

INNOVATION, OWNERSHIP STRUCTURES AND INTERNATIONALIZATION: EMPIRICAL
EVIDENCE FROM INDIAN PHARMACEUTICAL SECTOR

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Abstract

We combine insights from international trade and corporate governance literatures to explore the link between innovation and internationalization under different ownership structures in the context of the pharmaceutical sector in India. Our contention is that investment in innovation is positively associated with export intensity, but the strength of this relationship is influenced by the type of company ownership as well as by the structural characteristics of the business group to which the firm is affiliated. Results indicate that research expenditure is negatively associated with export intensity, implying that firms in the Indian pharmaceutical sector face a trade-off between investing in innovation and investing in internationalization. Ownership structures and business group impact the relationship between research intensity- export intensity relationship.

Keywords: Internationalization and entry strategies of DMNCs, Performance of DMNCs, Corporate governance in DMNCs

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INTRODUCTION

A long lineage of research in the international business literature, starting with Vernon's (1966) product life cycle theory, has coalesced around the dictum that R&D and innovation capabilities are positively associated with a firm's decision to export and subsequent export intensity. Vernon (1966, 1979) hypothesized that firms will initially innovate and produce for their home market, but will start moving into exports to exploit their market power in foreign markets because of the limits the domestic market poses in the early growth stage (Hirsch & Bijaoui, 1985). Innovation is positively associated with exporting because it allows the firm to exploit its competitive advantages globally (Chang, 1995; Hitt, Hoskisson, & Kim, 1997) thereby generating revenues on a larger scale and extending the product life cycle. Innovation and internationalization are often seen as complementary and self-reinforcing, in that linkages to suppliers and buyers, exposure to demanding customers and observation of capable competitors overseas facilitates technology diffusion (Görg and Greenaway, 2002), promotes knowledge spillovers (Salomon & Jin, 2008) and allows firms to learn-by-exporting, enhancing innovation, productivity, and firm performance (Salomon & Shaver, 2005).

The link between innovation and internationalization in the context of emerging economies, however, may be more tenuous. Emerging economies are characterized by lower returns on R&D (Gorodnichenko, Svejnar, & Terrell, 2008), prompting firms to engage more in imitation and adaptation of already created and tested innovations, rather than in generating new inventions (Minniti & Lévesque, 2010; Gorodnichenko et al., 2008). In addition, under conditions of financial constraints, as the case is for the majority of emerging market firms, internationalization and innovation activities often become substitutes, rather than complements, in that firms need to make a choice between investing in innovation and investing in internationalization (Gorodnichenko & Schnitzer, 2010). Finally, the market imperfections and institutional voids characterizing emerging markets make the ownership structures

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under which firms operate critically important for both their innovation and their internationalization strategies and performance (Peng, 2003; Yi, Wang, & Kafouros, 2012)

Surprisingly, few studies have looked at the tension between innovation and internationalization in the context for emerging market firms. This is the research gap our study is addressing. We explore the link between the R&D intensity and export intensity in the context of the Indian pharmaceutical sector, which ranks fourth in volume and thirteenth in value globally (Chittor et al., 2009). Our main premise is that R&D intensity will be positively associated with export intensity, but the strength of this relationship will be significantly affected by the type of company ownership, as well as by the structural characteristics of the business group to which the firm is affiliated.

Our paper is structured as follows. We begin by developing our theoretical argument and formulating six hypotheses that guide our study. We next present the context of the study, describe our methodological approach, and report statistical results. We conclude by discussing the theoretical, practitioner, and public policy implications of our findings.

THEORETICAL PERSPECTIVES AND HYPOTHESIS DEVELOPMENT

Innovation and exporting

Innovation boosts the internationalization of the firm through several interrelated mechanisms. First, innovation directed towards the introduction of new products, creative design, higher quality, or other desirable product attributes, provides firms with a source of monopolistic competitive advantage through differentiation, which can be exploited on a global scale (Chang, 1995; Hitt et al., 1997). In addition, investments in innovation increase the firm's ability to meet the demands of its changing domestic and international markets, thus making exporting more profitable for a firm (Zahra & Covin, 1994). Second, firms involved in innovation seek to recoup their R&D investments faster by increasing their revenue base through exports (Alvarez & Robertson, 2004). Finally, innovation provides a boost to productivity,

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which in turn facilitates export involvement (Cassiman & Golovko, 2011).

Empirical evidence from developed economies has largely supported the positive association between R&D capability and exporting, utilizing samples from various national contexts, such as Canada (Caves, Porter, Spence, & Scott, 1980), Italy (Basile, 2001), Spain (Cassiman & Golovko, 2011), Germany (Roper & Love, 2002), Japan (Tomiura, 2007), or Ireland and Great Britain (Girma, Gorg, & Hanley, 2008) and at different levels of analysis, such as the industry (Caves et al., 1980), the firm (Basile, 2001), or the manufacturing plant (Roper & Love, 2002).

In contrast, empirical evidence on the link between innovation and internationalization in the context of emerging economies is rather sparse and the theoretical justification for this link may be more tenuous. This is due to the inherent tradeoff between innovation and internationalization that typically less well capitalized firms in emerging markets may be forced to make. However, we still expect that the fundamental mechanisms translating a firm's R&D capabilities into higher export intensity will work in much the same way in emerging markets as in the context of developed markets. Indeed, Luo et al. (2011) traced the evolution of emerging economy enterprises from low cost imitators to novel innovators. Recent case-based work on the "second wave" of developing country multinationals (Bonaglia, Goldstein, & Matthews, 2007) has documented that these enterprises pursue global growth through accelerated internationalization combined with strategic and organizational innovation. Formally:

H1: Research expenditure will be positively associated with export intensity.

The moderating role of ownership structures

Corporate governance is "the system by which companies are directed and controlled" (Cadbury Committee, 1992). One stream of corporate governance research draws on agency theory tenets (Jensen & Meckling, 1976), focusing on the separation of ownership and control and the divergent preferences for

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corporate strategies between owners (principals) and managers (agents). However, different types of owners often have their own distinct and potentially conflicting preferences for corporate innovation strategies (Hoskisson et al. 2002) as well as for the scope of the international activities of the firm (Oesterle, Richta, & Fisch, 2012; Banalieva & Eddleston, 2011). The differences in preferences are based on their time horizon orientation and distinct incentives. For example, Hoskisson et al. (2002) found that different types of institutional investors had different preferences for the sources of corporate innovation (external vs internal) while Oesterle et al. (2012) found that the concentration of ownership has a non-linear relationship with the firm's degree of internationalization and the main regions of international diversification. In the context of emerging economies, Yi et al. (2012), in a large sample of Chinese firms, documented that that foreign ownership and business group affiliation positively moderate the effect of innovative capabilities on export performance. Thus, it can be reasonably expected that the ownership structure of the firm will significantly affect the link between innovation and internationalization. We explore the impact of different types of equity holders, because equity holders have a residual claimant status and therefore generally have a stronger interest in projects using firm-specific resources (Kochhar & Hitt, 1998) and focus in particular on three types of owners: family, foreign corporations, and foreign financial institutions.

Family-controlled firms constitute the majority of emerging market firms, including most of the largest Indian conglomerates. In theory, family ownership confers specific competitive advantages, including long-term orientation (Allen & Phillips, 2000), flexibility, speedy decision-making (Zahra, 2003), and the family "name" as a source of power and pride (Bhaumik et al., 2009). But Habbershon and Williams (1999) argue that these generic advantages of family ownership are misleading in internationalization contexts, in that family-dominated business groups tend to be more risk averse than other business groups, because much of the owners' wealth gets invested in the business (Calver, Rienda

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& Quer, 2009). Further, a lack of resources (notably managerial expertise in internationalization) and the uncertainty and complexity of the process usually work against foreign expansion (Fernandez & Nieto, 2005). Not surprisingly, in their study of the internationalization dynamics of 202 Western European firms from 1996 to 2006, Banalieva & Eddleston (2011) found that family leaders were more beneficial when pursuing a regional strategy, whereas non-family leaders were more beneficial when pursuing a global strategy. Formally:

H2: Family ownership will weaken the relationship between research expenditure and export intensity.

In contrast, foreign corporate ownership is likely to enhance the relationship between research expenditures and export intensity through reinforcing the role of innovative capabilities (Yi et al., 2012). Foreign affiliates are expected to be more innovative than domestic firms because of the existing ownership advantages of multinational corporations and the opportunities to benefit from technology diffusion and knowledge spillover effects (Görg & Greenaway, 2002). Empirical evidence from Brazil, for example, shows that export-oriented foreign affiliates have a higher propensity than export-oriented domestic firms to introduce new product innovations to the market (Kannebley, Porto, & Toldo Pazello, 2005). Formally:

H3: Foreign corporate ownership will strengthen the relationship between research expenditure and export intensity.

Compared to foreign corporations, foreign financial institutions are likely to have a shorter-term orientation and therefore are less likely to emphasize innovation strategies. This is a function of their foreign ownership which typically has an interest in short term financial gains over longer term

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investments. While foreign financial institutions may have deep pockets, and hence are likely to have funds available for both R&D developments and international expansion, they typically lack the industry expertise or the motivation that can enhance export performance through reinforcing the role of the firm's innovative capabilities. Formally:

H4: Ownership by foreign financial institutions will weaken the relationship between research expenditure and export intensity.

The moderating role of business group characteristics

In emerging markets, many of the firms that are involved in exporting are part of a business group. Business groups, known as “groups” in Latin America, “business houses” in India, or “chaebols” in South Korea, are groups of companies that do business in different markets under a common administrative or financial control and its members are linked by interpersonal trust and similar personal, ethnic, or commercial backgrounds (Leff, 1978). Business groups dominate the competitive landscape in the emerging economies' private sector. For example, the “business houses” control about 75% of the total industrial output in the Indian private sector (Purkayastha, Manolova, & Edelman, 2012).

The diversified business groups in emerging markets can benefit from access to internal capital and labor markets to bridge “institutional voids” (Khanna & Palepu, 1997). Bridging these well known voids helps business group affiliates mitigate external market failures, and leads to potentially profitable growth. However, the over-extended use of shared resources and the distraction of managerial attention away from the core business may lead to loss of control over the sources of individual firms' competitive advantage (Khanna & Yafeh, 2007). In addition, overly embedded intra-group networks can encourage parochialism, xenophobia, isolationism, and inertia, which are detrimental to corporate performance and

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globalization (Chung, 2004). For example, Gaur & Kumar (2008) in their study based on a sample of Indian firms found that business group affiliation reduces the positive effect of internationalization on firm performance. Therefore, while there are potentially a number of benefits associated with belonging to a business group, in highly diversified business groups with multiple disparate businesses, there are also many drawbacks which may negatively impact export performance. Formally:

H5: The degree of business group diversification will weaken the relationship between research expenditure and export intensity.

However, firms affiliated with business groups can benefit from synergies arising from the utilization of common infrastructures, resources, and competencies. For example, they can use the global subsidiary network of the business group, take advantage of foreign market intelligence and local contacts, recruit top talent globally and benefit from the established brand name recognition in international markets. Internationalization also allows business groups to exploit internalized intermediary institutions; for example, internal capital markets help groups allocate financial resources across different markets and thereby overcome international finance fluctuations (Hitt et al., 1997). Business group affiliation also plays a key role in buffering the company from the risks that are involved in creating and exploiting assets through internationalization (Becker-Ritterspach & Bruche, 2012). Organizational learning theory suggests that exposure to different environments also speeds up learning processes, because the group must transfer, integrate, and create knowledge-based resources to cope with uncertainties in different environments (Sambharya, 1995). Importantly, firms can learn from the internationalization experiences of other members of the business group. Formally:

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H6: The degree of business group internationalization will strengthen the relationship between research expenditure and export intensity.

METHODS Research

context

The Indian pharmaceutical industry accounts for about ten percent of global production. Since the liberalization of the Indian economy in 1991, the sector has grown at over 20% per annum, reaching about \$22 billion in 2009-2010 (Dun & Bradstreet, 2012). The industry is fragmented with more than 10,000 manufacturers; the top 200 companies, however, control 70% of the market (PWC, 2012).

Upon its accession to the World Trade Organization (WTO) in 1995, India committed to a transition from a process patent to a product patent system over the following ten-year period, thereby providing legal protection to trade-related intellectual property rights by 2005. This decision constituted a major institutional shock for indigenous Indian pharmaceutical firms, which had traditionally thrived by manufacturing and selling imitations of patented drugs through reverse engineering. In light of these changes in the property rights regime, the prognosis for domestic firms in the Indian pharmaceutical industry was rather pessimistic. However, in sharp contrast to these predictions, the last decade has seen an industry-wide resurgence and emergence of the pharmaceutical industry as one of the key drivers of India's global competitiveness and export-led growth.

One of the main reasons for the transformation in the Indian pharmaceutical industry has been the steep growth in the degree of internationalization and percentage of revenues from foreign markets. The total exports of pharmaceuticals from India (primarily undertaken by indigenous Indian firms rather than

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subsidiaries of multinationals) has increased from \$503.1 million in 1995 to more than \$18.83 billion in 2010 (FICCI 2012), for a compounded 27% annual growth rate. Another notable feature of internationalization of the Indian pharmaceutical industry is its breadth—a sizeable number of firms, instead of just a few large ones, are international—which indicates international expansion is an industry-wide phenomenon. Indian pharmaceutical companies also invest aggressively overseas in order to obtain a toehold in the large and growing generics markets in the United States and Europe (KPMG, 2006; Athreye & Godley, 2009), and to gain access to the patents and product lines of R&D-intensive pharmaceutical companies in developed economies (Bhaumik, Driffield, & Pal, 2009).

Sample selection

Our sample is drawn from the Center for Monitoring the Indian Economy (CMIE) database, which includes all firms listed on India's major stock exchanges, including public sector enterprises and foreign firms. For the purpose of this study we considered only firms belonging to the Indian pharmaceutical industry and affiliated to business groups. Our sample is thus comprised of 219 firms belonging to 109 Indian business groups.

We followed the following steps to build our sample. First, we downloaded from the database all business group firms that are categorized under the four digit industry classification of drugs and pharmaceuticals, which provided us with a list of 262 firms. Second, in order to have a balanced panel, we eliminated 23 subsidiaries of foreign firms and 8 firms that had been founded post 2005, the starting point in our sample. Finally, as the database had some missing values, we searched for data on those firms in competing databases such as Capital Line and Worldscope. Still, we were not able to find the complete information on our entire list of variables and thus had to exclude 12 firms. We conducted a balanced panel analysis with 1096 observations, which equals to 219 firms over a five-year period (2005

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to 2010). All explanatory variables were lagged by 1 year.

Variables

Dependent variable

We measured the internationalization of the firm as the ratio of foreign sales to total sales (FSTS), also known as export intensity. Export intensity is considered the most common measure of internationalization (Chittor et al., 2009). We chose the ratio of foreign sales to total sales over other possible measures, such as international geographic spread, growth in foreign sales, or foreign direct investment (FDI), for two reasons. First, the validity of any measure must be assessed on the basis of its potential explanatory power in the context of the theoretical assumptions on which it is based (Hassel et al., 2003). Because the majority of firms from emerging economies remain in the early stages of the internationalization process and use exporting as the dominant mode of international expansion (Aulakh et al., 2000), this measure is more contextually appropriate compared with other measures, such as FDI. Second, data availability on FDI is limited and there is a sizeable number of missing values, presenting problems with the validity and generalizability of our results.

Independent and moderator variables

The key explanatory variable for this study was firm's expenditure in R&D. The most direct measure taken from CMIE database is R&D intensity. However, as there were a large number of firms that did not have any R&D expenses, using a continuous measure would result in a sizeable error of estimation. We therefore use a dummy variable as a proxy for expenditure in R&D. The dummy variable takes a value of 1 for firms which have R&D expenditure; 0 otherwise. Other explanatory variables include different categories of owners such as group diversification (BGD), family ownership (FAMO), and

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ownership by foreign corporate (FORC) and ownership by foreign financial investors (FII). Finally, in order to test the effect of business group affiliation on internationalization, we included two variables - business group diversification (BGD) and business group internationalization (BGI). The BGD measure uses the Jacquemin-Berry entropy measure of diversification (Jacqueimin, & Berry, 1979) and BGI uses foreign sales to the total sales of the group.

For the ownership measure, our study uses the proportion (%) of equity held by each specific group, as identified in the hypotheses. Family ownership (FAMO) refers to the proportion of shares held by the founding family, including those held by family members and family foundations, as well as those held by group firms. FORC refers to the percentage of common shares held by foreign corporations. The variable FII refers to the percentage of common shares owned by foreign financial institutions. Finally, in order to test for the moderating effect of different ownership categories and business groups' characteristics on the relationship between R&D intensity and firm internationalization, we allow our explanatory variables to interact with the R&D dummy variable.

Control variables We control for a number of firm level characteristics. The size of the firm (SIZE) constitutes a critical control variable, because larger firms may be better positioned to access international resources, whether technology or finance, as well as to internationalize their product markets. Firm size, measured as the natural logarithm of sales (to remedy potential over-dispersion), thus controls for size effects. The age of each firm (AGE) since it was founded, in years, serves as a measure of experience. We also include current ratio (CR, measured as current assets over current liabilities) and leverage (LEVERAGE, measured as debt over total assets) to control for the financial health of the company. Finally, prior-year performance may influence a firm's outlook about embarking on international expansion, so we use prior return on assets (ROA) of the firm lagged by one year, as our

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last control variable. Because the entire data set pertains to a single industry, no industry controls are needed. Descriptions of all variables entered in the regression estimations are presented in Table 1.

Insert Table 1 about here

Model specifications

Since we have both cross-sectional and time series data, we use panel data regression techniques to test our hypotheses. The advantages of the panel nature of the data are twofold. First, it controls for firm-specific and time-invariant unobserved factors that might influence the decision to invest overseas using firm-specific fixed effects. We use Hausman (1978) test results to support our fixed effects modeling. Second, in order to mitigate endogeneity problems of the explanatory variables, following Bhaumik et al. (2009) and Yi et al. (2012) we lag them by one time period such that, for example, the sales in period t-1 affect internationalization in the period

t. Our regression specification is given by the following, $FSTS_{ijt} = \beta_0 + \beta_1 Dummy_{ij,t-1} + \beta_2 FAMO_{ij,t-1} + \beta_3 FORC_{ij,t-1} + \beta_4 FII_{ij,t-1} + \beta_5 BGD_{j,t-1} + \beta_6 BGI_{j,t-1} + \beta_7 Size_{ij,t-1} + \beta_8 Age_{ij,t-1} + \beta_9 Leverage_{ij,t-1} + \beta_{10} CR_{ij,t-1} + \beta_{11} ROA_{ij,t-1} + \beta_{12} I + u_{ij} + \varepsilon_{ijt}$ where i refers to the i^{th} firm belonging to the j^{th} business group; t and t-1 refers to the time periods; I refers to the interaction term between dummy variable and the other explanatory variables; u_{ij} is the firm specific fixed effects and ε_{ijt} is the error term. Our hypotheses have the following implications for the coefficient estimates

Hypothesis 1 implies $\beta_1 > 0$

Hypothesis 2 implies $\beta_{12} < 0$ when I is the interaction between dummy variable and FAMO

Hypothesis 3 implies $\beta_{12} > 0$ when I is the interaction between dummy variable and FORC

Hypothesis 4 implies $\beta_{12} < 0$ when I is the interaction between dummy variable and FII

Hypothesis 5 implies $\beta_{12} < 0$ when I is the interaction between dummy variable and BGD

Hypothesis 6 implies $\beta_{12} > 0$ when I is the interaction between dummy variable and BGI

RESULTS

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Table 2 contains the means and correlation matrix for all variables in the model. Almost none of the coefficients (cf. FORC and FII and BGD & BGI) exhibit high correlations with other control variables, and none of the variance inflation factors exceeds 10, the general threshold for detecting serious multicollinearity (Mendenhall & Sincich, 2003).

Insert Table 2 about here

The results of the panel data regression appear in Table 3. The results from the basic regression Model 1 (without interaction) reveal a negative, significant coefficient of R&D, suggesting that firms with R&D expenditure are poor internationalizers compared to firm without R&D expenditure. This result holds even after introducing the interaction terms (Models 2 to 6). Thus our hypothesis about the positive effect of R&D expenditure on export intensity is not supported.

Insert Table 3 about here

Hypothesis 2 suggests that family ownership negatively moderates R&D expenditure-internationalization relationship. In Model 2, the coefficient of the interaction term between family ownership and dummy is insignificant which suggests that family ownership has no effect on R&D expenditure-internationalization relationship. In Model 3, R&D expenditure has a negative impact on internationalization but the foreign corporate ownership positively moderates this relationship, which is in accordance to Hypothesis 3. The results from Model 4 show that the co-efficient of the interaction term between foreign financial investors and R&D dummy is not significant which is contrary to our Hypothesis 4. Hypothesis 5 states that business group diversification negatively moderates the R&D expenditure-internationalization relationship. Model 5 shows that the coefficient of the interaction term between business group diversification and dummy is negative, which is in accordance to Hypothesis 5.

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Finally, the co-efficient of the interaction term between business group internationalization and R&D expenditure is positive (Model 6) and is in accordance to Hypothesis 6. In summary, R&D expenditure has a negative impact on internationalization, but foreign corporate ownership and business group internationalization positively moderates, while business group diversification negatively moderates this relationship.

DISCUSSION

Internationalization patterns vary between developed and emerging markets. Well-established international business literature finds a positive correlation between innovation and exporting, but resource-constrained emerging market firms are more likely to have to make a choice between pursuing a strategy of exporting or channeling resources into innovation. In this study, we built on arguments from the international trade and corporate governance literatures in order to explore the effect of innovation on internationalization in the context of emerging market firms. We were particularly interested in the moderating effects of different ownership structures as institutional influences have been theorized to significantly impact the strategies and performance of emerging market firms (Peng, 2003). The results from our statistical tests lead to three principal findings, which we discuss below.

The link between innovation and internationalization for emerging market firms. Our finding of a negative relationship between research expenditures (an input into the innovation process) and export intensity adds to the literature on the patterns of internationalization of technologically-driven companies in the context of emerging economies. An argument has been made that firms in emerging economies are faced with numerous strategic trade-offs when internationalizing, making choices between foreign

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revenue exposure, country risk, and entry mode commitment in each country (Hashai, 2011). Under conditions of financial constraints, as the case is for the majority of emerging market firms, internationalization and innovation activities often become substitutes, although they are generally considered natural complements (Gorodnichenko & Schnitzer, 2010). Inputs in and outputs from the technology innovation process, in particular, may present conflicting tensions on internationalization patterns. While substantial research and development outlays create pressures to recoup the costs through increased revenue generation on a global scale, technological innovations (an output from innovation) which are sensitive to threats of competitive imitation or intellectual property rights infringements may create pressures to abstain from aggressive international expansion until a critical threshold in size or a technological breakthrough is reached.

Our findings support the arguments advanced by Kumar & Siddharthan (1994) in their study of the inter-firm variation in export behavior of Indian firms across 13 manufacturing industries. They argue that firms in developing or emerging markets are unlikely to achieve a competitive advantage from innovation because they are starting later, do not have the firm specific knowledge or vertical integration economies, suffer from shorter product life-cycles under which to recoup investment, and generally are less geographically diversified. From this, they suggest that the level of technology in an industry matters in that firms competing in industries with relatively low technology may achieve a competitive advantage based on imitation, but in firms competing in higher technology industries, or in industries based on introducing innovative new products or services, imitation advantages matter less. Our findings of a negative relationship between innovation and export intensity also supports Bruche's (2011) analysis of the challenges faced by Indian pharmaceutical companies in their competition with major global pharmaceutical companies. Bruche (2011) concludes that in "fortress industries" such as pharmaceuticals, due to the interaction of global oligopolistic structures, complex and multiple complementary resource

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and capability requirements or intellectual property and brand walls, the catch-up process – if left to market forces – may take up much longer. In sum, our findings suggest that there is a significant tension between allocating scarce resources for internationalization and for research and development, and in the context of Indian pharmaceuticals, where imitation has been superseded by a mandate for innovation, this tension affects internationalization.

The role of ownership structures. We found that ownership structure matters, although not to the extent we initially surmised. More specifically, we found that, as expected, foreign corporate ownership enhances the relationship between research intensity and export intensity. Our findings support arguments about the knowledge spillover and technology diffusion benefits of foreign direct investment (Görg & Greenaway, 2002). Our findings also support the broad conclusions drawn by Lall and Mohammad (1983), however while the context of both of our studies is Indian firms, the regulatory context in India has undergone significant changes since they conducted their inquiry. Finally, our study offers additional empirical support to the line of work started by Yi et al (2012) who found, in a large sample of Chinese firms, that foreign ownership positively moderates the effects of innovative capabilities on export performance.

While statistical results confirmed our hypothesis with respect to foreign ownership, we found no support for the effects of either family ownership or ownership by foreign financial institutions. It may be that the access to information on international markets and the reduced costs of doing business internationally have decreased the perceived risks of international expansion, thereby mitigating the traditional risk aversion of both family-owned firms and firms owned by foreign institutional investors. An alternative explanation, as will be discussed below, is the strong effect of business group embeddedness, which may eclipse the effect of equity ownership.

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The role of the business group. In line with a long lineage of research on the important role of business groups in emerging markets (see Carney et al., 2011, for a recent review of the role of business groups in emerging markets), we found that the degree of diversification and the degree of internationalization of the business group significantly affects the strength of the innovation-internationalization relationship in the Indian pharmaceutical sector. Importantly, we found that firms belonging to overly diversified business groups may not be able to translate their research expenditures into a corresponding increase of the share of exports in their revenues. In contrast, the degree of internationalization of the business group is clearly beneficial, suggesting that firms affiliated with internationalized business groups can derive significant synergies and learn from the internationalization experiences of other group members.

Boundaries and limitations

As with all research, our study has a number of limitations. Specifically, as is common to all single industry studies, the issue of generalizability beyond the context of the Indian pharmaceutical industry is of concern. While the conclusions that we draw from the study are applicable in the pharmaceutical industry, we suggest that our results may be applied to other industries, as well. For example, two other major industries in India that have a global presence are automotives and its ancillaries, and information technology. Future researchers may look into both of these industries to test the validity of our results. Second, our measure of internationalization (foreign sales to total sales) is coarse. More fine grained measures such as the entropy measures that incorporate both the breadth (number of countries) and the depth (relative importance of each market) of internationalization might lead to a better understanding of the relationships that we have explored in this study. Data limitations prevent us from using such measures. Similarly, our measure of R&D capabilities in terms of R&D expenditure is also rudimentary.

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Future studies may incorporate the effect of R&D expenditure in terms of new patents filed or new products introduced in the markets. Finally, as our study only looks at firms affiliated to business groups, future researchers may examine similar hypothesis related to unaffiliated firms.

IMPLICATIONS AND CONCLUSIONS

Limitations notwithstanding, our study seeks to make three contributions to the international business literature. First, we explore the link between innovation and internationalization in the context of an emerging economy, an area relatively unexplored by prior research. Next, we systematically investigate the moderating effect of different ownership structures on the strength of this relationship. Last, but not least, we test our hypothesis using rich panel data, allowing us to track the dynamics of change over time.

Our study looks at the very root of globalization and liberalization in an emerging economy. A potentially rich area for theory building is open wherein future researchers can build on the effect of firm level factors that help in shaping the innovation-internationalization debate. Additional large-sample studies in multiple industries and different geographical and institutional contexts should attempt to refine and validate our hypotheses and formulate new ones. Such studies may go a long way to clarifying the important linkages between changes in innovation and capability configurations and internationalization. To practicing managers, our study fleshes out the tensions between investments in innovation and investments in internationalization and brings to the fore the dynamics of capability creation and capability exploitation through the internationalization process. To public policy-makers, the implications from our study strongly suggest that public policy mechanisms need to be put in place in order to enhance the positive externalities of business group affiliation.

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Table 1. Variable definitions

Internationalization Measures

FSTS : Ratio of foreign sales to total sales

Explanatory variables

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Dummy: A proxy for expenditure in R&D. The dummy variable takes a value of 1 for firms which have R&D expenditure; 0 otherwise

FAMO :Percentage of shareholding by founding member’s family, including those held by family members and family foundations, as well as those held by group firms.

FORC :Percentage of common shares held by foreign corporations.

FII :Percentage of common shares owned by foreign financial institutions

BGD :Business group diversification, measured as $\sum_i P_i \ln(1/P_i)$, where P_i is the proportion of affiliated firm’s sales over the total sales of the business group

BGI :Business group foreign sales to the total sales of the group

Control variables

SIZE : Natural logarithm of sales

AGE : Years since the incorporation of the firm

LEVERAGE: Leverage defined as the ratio of total debt to total assets

CR : Current assets by current liabilities

ROA : Return on assets, defined as operating profit before depreciation, taxes, interest and other amortization charges over total assets

Table 2: Descriptive Statistics and correlations

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1. FSTS	0.37	0.24	1.00	-0.03	0.02	-0.05	-0.01	-0.14	0.01	0.05	-0.09	0.17	-0.16
2. SALES*	4244	10024		1.00	-0.02	0.12	0.49	0.08	0.01	-0.06	0.02	0.16	0.12
3. FAMO	64.97	20.79			1.00	0.01	-0.02	0.03	0.02	0.01	0.03	-0.00	-0.01
4. FORC	3.75	6.35				1.00	0.21	0.03	0.01	-0.05	0.02	0.17	0.02
5. FII	1.59	5.03					1.00	0.15	-0.02	-0.02	-0.07	0.01	0.17
6. AGE	25.30	15.65						1.00	-0.04	0.03	0.01	-0.11	0.02
7.LEVERAGE	1.55	1.18							1.00	0.07	0.05	-0.04	0.21
8. CR	3.26	2.27								1.00	-0.07	0.03	-0.15
9.BGD	1.06	1.64									1.00	-0.27	0.05
10. BGI.	0.23	0.19										1.00	0.04
11. ROA	0.31	0.57											1.00

N=219, All correlations above 0.14 are significant at 0.05 or below Measured in Rs in million

Table 3: Panel data estimation with internationalization as the dependent variable

Variable	Base line		Interaction Models			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6

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Constant	0.222** (0.031)	0.221** (0.031)	0.222** (0.031)	0.226** (0.031)	0.212** (0.030)	0.245** (0.029)
Dummy	-0.093** (0.019)	-0.101* (0.044)	-0.092** (0.022)	-0.103** (0.020)	-0.045* (0.023)	-0.267** (0.028)
FAMO	0.000 (0.000)	0.000 (0.000)	(0.000) 0.000 (0.000)	0.000 (0.002)	0.000 (0.002)	0.000 (0.000)
FORC	0.003* (0.001)	0.002* (0.001)				0.001 (0.001)
FII	-0.000 (0.001)	-0.001 (0.002)		-0.001 (0.002)	-0.023** (0.007)	-0.002 (0.002)
BGD	-0.005 (0.004)	-0.005 (0.005)		-0.005 (0.004)	-0.005 (0.004)	0.007 (0.006)
BGI	0.197** (0.041)	0.198** (0.041)		0.197** (0.041)	0.189** (0.041)	0.184** (0.040)
SIZE	0.027** (0.003)	0.027** (0.004)		0.027** (0.004)	0.028** (0.004)	0.028** (0.003)
AGE	-0.002** (0.000)	-0.002** (0.000)		-0.001** (0.000)	-0.002** (0.000)	-0.001** (0.000)
LEVERAGE	-0.003 (0.006)	-0.003 (0.005)	(0.006)	(0.006)	(0.006)	0.005 (0.005)
CR	0.005+ (0.003)	0.005* (0.003)				0.005+ (0.003)
ROA	-0.024** (0.009)	-0.024* (0.009)		-0.024** (0.009)	-0.0237** (0.009)	-0.024** (0.009)
FAMO*Dummy		0.000 (0.001)				
FORC* Dummy					0.023** (0.007)	
FII* Dummy					-0.000 (0.003)	
BGD.* Dummy					-0.040** (0.009)	
BGI.* Dummy						0.729** (0.087)
R ₂	0.106	0.105		0.112	0.106	0.121
Δ R ₂		-0.001		0.006	0.000	0.015
F Stat	9.719***	9.107***	9.656***	9.104***	10.422***	14.115***
No. of Obs.	1095	1095		1095	1095	1095

+ p<0.10. *p <0.05. **p <0.01; Standard errors are in parentheses