the relationship between length of foreign experience and the internationalization of internalized inputs. The latter two findings highlight the potential contribution of inter-firm collaboration to increasing the levels of internationalization.

Key words: Internationalization, Internalization, Technological knowledge, Foreign experience.

INTRODUCTION

The term internationalization is undoubtedly at the heart of the international business domain. The process and level of firm internationalization, their drivers and their performance implications have been discussed extensively in international business literature over the years. Despite the considerable number of studies addressing firm internationalization, its meaning seems to have remained unclear and open to different interpretations, at the theoretical and empirical levels.

While some scholars focus on the role of cross border internalization as means of internationalization (e.g. Buckley & Casson, 1976; Dunning, 1977, 1988; Hirsch, 1976; Rugman, 1981; Vernon, 1966), others focus on the role of experiential learning in foreign markets as means to increase firms' level of internationalization (e.g. Johanson & Vahlne, 1977,1990; Erramilli, 1991), yet others are concerned with the role of different entry modes in promoting internationalization (e.g. Chang, 1995; Chang & Rosenzweig, 2001). While these approaches are not necessarily conflicting, their divergence makes it difficult to capture a single coherent picture of the term internationalization. This difficulty is reflected in the multiple and differing empirical approaches used to measure internationalization (Hitt, Tihanyi, Miller & Connely, 2006). It is further reflected in the debates regarding the specific parameters that should be included when measuring internationalization as well as in debates regarding the appropriateness of combining different internationalization measures into a single measure (e.g. Hassel, Hopner, Kurdelbusch, Rehder & Zugehor, 2003; Hitt et al., 2006; Ramaswamy, Kroeck & Renforth, 1996; Sullivan, 1994, 1996).

This paper adds to the cumulative knowledge on firm internationalization by distinguishing between the internationalization of "inputs" and of "outputs". We view "outputs" as the products and services that a firm sells to other businesses or end

customers. "Inputs" include natural resources, intermediate outputs, tangible and intangible services, and labor used in the processes of developing, producing, selling and supporting the products or services ultimately sold to customers.

By distinguishing between the internationalization of inputs and of outputs, the results of this study enhance our understanding of the impact of foreign experience and of technological knowledge on the level of internationalization. Counter-intuitively, we find that while the level of technological knowledge is positively associated with internationalization of both inputs and outputs, longer foreign experience is positively associated with the internationalization of outputs but negatively associated with the internationalization of inputs. Furthermore, technological knowledge is shown to intensify the relationship between foreign experience and the internationalization of inputs, indicating that experienced, technologically abundant firms tend to internalize their cross border input base to a lesser extent than experienced non-technologically abundant firms. These results are discussed extensively in the last part of the paper and various explanations are posed that address the findings.

This study advances internationalization theory by explicitly considering the different dimensions of internationalization and of their drivers. The paper integrates and refines predictions from multiple schools of thought to yield novel predictions regarding the separate and combined impact of technological knowledge and foreign experience on firms' level of internationalization of their inputs and outputs and specifies the conditions under which internationalization does and does not equal cross border internalization.

CONCEPTUAL FRAMEWORK

Internationalization defined

The term "internationalization" refers to the geographic spread of a firm's operations as well as of its sales. Internationalization implies the existence of a "home country" and one or more foreign countries. The home country is presumably the country where the firm's activities originate. Foreign countries include "host" countries, where marketing, production and Research and Development (R&D) affiliates are located (Adler & Hashai, 2007; Buckley & Casson, 1976; Dunning, 1977, 1988, 1993) and "target" countries to which the firms' output is directed.

Given our distinction between the internationalization of "inputs" and of "outputs", internationalization may thus refer to the marketing and selling of "outputs" which firms produce, either through export, through alliances or through its foreign subsidiaries. In addition, internationalization also refers to the utilization of tangible and intangible "inputs" in host countries, be it for R&D activities, production, marketing, customer support or any other firm activity. Internationalization is therefore a multidimensional construct, the level of which is determined by the interaction of two major factors: location of the markets for outputs and location of the relevant inputs, such as natural resources as well as unskilled and skilled labor.

While the linkage between the location of output markets and the extent of a firm's internationalization is straightforward, determination of the linkage between a firm's level of internationalization and the location of inputs is more complex. This is so since the level of internationalization is affected not only by the location of the inputs employed by the firm but also by the firm's internationalization strategy (Buckley & Casson, 1976; Dunning, 1977, 1988; Dunning & Lundan, 2008; Rugman, 1981). The internationalization of firms utilizing inputs domestically is naturally low. However,

the extent of input internationalization is also limited, regardless of whether inputs are procured from independent suppliers located in the home country or abroad. High levels of input internationalization are therefore associated with the operation of own cross-border subsidiaries.

Hence, the factors which affect the extent of a firm's internationalization include: the location of markets, location of inputs and the internalization strategy chosen by the firm. It further follows that different factors are likely to affect the internationalization levels of inputs and outputs. This is not only so since a given firm's target markets do not necessarily overlap with its host economies (where inputs are deployed) but more importantly since the motivations to internalize cross border activities are orthogonal to the decision to cater to specific foreign markets.

Yet, despite this clear distinction between the internationalization of firms' inputs and outputs, extant literature uses proxies relating to the internationalization of inputs and outputs interchangeably and often also combines them into a single measure. As indicated by Hitt et al. (2006) the ratio of foreign sales to total sales is probably the most frequent proxy used for the measurement of firm internationalization (e.g. Autio, Sapienza & Almeida, 2000; Capar & Kotabe, 2003; Lu & Beamish, 2001; Ruigrock, Amman & Wagner, 2007; Shyam-Kumar, 2009; Tseng et al., 2007). Studies based only on the share of foreign sales clearly miss any aspect of input internationalization. A few studies refer only to firms input internationalization (e.g. Kwok & Reeb, 2000; Ramaswamy, 1995) thus ignoring any aspect of output internationalization. Other studies (e.g. Sullivan, 1994; Sanders & Carpenter, 1998) including those based on the familiar Transnationality Index (TNI),

employed by the United Nations (UNCTAD, 2007)¹, utilize an aggregate measure of input and output internationalization. Following the discussion above, this kind of aggregation (even when statistically correct for a specific sample) has no apparent theoretical meaning as the location of a firm's market is not necessarily correlated with the location of inputs, let alone its internalization strategy. It is not surprising therefore that studies employing aggregated internationalization measures are often criticized (Hassel, et al., 2003; Hitt et al., 2006; Ramaswamy et al., 1996). Given the sharp distinction between the internationalization of outputs and of inputs, it is apparent that the analysis of the factors affecting internationalization should explicitly distinguish between these two facets of internationalization.

Foreign experience and technological knowledge, two major firm specific factors have, in recent decades, come to assume a leading position in their effect on choice of the location of markets and operations (at home or abroad) and the internalization strategy.. The so-called "Uppsala school" (e.g. Johanson & Vahlne, 1977; 1990) attributes internationalization to the accumulation of foreign experience. The purported "internalization school" (e.g. Buckley & Casson, 1976; Rugman, 1981, 1986) regards technological knowledge as a major incentive for the internalization of foreign operations. Other scholars view technological knowledge as a major driver for sales in foreign markets (Delios & Beamish, 1999; Dunning, 1977, 1988; Knight & Cavusgil, 2004; Oviatt & McDougal, 1994; Zahra et al., 2000).

The internationalization of outputs

Internationalization process models such as the Uppsala model, which view internationalization as an evolutionary process, argue that firms increase their level of internationalization as a result of cumulative experience gained in foreign countries

¹ The TNI index is the simple average of three ratios: foreign sales to total sales, foreign assets to total assets and foreign employment to the total employment.

(Barkema & Drogendijk, 2007; Chang, 1995; Chang & Rosenzweig, 2001; Erramilli, 1991; Eriksson, Johanson, Majkgård & Sharma, 1997; Johanson & Mattson, 1985; Johanson & Vahlne, 1977, 1990, 2003; Welch & Luostarinen, 1988). According to this approach, internationalizing firms increase over time the number and diversity of countries in which they operate, starting out in countries that are "psychically" close to the home country, and gradually diversifying into more psychically distant markets (Johanson & Vahlne, 1977). This perception of increased foreign commitment is rooted in behavioral theories of the firm that emphasize the role of managerial learning (Eriksson, Majkgård & Sharma, 2000; March, 1991). The level of penetration into psychically distant foreign markets is kept initially low as a result of risk aversion. As risk declines over time with the accumulation of foreign experience, the tendency to penetrate psychically distant foreign markets increases (Barkema, Bell & Pennings, 1996; Johanson & Vahlne, 1977, 1990; Shaver, Mitchell & Yeung, 1997; Welch & Luostarinen, 1988).

When focusing on the internationalization of the firm's outputs, the evolutionary process view expects firms to increase the number and diversity of target countries in which firms sell their products as a function of cumulative experience gained in foreign countries. Following this reasoning we hypothesize that:

Hypothesis 1: *Cumulative foreign experience is positively associated with the internationalization of firms' outputs.*

Technological knowledge has been traditionally considered to be a dominant determinant of a firm's level of internationalization through the effect of the firm's ownership advantage (Dunning, 1977, 1988). Firm specific technological knowledge is often considered as the basis of the firm's ownership advantage which reflects the level of proprietary knowledge possessed by the firm and affects its competitive

position in foreign markets (Caves, 1996; Delios & Beamish, 1999; Hashai & Almor, 2008; Hymer, 1976; Knight & Cavusgil, 2004; Oviatt & McDougal, 1994; Tseng et al., 2007; Zahra et al., 2000). Firm specific technological knowledge often enables privileged access to markets, and is considered a profit generating asset around which the long term profit earning potential of firms is developed and entry barriers are created (Barney, 1991; Tseng et al., 2007; Wernerfelt, 1984). Based on this observation, we argue that firms with high levels of technological knowledge are likely to penetrate foreign markets successfully and increase the share and dispersion of their foreign sales. Ceteris paribus, greater technological knowledge is expected to be associated with a larger share of output which is marketed in a larger variety of target markets. We therefore hypothesize that:

Hypothesis 2: *The level of technological knowledge is positively associated with the internationalization of firms' outputs.*

The internationalization of inputs

The level of internationalization of inputs is represented by the location and the internalization mode of operations of firms engaged in international business. The Uppsala school posits that with the accumulation of foreign experience and the rise in share of foreign sales, firms increase their international resource commitment. Internationalization commences at a low level with sporadic exporting to a target country, conducted at arms' length, by non-specialized units within the firm. Over time, these sporadic activities are replaced by formally constituted export departments. As foreign experience accumulates and the share of foreign sales rises, the firm increases its international resource commitment by transferring distribution, production and other value adding activities abroad to foreign countries, thereby increasing its level of input internationalization (e.g. Johanson & Vahlne, 1977; 1990;

Chang & Rosenzweig, 2001). This view therefore assumes that increased foreign experience not only increases internationalization but also internalization of foreign activities. Hence, we hypothesize that:

Hypothesis 3: *Cumulative foreign experience is positively associated with the internalization of a firm's international inputs.*

Greater technological knowledge often implies greater absorptive capacity (Cohen & Levinthal, 1990). Since firms with greater absorptive capacity are likely to have a greater capacity to learn from diverse locations, higher levels of technological knowledge (and hence of absorptive capacity) are expected to be associated with greater dispersion of operations and with a greater internationalization level of inputs (Autio, et al., 2000). The higher the level of technological knowledge, the more likely firms are to seek complementary foreign knowledge assets abroad (Almeida, 1996; Bartlett & Ghoshal, 1989; Cantwell, 1995; Dunning & Narula, 1995; Nahum & Zaheer, 2005) implying greater internationalization of inputs.

The ownership of foreign operations is determined by internalization advantage, which is expected to be correlated with the level of technological knowledge (Buckley & Casson, 1976; Buckley, 1988; Dunning, 1977, 1988, 1993; Rugman, 1981). Such correlation is expected since the higher the level of technological knowledge, the greater the need to overcome market imperfections involved in the transfer of such know-how (Buckley & Casson, 1976). The technological knowledge developed by firms is often complex and hard to teach, and, hence, is relatively difficult to transfer (Kogut & Zander, 1992, 1993; Martin & Salomon, 2003; Saviotti, 1998; Simonin, 1999; Teece, 1977). Externalization of such knowledge is likely to result in knowledge dissipation costs associated with the misappropriation of transferred knowledge, and with higher control and monitoring

costs, to protect firm technological specific knowledge, as well as higher negotiation and litigation costs (Martin & Salomon, 2003). On the other hand, intra-firm organizational bonds increase the efficiency of such knowledge transfer (Gupta & Govindarajan, 2000; Kogut & Zander, 1992, 1993). Thus, intra-organizational knowledge transfer is likely to be more efficient than inter-organizational knowledge transfer for firms' characterized by high levels of technological knowledge (Martin & Salomon, 2003). This implies that firms' levels of internalization and technological knowledge are likely to be positively associated.

Finally, the observation that greater technological knowledge increases the frequency of interaction with customers further supports the expected tendency of firms to locate their own pre-sales, sales and post-sales operations abroad (Adler & Hashai, 2007; Almor & Hirsch, 1995; Hirsch, 1989; Simonin, 1999) in order to increase the efficiency and reduce the costs of interaction with customers in the processes of sales promotion, distribution, training, installation and maintenance. Our next hypothesis is therefore that:

Hypothesis 4: *The level of technological knowledge is positively associated with the internalization of a firm's international inputs.*

The interactive effect of foreign experience and technological knowledge

Since both technological knowledge and accumulation of foreign experience are hypothesized to have a positive impact on the internationalization of the firm's outputs as well as their internalized inputs, both factors are likely to complement each other creating an increase in the internationalization of outputs. Furthermore, high levels of technological knowledge are associated with the ability of firms to develop the learning capacities necessary for adaptation to foreign environments and for perceiving foreign market expansion as being less risky both in terms of served

markets and the establishment of foreign operations (Autio, et al., 2000). We therefore expect that higher levels of technological knowledge will further enhance the internationalization of both outputs and internalized inputs of firms' with lengthy foreign experience:

Hypothesis 5: *Technological knowledge strengthens the positive relationship between foreign experience and the internationalization of outputs and internalized inputs.*

EMPIRICAL TESTING

The sample

The hypotheses presented in this paper were empirically tested on data obtained from Israel's largest industrial firms. The original list included Israel's one hundred and fifty largest industrial firms in 1999. Combined foreign sales of these 150 firms represented about 80 percent of Israel's industrial exports. The list was based on data received from Israel's Ministry of Industry and Trade and data provided by Dun & Bradstreet (2000). After eliminating foreign affiliates and firms with insufficient data, a group of 100 firms remained, which were approached and asked to participate in this research.

The final sample consisted of 75 firms which provided useable information. Comparisons between the 75 participating firms and the 25 non-participating firms did not show evidence of any response bias in terms of firm sales, number of employees, year of establishment, industrial classification and percentage of foreign sales.

The location of markets for outputs and the location of inputs, is dependent on the size of the domestic market as well as on the availability of inputs in this market. Hence, a sample that includes firms from a single country has the advantage of

controlling for country specific effects on the internationalization of inputs and outputs.

Measures

Dependent variables

Several measures were used to represent firms' level of internationalization of inputs and outputs. First, we used the different components of the familiar Transnationality Index (TNI), employed by the United Nations (UNCTAD, 2007) as measures for the level of firms' input and output internationalization. We used the ratio of foreign sales² to total sales (denoted as *share of foreign sales*) as one of the proxies for the internationalization of outputs. We further used the ratio of foreign to total employees (denoted as *share of foreign employees*) and the ratio of foreign to total assets (denoted as *share of foreign assets*) and their average (denoted as *share of foreign inputs*) as proxies for the internalization of international inputs.

In addition we created entropy measures which examine the international dispersion of inputs and outputs. The general formula for the entropy measure is:

$$Entropy_Measure = \sum_{i=1}^n [P_i * \ln(1/P_i)] \text{ when } P_i \neq 0; P_i \text{ represents the proportion of}$$

inputs or outputs within region *i*. We measured the distribution of foreign sales across six world regions: North America, Central and South America, European Union, Rest of Europe, South East Asia and ROW - the rest of the world. This allowed us to measure the international dispersion of outputs (denoted as *foreign sales dispersion*). We further used the dispersion of internalized inputs in the above six regions to construct an entropy measure for the dispersion of international inputs in terms of assets and employees (Delios & Beamish, 1999) as a measure for the internalization

² Foreign sales are comprised of exports and of sales by foreign subsidiaries.

of international inputs (denoted as *international output dispersion*). The use of multiple measures is likely to enhance the robustness of our results.

Independent variables

Cumulative foreign experience was measured as the number of years that elapsed between the year the initial foreign sale had occurred and 1999. (Chang & Rosenzweig, 2001; Johanson & Vahlne, 1977, 1990; Welch & Luostarinen, 1988). The ratio of R&D expenses to sales was used as a proxy for the level of technological knowledge (*R&D intensity*). Investments in R&D enable the creation and absorption of technological knowledge and are the major vehicle by which firms create technological knowledge (Hirsch, 1989; Mol, 2005; Almor, et al., 2006; Hashai & Almor, 2008), therefore, *R&D intensity* is employed to represent the level of technological knowledge (Delios & Beamish, 1999; Zahra et al., 2000). Since the *R&D intensity* measure was skewed to the left, we performed a logarithmic transformation which reduced the skewed values from above 3 to less than 0.5.

Control variables

To account for additional effects on the level of internationalization, we included the following control variables:

Size – Firm size was proxied by the number of employees. A positive relationship is expected between a firm's size and its level of internationalization since larger size is expected to enable firms to exploit economies of scale and scope which in turn facilitate further internationalization (Caves, 1996).

Industry affiliation – Eight industry dummies were introduced in order to control for industry specific effects on firms' level of internationalization. The reference industry was 'chemicals' and the other industries were: (1) Computer hardware, (2) Software,

(3) Telecommunication, (4) Pharmaceuticals, (5) Food and beverage, (6) Metal, (7) Rubber, plastics, wood and paper and finally (8) Textiles and clothing.

Table 1 depicts the descriptive statistics and correlations of the dependent and independent variables. The firms in the sample may be considered as relatively small compared to the world largest multinationals (UNCTAD, 2007). These firms have on average over 900 employees (with total sales averaging at \$US 126 Million while assets average at \$US 183 Million). These numbers reflect the relatively small size of the Israeli economy (with a GDP of about \$US 100 Billion at the time of the survey). The foreign-sales, employees and assets ratios have a relatively high standard deviation. On average, the foreign experience of the firms in the sample is about 15 years.

[Insert Table 1 about here]

Correlations are not very high. *R&D intensity* has a positive correlation with all internationalization measures, while *foreign experience* is positively correlated only with foreign sales. Firm *size* is positively correlated with the three ratios composing the TNI. Overall, the table does not reveal any significant signs for multicollinearity.

We used two sets of Ordinary Least Squares (OLS) regressions to test our hypotheses:

- **Internationalization of outputs = f(*R&D intensity, foreign experience, R&D intensity X foreign sales, size, industry dummies*)**
- **Internationalization of inputs = f(*R&D intensity, foreign experience, R&D intensity X foreign sales, size, industry dummies*)**

RESULTS

Table 2 details the standardized coefficients of the explanatory variables in Ordinary Least Squares (OLS) regression and the significance of these coefficients for the five different dependent variables.

[Insert Table 2 about here]

Table 2 shows that the partial coefficients of the *cumulative foreign experience* measure are positively correlated with the *share of foreign sales* and *foreign sales dispersion*. These results support Hypothesis 1. Table 2 further shows a consistent and significant positive correlation between *R&D intensity* and *share of foreign sales* and *foreign sales dispersion*, thus supporting Hypothesis 2.

The coefficients of *cumulative foreign experience* are negatively correlated with the *share of foreign employees*, *the share of foreign assets*, *the share of foreign inputs*³ and *dispersion* of international inputs. Thus, we identify a significant negative relationship between the accumulation of foreign experience and the internalization of firms' international inputs. These findings imply that not only should Hypothesis 3 be rejected but that the effect of *cumulative foreign experience* on the internalization of international inputs contradicts the conventional predictions of the Uppsala school. Table 2 further shows a consistent and significant positive correlation between the level of *R&D intensity*, *the share of foreign employees*, *the share of foreign assets*, *the share of foreign inputs* and *dispersion* of international inputs. These results support Hypothesis 4.

As for the interaction effects of *cumulative foreign experience* and *R&D intensity* on the level of output internationalization, we do not find a significant relationship between the interaction of the two measures and the measures of output

³ Representing the simple average of 'share of foreign assets' and 'share of foreign employees'.

internationalization. We do find a significant negative relationship between the interaction of *cumulative foreign experience* and *R&D intensity* and the measures of input internationalization. These two results imply that there is no interactive effect of *cumulative foreign experience* and *R&D intensity* on the internationalization of outputs. The fact that *R&D intensity* increases the main effect of *cumulative foreign experience* on the internationalization of international inputs indicates that in our sample, technologically abundant firms internalize their international operations (inputs) less than non-technologically abundant firms as foreign experience accumulates.

As for our control variables *size* is significantly positively correlated with the *shares of foreign outputs, share of foreign employees, the share of foreign assets,* and the *share of foreign inputs*, but is not significantly correlated with the dispersion measures. This indicates that in Israel, and possibly elsewhere in the world, large firms are more internationalized than small firms, but are not necessarily more dispersed in their operations. Some of the industry controls are also significant, reflecting inter-industry variance in level and dispersion of the internationalization of both inputs and outputs. In particular it is noteworthy that firms from the metal and telecommunication industries show a significant difference between their input and output internationalization. Such firms are on average less internationalized relative to other firms in the sample in terms of inputs, but are more internationalized relative to other firms in the sample in terms of outputs. These differences, as well as the differences in the relative level of input and output internationalization in other industries further support for the claim that internationalization of inputs and of outputs represent distinct phenomena.

Overall, Table 2 shows that the models used have reasonable adjusted R squared values and significant values of the F statistic (ANOVA). Multicollinearity in

the regression analyses is excluded since the maximal Variance Inflation Factors (VIF) reported are sufficiently small. Heteroskedasticity is excluded since the plots of the residuals against the dependent variables show a random distribution of the residuals. This was further verified by regressions of the residuals run against the dependent variables. As expected, the regression coefficients turned out to be insignificant, indicating that the residuals did not contribute to the dependent variables. Finally, in order to further establish the robustness of our results, we also ran the regressions on 1995 data that we had for the firms in our sample. In all cases results were robust.

DISCUSSION

The findings of this study advance internationalization theory in several respects. First, by distinguishing between the internationalization of internalized inputs and outputs, we are able to observe how technological knowledge and foreign experience affect these aspects of internationalization. While technological knowledge is positively associated with both the internationalization of outputs and that of internalized inputs, cumulative foreign experience is positively associated with the latter, but negatively associated with the former. This finding contradicts the predictions of the Uppsala school as it implies that while internationalizing firms serve a larger share of foreign markets they decrease their level of foreign operations (in terms of assets, employees and subsidiaries). It further implies that the motivation of firms to internalize cross border activities does not necessarily correlate with the decision to supply specific foreign markets with the firm's outputs.

Our interpretation of this finding is that the accumulation of foreign experience may in fact, increase the use of non-equity based foreign market servicing modes, based on the utilization of inputs provided by third parties, often referred to as "network partners" (Johanson & Mattsson 1986; Sharma & Johanson, 1987; Johanson & Vahlne, 1990; 2003, 2006). Greater foreign experience implies increased familiarity with foreign networks in terms of the depth of relation formation with network partners as well as with the number of links with foreign partners (Johanson & Vahlne, 1990; 2003, 2006; Gulati, 1998; Zaheer & Bell, 2005). This in turn enables firms which have more international experience, to build on their "network resources" (Gulati, 1999; Lavie, 2006) rather than to commit more internal inputs to foreign markets. The relational-view of the firm (Dyer & Singh, 1998; Gulati, 1995, 1999; Lavie, 2006) essentially implies that combining complementary capabilities of different firms fosters the creation of competitive advantage. Firms with substantial network relations may therefore focus on the internationalization of specific inputs while relying on different types of foreign collaborations where they can build on complementary inputs supplied by foreign partners (Teece, 1986; Dyer & Singh 1998; Gulati 1995; Powell 1990; Uzzi, 1997), rather than on internalizing more and more inputs obtained in host countries.

Extant literature shows that firms increase their engagement in networks and utilize the resources of their network partners as they accumulate experience in engaging in such networks (Chung, Lee & Singh, 2001; Gulati, 1995, 1999). Likewise, we find that firms increase their engagement in foreign networks and the utilization of their foreign network partners inputs with the accumulation of foreign experience (Makino, Lau & Yeh, 2002; Martin, Swaminathan & Mitchell, 1998). Our speculation is that firms with limited foreign experience initially perceive the

formation of foreign partnerships as risky and costly (e.g. due to the transaction costs involved in such partnerships) and prefer to internalize their foreign operations to the extent possible. Once such firms gain foreign experience and become more familiar with their foreign competitive environment, they view foreign market collaborations as less risky and costly and are expected to increase the level of their collaboration with foreign suppliers, distributors, licensees and other third parties. *Ceteris paribus*, the accumulation of foreign experience allows firms to decrease the level of international input internalization and reduce the potential agency costs of such internalization.

Our findings imply that high levels of technological knowledge are likely to be associated with internationalization strategies that involve cross border internalization of assets and employees. Accumulation of foreign experience on the other hand seems to increase the propensity of firms to externalize some of their operations to foreign third parties and hence reduce their level of input internationalization.

The observation that accumulation of foreign experience is associated with a decrease of input internationalization may explain some of the inconsistencies in the empirical validation of the Uppsala school's assertion that foreign experience is associated with increased levels of internationalization (Benito & Gripsrud, 1992; Autio *et al.*, 2000; Jones, 1999, 2001; Oviatt & McDougall, 1994; Knight & Cavusgil, 2004). Our findings indicate that the increase of foreign experience tends to be associated with higher levels of foreign cooperation and lower levels of internalization. Thus, we show that the predictions of the Uppsala model hold for the internationalization of outputs, but not for the internationalization of internalized inputs. Yet, if the notion of "reduced perceived risk of foreign operations", which is central in the Uppsala framework, is interpreted as firm's willingness and capability to

rely on foreign network partners in their operation in host markets, the paper points to the possible existence of additional modes of internationalization .

Moreover when both technological knowledge and foreign experience are considered interactively they also affect the internationalization of inputs negatively. Consistently with our explanation to the effect of cumulative foreign experience on the internalization of international inputs, we contend that with the accumulation of foreign experience, experienced technologically abundant firms use international collaborations more than experienced non-technologically abundant firms. It seems that with the accumulation of foreign experience, high levels of technological knowledge push firms to focus their set of internalized operations on activities that are at "*the creative heart of the value chain*" (Mudambi, 2008), thus focusing on those operations that create most value, whilst acquiring complementary assets from third parties (Teece, 1986). High levels of technological knowledge coupled with lengthy foreign experience constitute a barrier which allows experienced technology-intensive firms to internalize only specific value chain activities (internationally) and externalize other value chain activities with little risk of misappropriation of their technological knowledge (Hashai & Almor, 2008; Teece, 1986).

Our results further indicate that the level of internationalization is composed of both internal and external components. This study has focused on the internalization of cross border activities as a proxy for the internationalization of inputs, in accordance with extant literature, however it is apparent that firms may be no less international in terms of their foreign market commitment, and yet exhibit lower levels of cross border internalization over time. We assert that accumulation of foreign experience provides firms with the capability to externalize a greater share of their operations, due to their increased familiarity with foreign partners, as a result of

an increased number of links with such partners and due to reduced perceived risk of operating in foreign environments. Thus, it may be time to re-think the conceptualization as well as the measures of internationalization at the firm level.

Rather than focusing on the level of resource internalization, as is usually done in extant international business literature, such measures should focus on the number and quality of ties that internationalizing firms possess in host markets (Nahapiet & Ghoshal, 1998, Gulati, 1998). Indeed, Dunning and Lundan (2008) recently defined the multinational enterprise (MNE) as follows: "*The MNE is thus best considered as a coordinator of a system of domestic and foreign activities that are controlled and managed by it*". The focus here is on *control* rather than on ownership; control does not necessarily imply internalization.

Finally, since the main effects and interaction effects identified in this paper relate to a relatively small sample of internationalizing firms from a single country, additional evidence on the interrelationship between technological knowledge, foreign experience and internationalization of inputs and of outputs is needed, before these findings can be regarded as conclusive. Furthermore, since technological knowledge does not only affect internationalization level but is also facilitated by it (Bartlett, & Ghoshal, 1989; Cantwell, 1995), the use of longitudinal data sets (rather than the cross sectional data used in the current study) may enable researchers to control for the possibility of reverse causality in the technological knowledge-internationalization level relationships.

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Table 1 – Descriptive Statistics and Correlations

| | N | Mean | Std. Deviation | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---------------------------------------|----|------|----------------|-----|------|-------|-------|-------|--------|-------|--------|
| <i>(1) Share of foreign sales</i> | 75 | 0.29 | 0.35 | 1 | .159 | .147 | .181* | -.065 | .322** | .124* | .126** |
| <i>(2) Share of foreign employees</i> | 75 | 0.24 | 0.27 | | 1 | .126* | -.272 | .152 | .415** | -.192 | .082* |
| <i>(3) Share of foreign assets</i> | 75 | 0.20 | 0.25 | | | 1 | .013 | .094* | .029* | .074 | .092* |
| <i>(4) Foreign output dispersion</i> | 75 | 0.65 | 0.32 | | | | 1 | -.163 | .219** | .161* | .114 |
| <i>(5) Foreign input dispersion</i> | 75 | 0.71 | 0.26 | | | | | 1 | .114* | .268 | -.137 |
| <i>(6) R&D intensity</i> | 75 | 0.11 | 0.15 | | | | | | 1 | -.164 | -.099 |
| <i>(7) Foreign experience (years)</i> | 75 | 14.5 | 17.6 | | | | | | | 1 | .236 |
| <i>(8) Size (no. of employees)</i> | 75 | 923 | 1635 | | | | | | | | 1 |

Legend: ** - Significant at p<0.01; * -Significant at p<0.05

Table 2 – Ordinary Least Squares (OLS) Estimations of internationalization level

(Standardized coefficients)

| | Share of Foreign Output | Foreign output Dispersion | Share of foreign assets | Share of foreign employees | Share of Foreign Input | Foreign input Dispersion |
|---|-------------------------|---------------------------|-------------------------|----------------------------|------------------------|--------------------------|
| R&D Intensity | .262** | .171** | .327*** | .417*** | .365*** | .332** |
| Foreign Experience | .034* | .055* | -.015* | -.029* | -.021* | -.038* |
| R&D Intensity X Foreign Experience | .142 | .011 | -.022* | -.014* | -.019** | -.012* |
| Size | .046* | 0.122 | .166* | .059* | .104* | 0.321 |
| Food & Beverage | .013* | .145 | -.192 | -.158 | -.176 | -.277 |
| Metal | -.003** | .022 | .055* | .031* | .045* | .029 |
| Rubber, Plastic, Wood & Paper | .020* | .085* | -.062 | -.029* | -.022 | .029 |
| Textile & Clothing | .186 | .165 | .078 | .141 | .094 | .284 |
| Computer hardware | -.045* | -.221 | -.137 | -.090 | -.105 | -.016 |
| Software | .122 | .251 | .072* | .063 | .070* | .228 |
| Telecommunication | -.039* | -.213* | .004** | .062 | .001** | .014* |
| Pharmaceuticals | -.163 | -.089 | .106 | .025* | .008* | -.751 |
| Other | -.140 | -.078 | .059 | .046* | .051 | .389 |
| Adjusted R-square | 0.17 | 0.12 | 0.18 | 0.16 | 0.18 | 0.14 |
| F-statistic | 15.18*** | 12.28*** | 14.53*** | 15.34*** | 14.93*** | 13.46*** |
| N | 75 | 75 | 75 | 75 | 75 | 75 |
| Max VIF | 1.56 | 1.22 | 1.63 | 1.61 | 1.62 | 1.17 |

Legend: *** - Significant at $p < 0.001$; ** - Significant at $p < 0.01$; * - Significant at $p < 0.05$.

VIF= Variance Inflation Factor. Reference industry = Chemicals.

Share of foreign inputs is the simple average of share of foreign assets and share of foreign employees.