

THE ADVANTAGES OF FOREIGNNESS IN INNOVATION

I analyze the innovativeness of manufacturing subsidiaries of foreign multinational enterprises (MNEs) in comparison to domestic firms. I argue that subsidiaries of foreign firms are more innovative than domestic companies, not only because they receive technology from the MNE as traditionally argued, but also because they are more effective at transforming R&D investments into innovations. Unlike domestic firms, subsidiaries of foreign firms face two sets of pressures, one at the MNE level in the corporate factor market and another at the host-country level in the consumer market. Rather than diverge, as has been argued by MNE studies using neo-institutional theory, these pressures converge in influencing subsidiaries to be more innovative than domestic firms.

(113 words)

Key words: innovation, competition, R&D, foreignness, domestic, multinational firms, technology strategy, neo-institutional theory

This study examines the innovativeness of manufacturing subsidiaries of foreign firms in comparison to domestic companies. Innovation is key for the advantage of the firm (Christensen and Bower, 1996; Helfat, 2000; Leiponen, 2008; Teece, Pisano, and Shuen, 1997); the firm's ability to search to create new products is critical for achieving market share, market value and survival (Banbury and Mitchell, 1995; Cottrell and Nault, 2004; Nekar and Roberts, 2004). However, despite this, we do not know whether there are differences in innovativeness between manufacturing subsidiaries of foreign firms and domestic companies; no tests have been done. More importantly for research, there are two competing answers to the question. On the one hand, studies of multinational enterprises (MNEs) assume that subsidiaries of foreign firms are more innovative than domestic firms because they receive innovations from the parent firm (Bartlett and Ghoshal, 1989; Buckley and Casson, 1976; Hymer, 1976; Vernon, 1966); this argument has not been empirically tested, however. Related studies on innovation within MNEs compare the innovativeness among research and development (R&D) subsidiaries in the MNE (e.g., Frost, Birkinshaw and Ensign, 2002; Phene and Almeida, 2008), but they do not compare the innovativeness of subsidiaries of foreign firms to domestic companies. On the other hand, research that directly compares subsidiaries of foreign firms to domestic companies has argued that subsidiaries of foreign firms are at a disadvantage over domestic firms. These studies propose that subsidiaries of foreign firms suffer from a cost of doing business abroad (Hymer, 1976) or a liability of foreignness (Zaheer, 1995) and as a result they have lower profitability and survival than foreign firms (e.g., Zaheer, 1995; Zaheer and Mosakowski, 1997; see Kronborg and Thomsen, 2009 for a recent review). However, this research has not compared differences in innovativeness between subsidiaries of foreign firms and domestic companies.

Hence, in this paper I explain and explicitly test differences in the innovativeness of subsidiaries of foreign firms in comparison to domestic firms by linking studies in technology strategy (e.g. Helfat, 1997, Henderson, 1993; Leiponen, 2005; Tripsas, 1997) with ideas from the application of neo-institutional theory to the study of the MNE (e.g. Kostova and Roth, 2002; Westney, 1993). I propose that subsidiaries of foreign firms enjoy an advantage of foreignness in innovation, that is, they are more innovative than domestic firms. The reason is not only that they receive innovations from other parts of the MNE, as has been traditionally suggested, but also that they are more efficient at converting R&D investments into innovation. This second argument is explained by how two sets of pressures, from other subsidiaries in the MNE and from the local environment, induce subsidiaries to act differently from domestic firms and increase their efficiency in R&D. Empirical results of the comparison between the innovativeness of manufacturing subsidiaries of foreign firms and that of domestic firms suggest that subsidiaries of foreign firms are more likely to have more product innovations, and that the R&D investments undertaken by subsidiaries of foreign firms are more likely to result in more product innovations.

These arguments and findings extend previous research in two ways. First, the arguments extend studies of technology strategy, in particular innovation in the MNE. They provide an explanation and test that directly compares the innovativeness of subsidiaries of foreign firms and domestic companies. This is a comparison that has not been directly analyzed before despite its importance. Moreover, the paper goes beyond traditional explanations of the innovativeness of subsidiaries of foreign firms that have argued that they benefit from the transfer of innovations from abroad. It argues that, additionally, subsidiaries are more efficient at transforming R&D investments into product innovations than domestic firms. The explanation highlights differences

in behavior that go beyond merely being foreign and that focus on the strategic actions taken by subsidiaries of foreign firms, actions that domestic firms would find difficult or costly to imitate.

Second, the arguments extend the application of neo-institutional theory to the study of the MNE. They build on the idea that a subsidiary of an MNE is subject to pressures from the parent firm and pressures from the local environment. However, rather than argue that these pressures exert diverging influences on the behavior of the subsidiary, as has been traditionally proposed, I argue that such pressures exert converging influences on the subsidiary in the realm of innovation. Hence, the paper extends theory by identify boundary condition of previous arguments; whereas influences of the MNE and local environment pressures diverge when trying to achieve legitimacy, they may converge when trying to achieve other strategic behavior such as innovation. This argument helps extend neo-institutional theory beyond the claim that subsidiaries of foreign firms imitate the behaviors of domestic firms, instead calling for more agency in the way neo-institutional theory has been applied to the study of the MNEs. I explain why, at least in the area of innovation, subsidiaries of foreign firms play an active role in differentiating themselves from domestic firms and other subsidiaries.

The remainder of the paper is organized as follows. In the next section, I briefly summarize the two research streams upon which I build and then link them to explain why I argue that MNE subsidiaries are more innovative than domestic firms. In so doing I present two testable hypotheses, one based on the traditional argument and a second based on the new argument introduced here. I then present the research design and describe the results of the analyses. I conclude the paper by summarizing the contributions to the literature and its limitations.

THEORY AND HYPOTHESES

To analyze the innovativeness of subsidiaries of foreign firms to domestic companies I integrate two theoretical streams that have been running mostly in parallel: technology strategy explanations of innovation and neo-institutional explanations of the behavior of subsidiaries of foreign firms. I link the two lines of research discussed above because their viewpoints complement each other in answering the research question.

Technology Strategy, Competitive Pressures, and Innovation

The technology strategy literature focuses on identifying the determinants of innovation. Its key arguments were laid down by Joseph Schumpeter, who proposed the idea of creative destruction, whereby innovations by new firms will result in the replacement of incumbent companies (Schumpeter, 1934). This threat of replacement induces incumbent firms to innovate to ensure their future (Greve, 2003; Tripsas, 1997). Thus, in essence, competitive pressures force firms to innovate.

However, this line of research has not focused on analyzing differences in innovative behavior between foreign firm subsidiaries and domestic firms. Most of the studies on innovation do not make this distinction, instead focusing on the firm and industry characteristics that lead firms to innovate (see reviews in Fagerberg, Mowery, and Nelson, 2005). A subset of the literature on innovation in MNEs has focused on innovation in the parent MNE and its subsidiaries, comparing MNE subsidiaries to one another (e.g., Buckley and Casson, 1976; Frost et al., 2002; Vernon, 1966; Zhao, 2006). Nevertheless, this line of research has not established comparisons to domestic firms; at most, it has argued that at the initial expansion into the foreign country, the foreign firm enters the country because it has a perceived advantage of technology over domestic firms (Buckley and Casson, 1976). It remains unclear whether subsidiaries are

more innovative than domestic firms, or merely conduits for innovations developed elsewhere. Hence, in the present paper, I aim to establish a direct comparison and test for differences.

Neo-institutional Theory, Subsidiaries of MNEs, and Isomorphic Pressures

Neo-institutional theory has been used to explain the competing pressures faced by subsidiaries of foreign firms. The theory focuses on firms' achievement of legitimacy and how firms deal with three sets of isomorphic pressures (regulatory, normative and cognitive) that drive them to imitate each other (Scott, 1995). In the case of the subsidiary of an MNE, it faces two sets of isomorphic pressures which result in diverging directions (Kostova and Roth, 2002; Westney, 1993). On the one hand, the local environment where the subsidiary operates pressures it to imitate domestic companies and conform to the domestic environment. On the other hand, the parent MNE pressures the subsidiary to imitate and conform to other subsidiaries in the MNE. As a result of the divergence of these pressures, subsidiaries of foreign MNEs imitate the behaviors of either local firms or other subsidiaries in the MNE.

However, the theory has limitations in its explanation of innovation by firms. Its focus is explaining how firms imitate an innovator, but not why a firm innovates in the first place. The theoretical mechanisms are designed to explain isomorphism and diffusion of practices that increase firms' similarity because its core research question is why organizations tend to be similar (Poole and Van de Ven, 2004). The traditional explanation of innovation in this theory is that a firm finds itself under a different set of environmental conditions and has to innovate to achieve consistency with the environment. Once this firm innovates, other companies imitate such innovations, conforming to the isomorphic pressures to achieve legitimacy. I extend this theory to better understand innovation, specifically in subsidiaries of foreign firm in comparison to domestic companies.

Innovativeness of Subsidiaries of Foreign Firms in Comparison to the Domestic Firms: The Advantage of Foreignness in Innovation

Two arguments explain the idea that subsidiaries of foreign firms have an advantage of foreignness in innovation, that is, that they are more innovative than domestic firms. The first one is the traditional idea that subsidiaries of foreign firms receive innovations from the MNE. The second one is the idea I introduce here that, in addition to receiving innovations, subsidiaries of foreign firms are more efficient at converting R&D investments into innovation. I briefly review the first idea and explain in detail the second one.

However, before discussing the arguments, I need to establish some theoretical boundaries. First, the current study explains differences in innovativeness of established subsidiaries of foreign firms and domestic firms. It is not designed to explain differences in innovativeness of subsidiaries of foreign firms that have just entered the foreign country. Such firms are likely to innovate only through the transfer of innovations from other parts of the MNE because they have not had time to establish their R&D investments in the country. Second, the current study explains the innovativeness of manufacturing firms. It is not designed to explain innovativeness of service firms. These firms follow a different innovation processes (Dougherty, 2004; Leiponen, 2008). Additionally, it is not designed to explain innovativeness of R&D firms. These firms differ in their innovativeness because they specialize in the creation of new ideas that can then be used by other subsidiaries or firms to make new products (Ambos and Schlegelmilch, 2007; Cantwell and Mudambi, 2005; Frost et al., 2002). Third, the paper analyzes innovativeness in the form of product innovations (Helfat and Raubitschek, 2000; Nerkar and

Roberts, 2004). The study is not designed to analyze other forms of innovativeness such as operations, organizational or marketing innovations¹.

Traditional argument: Advantage of foreignness in innovation through transfer of innovations from other parts of the MNE. The traditional explanation for why subsidiaries are more innovative than domestic firms is that by being part of the MNE they receive innovations from it. This explanation goes back to the initial discussions of the existence of MNEs. Thus, Vernon (1966) explains that firms expand abroad to sell innovations created in the home-country. Hymer (1976) proposes that firms expand into foreign markets because they have superior knowledge in some areas in comparison to firms in the host country. Buckley and Casson (1976) argue that foreign firms have superior innovations and technologies in comparison to domestic competitors that compensate for the costs of doing business abroad.

This idea has been refined more recently by studies that have analyzed the mechanisms that facilitate the transfer of innovations from other parts of the MNE. Thus, Bartlett and Ghoshal (1989) and Ghoshal and Bartlett (1990) propose methods to organize the MNE and manage people to facilitate the transfer of knowledge and innovation in the network of subsidiaries. Kogut and Zander (1993) explain that the MNE exists because it is superior to markets at transferring knowledge and innovations across country borders; such transfer is especially difficult when knowledge is tacit. Kuemmerle (1997) proposes that MNEs have dispersed their R&D centers across the world to either undertake research or development of new products that are later transferred to manufacturing subsidiaries. Birkinshaw and Hood (1998) argue that some subsidiaries become centers of excellence and act as sources of innovation for others. Frost et al. (2002) explain how centers of excellence of R&D subsidiaries can provide knowledge and expertise to other subsidiaries to help them innovate and compete.

¹ I thank an anonymous referee for suggesting this theoretical boundary.

Applying these ideas to our research question would suggest that subsidiaries of foreign firms are more innovative than domestic firms because they can rely on the parent MNE and other subsidiaries in the network for innovations. Innovations and technology developed in other countries, especially by specialized R&D subsidiaries, are transferred to the manufacturing subsidiary of the foreign firm, enabling it to achieve higher levels of innovation without the need to undertake its own R&D. In this sense, the subsidiary is being subsidized in its R&D efforts by being part of the MNE. Domestic competitors would not be able to replicate or imitate this action easily because the MNE has control over its technologies and innovations and would actively protect them from imitation using external mechanisms such as the patent system and internal mechanisms such as systemic complexity and causal ambiguity. These arguments are an extension of previous arguments but have not been empirically tested before. Hence, I summarize them in the following hypothesis:

Hypothesis 1. Subsidiaries of foreign firms are more likely to be more innovative than domestic firms.

New argument: Advantage of foreignness in innovation through higher efficiency in transforming R&D investments into innovations. In addition to the traditional explanation, I argue that subsidiaries of foreign firms are more innovative than domestic firms because they are more efficient at transforming their R&D investments into innovation than domestic firms. To explain this, I link the idea from neo-institutional theory that a subsidiary of a foreign firm faces two levels of pressures, one at the level of the MNE and another at the level of the host country (Kostova and Zaheer, 1999), with the idea from technology strategy studies that firms innovate because of competitive pressures (Schumpeter, 1954). As a result, I propose that subsidiaries of foreign MNEs are more effective at transforming R&D into innovation than domestic firms

because they face two sets of pressures to innovate: one at the host country level, where the subsidiary of the MNE is competing against local firms for customers, and another at the MNE level, where the MNE subsidiary is competing against other subsidiaries of the MNE for support from the parent company. These pressures exert converging influences on the behavior of the firm, rather than diverging influences as has been traditionally argued in neo-institutional theory, and induce the subsidiary to be more efficient in innovation.

Competitive pressures from the host country. Competitive pressures in the host country in the form of customer discrimination induce subsidiaries of domestic firms to differentiate themselves through innovation. All firms face competitive pressures at the industry level to innovate for fear of being replaced by competitors (Ceccagnoli, 2009; Christensen and Bower, 1996; Schumpeter, 1934; Tripsas, 1997); however, subsidiaries of foreign firms face additional competitive pressures that domestic competitors do not face. Specifically, consumers have biases against products of subsidiaries of foreign firms simply because of the parent firm's foreign origin (Bilkey and Nes, 1982; Jaffe and Nebenzahl, 2001). Negative feelings towards foreign products can arise because consumers think products from certain countries are of inferior quality (Elliott and Cameron, 1994), have animosity toward a country (Shoham et al., 2006), or consider it wrong, almost immoral, to buy foreign products (Shimp and Sharma, 1987). Recently, Evanschitzky et al. (2008) confirmed prior findings that consumers are biased for products made by domestic firms and against products made by foreign firms. Moreover, domestic competitors can play on nationalism and reinforce these biases to further discourage customers from purchasing products of foreign firms (Shoham et al., 2006). To overcome such biases subsidiaries of foreign firms can provide customers with more innovative products that compensate for the perceived negative biases. Once the products are more innovative, the

company can highlight such innovativeness with marketing campaigns to reduce negative perceptions about being foreign (Suzuki, 1980).

The subsidiary of the foreign firm can use two sets of actions to become more innovative than domestic firms, actions that domestic firms would find costly to imitate: R&D investments that integrate existing foreign knowledge with local knowledge, and selection and training of employees to build on employees abilities to integrate local and foreign knowledge.

First, the subsidiary of the foreign firm can focus its R&D investments to integrate the foreign knowledge it receives from the MNE with local knowledge it obtains in the host country and innovate. As I discussed before, by being part of the MNE the subsidiary of the foreign firm gets a technology subsidy in the form of innovations developed elsewhere. This reduces the need for the subsidiary of the foreign firm to develop all its innovations. However, instead of merely relying on innovations developed elsewhere the subsidiary can leverage this technology subsidy additionally by investing in R&D to generate more innovations. The subsidiary can integrate knowledge and innovations from other countries with knowledge from the local conditions of the country to achieve additional innovation. These additional innovations can take the form of not only the adaptation of prototypes and innovations received to the conditions of the local country, but also the creation of unique new products that rely on underlying systemic and component innovations received from the MNE. Thus, the subsidiary achieves higher efficiency in R&D in developing innovations because it can rely on R&D done elsewhere in the MNE.

Second, the subsidiary can manage its personnel to integrate knowledge from outside the country with local knowledge and generate new products. First, the subsidiary of the foreign firm selects some or all of its personnel that have a better attitude and understanding of foreign knowledge which is useful for innovations. Since the personnel are working for a foreign firm,

the subsidiary may select employees based on their existing receptive attitudes towards foreign ideas and knowledge about foreign countries such as languages or international work experience. These favorable attitudes facilitate the integration of the subsidiary with the rest of the MNE. This same selection can become a favorable element in the process of innovation because the employees are better at integrating foreign and domestic knowledge to create new products. They already have the needed attitude and knowledge that facilitates the transfer of foreign innovations and their combination with local knowledge to generate innovations. Second, the subsidiary of the foreign firm develops employees to be exposed to a variety of foreign ideas which in turn can result in innovation as these foreign ideas are combined with the domestic knowledge of the individuals. Valuable overseas knowledge for creating new products tends to be tacit and context-dependent (Subramaniam and Venkatraman, 2001). Subsidiaries are likely to provide employees work experiences in the country of the parent company as well as in other country subsidiaries. These experiences are part of the development process of new employees where they are rotated to different country subsidiaries to learn about the various operations in the MNE. These same training allow subsidiaries access to a great diversity of knowledge, which is useful for innovation and also facilitates its transfer (Hansen, 1999; Tsai, 2001). Subsidiaries can build these relationships by exchanging personnel across subsidiaries (Nohria and Ghoshal, 1997) and by involving individuals from other subsidiaries in their new product development process (Hansen, 1999; Subramaniam and Venkatraman, 2001). These relationships enable the exchange of ideas and knowledge that could be useful for creating new products. Studies using laboratory experiments have found a positive relationship between living abroad and creativity, a process of bring into being something that is both novel and useful (Maddux and Galinsky, 2009). Foreign experiences result in employees becoming more curious about and open to new

and useful ideas and are more mentally ready to accept and search for novel insights from unfamiliar sources in searching for new knowledge when conducting R&D, helping the firm innovate.

It is costly for domestic competitors to imitate such actions. Domestic competitors can invest in R&D and select and train individuals to integrate foreign knowledge with domestic knowledge to create innovations. However, this would be more expensive than for subsidiaries of foreign firms because they would be undertaking new investments with the purpose of innovating. In contrast, the subsidiary of the foreign firms has already undertaken such investments as part of its operations. It has undertaken part of the research in other parts of the MNE and thus requires only a smaller complementary R&D investment to achieve innovations. Moreover, it has undertaken the selection and training of personnel with the understanding of foreign knowledge as part of its human resource management policies. As a result, the subsidiary of the foreign firm can achieve higher efficiency in how its R&D investments result in innovations than a domestic company can because it requires smaller investments to integrate foreign and local knowledge.

Competitive pressures from the MNE. Competitive pressures from other subsidiaries within the MNE in the form of mandates and support from the parent also drive the subsidiary of the foreign firm to be more innovative than domestic firms. Subsidiaries are in competition with each other for continued support from the parent MNE (Bouquet and Birkinshaw, 2008). They can achieve this by lobbying for resources and showing better investment prospects than other subsidiaries. These prospects depend not only on host country characteristics, but also on the actions of the subsidiary (Birkinshaw and Hood, 1998). The best subsidiaries get new mandates and receive additional support. Thus, to become better than other subsidiaries, the focal

subsidiary may focus on innovating and generating new products that enable it not only to operate better in the host country, but also to contribute to the overall operations of the MNE. Subsidiaries that are leading innovators and that contribute to the MNE's overall competitiveness rise in importance within the MNE and get additional resources and status, while those that are not as innovative do not receive such recognition and support (Frost et al., 2002; Phene and Almeida, 2008). Although the parent company may subsidize poor performance at the initial entry into the foreign market, over time the parent company expects subsidiaries to have developed capabilities and meet their mandates (Birkinshaw, 1996). Based on the level of capabilities, the subsidiary can keep its current charter to operate, gain, or lose it to another subsidiary (Birkinshaw and Hood, 1998: 783). Therefore, subsidiaries are in competition with each other to be seen as having superior capabilities by the parent company to ensure that they keep their current charters and associated resources or have them extended. A byproduct of this competition among subsidiaries of the MNE for support is that subsidiaries of foreign firms become more innovative than domestic firms, which are not subject to this competitive pressure.

The subsidiary can use two actions to deal with the pressure at the MNE level and innovate. One involves investing in R&D by establishing relationships with local sources of knowledge that reinforce the knowledge received from other parts of the MNE and enable it to innovate in comparison to other subsidiaries. Another involves managing employees for actively scanning the local environment for ideas and opportunities for innovation that build on the foreign knowledge of the MNE. As a result, the firm not only innovates and improves its standing in relationship to other subsidiaries, but also becomes more efficient at innovation than domestic companies because, although it invests in obtaining local knowledge, it saves on the investments in foreign knowledge.

First, the subsidiary of the foreign firm can integrate knowledge from local sources with foreign knowledge to generate innovations that other subsidiaries cannot replicate. Subsidiaries can establish relationships with host country firms and organizations in order to acquire knowledge that allows them to make new products, helping compensate for their foreignness. They can collaborate with local customers, suppliers and universities in search of new ideas for generating new products (Belderbos et al., 2004, van Beers, Berghäll and Poot, 2008 von Hippel, 1986, 2007; Takeishi, 2001; Agrawal, 2006). They can even involve them directly in the new product development process (Takeishi, 2001; Von Hippel, 1986, 2007). These collaborations provide the subsidiary with knowledge that is unique and can be combined with the knowledge from other parts of the MNE to innovate products in a way that other subsidiaries of the MNE cannot.

Second, the subsidiary develops employees to challenge the assumptions of the local environment, identifying new opportunities that make use of foreign and local knowledge to innovate products. As subsidiaries of foreign firms select and develop employees to understand foreign knowledge better, they develop them to question deep-seated assumptions about the environment and the relationship of the firm with the environment. The environment of the firm differs between home and host countries. To be able to integrate the operation in the MNE and transfer knowledge across countries, employees need to be able to decontextualize knowledge from its environment. This way they can understand the culture of the company and its competitive advantage separate from the conditions of its country of origin. This development of employees to question assumptions of the environment and the decontextualization of knowledge is not only useful for integrating operations but also for innovation. The employees of the subsidiary of the foreign firm can analyze the local environment and identify opportunities for

innovation that employees of firms with no such training may not be able to do. Whereas the former question such as how and why things are done in the country, the latter take for granted the conditions of the environment. This questioning of assumptions enables employees of the subsidiary to identify new opportunities that are available in the local market, opportunities that employees in other subsidiaries may not observe because they are in other countries, or that employees in domestic firms cannot observe because they take for granted the conditions of the environment. Thus, the development of employees undertaken to facilitate the integration of the subsidiary can help it innovate in response to the competitive pressures among parts of the MNE.

It is difficult for other subsidiaries of the MNE to imitate the particular actions. Whereas in principle all subsidiaries of the MNE can establish relationships with local sources of knowledge and develop employees to question the assumptions behind knowledge, the subsidiaries differ in the specific local knowledge they access and how they integrate this with foreign knowledge. Each subsidiary will access its local knowledge sources and would show different recombinations of knowledge and innovations as a result of the different local conditions. Hence, in part the success at innovation of the subsidiary would depend not only on its efforts, but also on the characteristics of knowledge in the country of operation. However, this discussion is beyond the scope of the paper because the focus is the comparison between subsidiaries of foreign firms and domestic companies.

It is also difficult for domestic companies to imitate the actions of the subsidiaries. Domestic competitors can establish relationships with local sources of knowledge but it would be more costly for them to access foreign technologies and innovations since they would have to pay for them directly. In contrast, the subsidiary has such foreign technologies and innovations subsidized by the network of subsidiaries. Additionally, the domestic competitors can develop

their employees to question assumptions and the characteristics of the environment to identify new opportunities. However, such questioning would require a specific investment that the subsidiary of the foreign firm has already undertaken as part of its process of developing its employees. As a result of previous investments by the MNE in foreign knowledge and in the development of its personnel, it can achieve higher efficiency in R&D investments and be more successful at innovation. This efficiency is not only achieved by the lower investments in mechanisms that support innovation. It is also achieved through the access to foreign and domestic knowledge that domestic firms may not have and that increases the probability of success at innovation through the combination of different types of knowledge, foreign and local.

In sum, competitive pressures at the host country level and at the MNE level induce the subsidiary of the foreign firm to become more innovative than domestic firms. At the host country level, the subsidiary of the foreign firm compensates for the discrimination of its products through innovation. It achieves efficiency in its R&D investments by leveraging on previous investments in innovation by the parent firm and other subsidiaries and previous development of employees to have the ability to integrate foreign and local knowledge, investments that domestic companies have not undertaken. At the MNE level, the subsidiary of the foreign firm improves its standing in the network of subsidiaries through innovation. It achieves efficiency in its R&D investments by saving on investments in foreign knowledge and on the development of a questioning attitude among its employees that facilitates the identification of opportunities for innovation, investments that domestic firms have not done. In addition to the saving on investments, subsidiaries of foreign firms can achieve higher levels of innovation through the combination of foreign and local knowledge. The result of these pressures and the actions taken by subsidiaries of foreign firms in response to such pressures is higher

levels of innovation than domestic firms. Hence, these arguments are summarized in the following hypothesis:

Hypothesis 2. R&D investment of foreign firm subsidiaries has a higher positive impact on innovation than R&D investment of domestic firms.

RESEARCH DESIGN

Sample

I test my hypotheses on a sample of manufacturing firms in Spain. Data come from a survey of manufacturing firms operating in Spain and were collected by the SEPI Foundation in collaboration with the Ministry of Industry, Tourism and Commerce. The database has been used by other researchers to study diversification (e.g., Merino and Rodriguez, 1997), internationalization (e.g., Salomon and Shaver, 2005), and R&D investment (e.g., Cuervo-Cazurra and Un, 2007). However, it has not been used to compare the innovativeness of subsidiaries of foreign MNEs to that of the domestic firms.

Complete data are available for 785 firms over a period of 13 years, from 1990 to 2002. All firms operate in manufacturing industries, in codes 15 through 37 of the CNAE, the Spanish equivalent of the SIC classification. These include food, beverages, textiles, leather, shoes, apparel, wood, paper, construction materials, chemicals, plastics, metallurgy, machinery, computers, electronic products, automobiles, other transportation equipment, and precision instruments. This sample is representative of the underlying population of firms in manufacturing industries in the country. The sample includes firms dispersed throughout the country and includes small, medium-sized, and large firms; the average firm has €36.4 million in annual sales and 296 employees. Subsidiaries of foreign MNEs and domestic firms are present in all industries except leather manufacturing, where all firms in the sample are domestic.

Conclusions from the results were the same whether or not firms in the leather industry were included in the analysis.

Restricting the analysis to manufacturing firms helps me evaluate my hypotheses and reduces the influence of unrelated variables. The sample does not include subsidiaries that focus exclusively on R&D. There exists a different set of studies on MNEs that has focused exclusively on the R&D laboratories of MNEs (e.g., Frost et al., 2002). However, these are highly specialized subsidiaries whose nature and behavior differs from that of other subsidiaries (Cantwell and Mudambi, 2005). Including them would bias my results upward because their primary activity is R&D, whereas the typical foreign MNE subsidiary or domestic firm's main activity is making products to serve the needs of the customers. For the same reason, I do not include service firms, whose development of innovative capabilities is typically done at the same time as the undertaking of activities, thus possibly biasing the results downward since these companies are less likely to have formal investments in R&D (Dougherty, 2004).

Spain is a suitable location for conducting the empirical test. It is neither at the forefront of technological development nor behind in comparison to other countries in the world. Although it is a developed country according to the OECD, in terms of R&D investment as a percentage of gross domestic expenditure, a proxy of innovativeness of the country, it is above Slovak Republic and Hungary but below Sweden, Japan, United States, the United Kingdom, Norway, Korea etc. (for a review, see Cuervo-Cazurra and Un, 2007). However, its technological development is still likely to be higher than the majority of the countries in the world since most countries are still developing. Therefore, it is unlikely that the MNEs establish subsidiaries in Spain to benefit from its technological advancement. Additionally, Bartlett and Ghoshal (1986) would suggest that the strategic importance of the Spanish consumer market is not high enough

for subsidiaries to play “strategic leader” role in the MNE. Inclusion of strategic leader subsidiaries, typically those based in highly technologically developed markets, such as Japan and the United States, would potentially bias the results upward for subsidiaries since they could receive more resources and subsidies from the parent company than other types of subsidiaries. Strategic leader subsidiaries are expected to generate their own innovations as well as serve as sources of innovations to other subsidiaries, especially those that play “implementer” role. At the same time, the strategic importance of the Spanish market is unlikely to be so low that these subsidiaries play “implementer” role, which would bias the results downward against the subsidiaries; implementer subsidiaries would be expected to primarily exploit the competence of the parent company or that of strategic leader subsidiaries rather than developing their own innovative capabilities, as such, they receive fewer resources from the parent company.

Variables and Measures

Table 1 summarizes the variables and measures used in this study. The dependent variable is number of new products introduced by the firm in the year. Questionnaire respondents were managers in the firm; they were asked to list the number of new products introduced in the year. A new product was defined as either a product that was completely new to the establishment or that was a significant modification of an existing product. This measure of innovativeness of firms is used in other studies (e.g., Katila and Ahuja, 2001) and is appropriate since the main purpose of manufacturing firms is to make and sell products and compete with each other primarily on this basis (Cottrell and Nault, 2004; Nerkar and Roberts, 2004).

To test Hypothesis 1, which is based on the traditional argument that subsidiaries of foreign firms are more innovative simply by being part of the MNE, I created a variable ‘subsidiary of foreign MNE’. A subsidiary of foreign MNE is defined as a firm that has a foreign

company as owner of some or all of its stock. This classification is mutually exclusive and allows for unambiguous classification of companies for the purposes of the analyses. The sample includes 162 subsidiaries of foreign firms and 623 domestic firms.

To test Hypothesis 2, which argues that subsidiaries of foreign MNEs are more innovative because they are more efficient in converting their R&D investment into innovations, I create an indicator that captures the additional impact on innovation that R&D investments by foreign firm subsidiaries have on R&D investment by all firms. This indicator is the product of an indicator of the amount invested in R&D by an indicator that the firm is a foreign firm subsidiary. The variable 'R&D investment' is measured as the ratio of total expenditures in R&D to sales, multiplied by one thousand. This measure of R&D as a ratio of sales is similar to that used in previous studies of R&D (e.g., Cohen, Levin and Mowery, 1987; Greve, 2003). Unlike previous studies, I use per thousand rather than the percentage; this change in scale increases the magnitude of the coefficients, making them easier to interpret, without altering their statistical significance. I multiply R&D investments by the indicator that a firm is a foreign MNE subsidiary to evaluate how R&D investments by foreign firm subsidiaries have a differential impact on innovations than R&D investments by all other firms².

In testing Hypothesis 2, I control for the firm being a subsidiary of a foreign MNE. This captures the benefits of simply being part of the MNE. I also control for the amount invested in R&D. This captures the impact that R&D investments have on innovation, independently of the type of firm that undertakes the R&D (Greve, 2003; Helfat, 1997; Leiponen, 2005).

*** Insert Table 1 about here ***

I control for other determinants of innovations that are commonly discussed in the literature. First, I control for the employees' skills based on their level of formal education

² There are no differences in how domestic firms and foreign firm subsidiaries report their R&D expenditures.

(Leiponen, 2005). Following previous studies, employee skill level is measured by the percentage of employees with a university or technical college degree divided by total number of employees multiplied by 100. Second, I control for firm size because larger firms are likely to have more resources that support innovation. Size of subsidiary and domestic firms is measured using the value of total sales (Contractor et al., 2003). Third, I control for whether or not the domestic firm is a division of another firm, because these firms may receive technologies from the parent firm that make them more innovative. Division of domestic firms is measured using 1 or 0, representing whether or not the firm has a domestic company as owner of some or all of the stock and does not have a foreign firm as an owner of stock. Fourth, I control for whether the domestic firm is a multinational firm, because by being a multinational it may benefit from access to foreign technology, supporting its innovation. I measure this with an indicator that the firm has value-added activities outside Spain and that a foreign investor does not own its stock. Fifth, I control for other industry characteristics that influence R&D intensity, such as appropriability and technological opportunities (Levin, Cohen and Mowery, 1985). I employ an indicator for each industry using the two-digit CNAE, the Spanish equivalent of the SIC codes. Sixth, I control for year using an indicator for the year of study (12 years) because annual effects may affect the rate of innovation. Finally, I control for other unobserved firm characteristics with a random effects model. A fixed effect model is not appropriate because time-invariant variables and firms with no innovations in the period would drop out of the analyses.

Despite the strength of this research design, there are several limitations on the generalization of results to other settings; some theoretical boundaries are discussed above. First, the present study focuses on manufacturing firms, and results from this study may not be applicable to service firms. Second, this study includes firms in only one country. Although I

selected a country that is neither at the forefront nor at the bottom in terms of technological development, that provides the MNE with neither cost advantage nor disadvantage, and that is neither high nor low on strategic importance of the market, results may be limited to firms in countries with similar characteristics. For example, in countries that are at the forefront of technological development, such as the U.S. or Japan in some industries, domestic firms may have an advantage over subsidiaries of foreign MNEs due to their access to local technology, inducing foreign firms to purchase these domestic companies (e.g., Dunning and Narula, 2005).

Methods of Analysis

Since the dependent variable is the number of product innovations in the year, which takes positive integer numbers, the use of regression would yield biased results. Therefore, I use Poisson analysis, which is appropriate for count data, and negative binomial analysis, which is appropriate for count data with an overdispersion of zeroes and serves to check for the robustness of the analyses. I lag the independent variables one year as typically done in other studies using panel data. The general model of the study is the following:

$$\begin{aligned} \text{Innovativeness (number of new products)}_{it} = & \beta_0 + \beta_1 * \text{Subsidiary of foreign MNE}_{it-1} + \beta_2 * \\ & \text{Subsidiary of foreign MNE}_{it-1} * \text{R\&D investment}_{it-1} + \beta_3 * \text{R\&D investment}_{it-1} + \beta_4 * \text{Skilled} \\ & \text{employees}_{it-1} + \beta_5 * \text{Division of domestic firm}_{it-1} + \beta_6 * \text{Domestic MNE}_{it-1} + \beta_7 * \text{Size}_{it-1} + \beta_k \\ & * \text{Industry}_k + \beta_j * \text{Year}_j + \varepsilon \end{aligned}$$

In testing Hypothesis 1, the coefficient of interest is β_1 , which is the coefficient of the “subsidiary of foreign MNE”. A positive and statistically significant coefficient would provide support for Hypothesis 1, that subsidiary of foreign MNE is more innovative than domestic firms simply by being part of a foreign firm. In testing Hypothesis 2, the coefficient of interest is β_2 . A positive and statistically significant coefficient would provide support for Hypothesis 2 that

R&D investment by foreign MNE subsidiaries has a higher positive impact than R&D investment by domestic firms on their respective innovations.

RESULTS AND ANALYSIS

Descriptive Statistics and Correlations

Table 2 provides a summary of the descriptive statistics and the correlation matrix. The average number of new products generated by firms is three. The average R&D investment by firms is 6.9% of sales. The average of skilled employees is 8.4%. Some of the domestic firms are domestic MNEs; I control for these firm characteristics in the analyses. The average firm size is 5.1 million euros in total sales. It is interesting to note that the predictors are significantly correlated with each other. I tested and ruled out any multicollinearity problems by excluding highly correlated variables one by one. The results do not change in sign and significance, indicating limited multicollinearity problems (Greene, 2005).

*** Insert Table 2 about here ***

Hypotheses Testing

Table 3 presents the results of hypotheses testing. Model 3c uses the Poisson analysis to test Hypothesis 1 and Hypothesis 2. Model 3g uses negative binomial analysis to check the robustness of results of Model 3c. Both Hypothesis 1 and Hypothesis 2 are supported. The effect of being a subsidiary of a foreign MNE on innovations is positive and statistically significant across all models. This result suggests that, independent of R&D investment and other relevant factors, subsidiaries of foreign MNEs are more innovative than domestic firms simply by being part of the foreign MNE. This finding supports the traditional argument, which until now has not been tested, that subsidiaries are likely to be more innovative than domestic firms because they receive resources from the MNE that help them innovate (Buckley and Casson, 1976; Vernon,

1966). Specifically, a subsidiary of foreign MNE is likely to introduce 17.9% more new products than the domestic firms. In testing Hypothesis 2, I include the subsidiary of foreign MNE variable in the models so that I control for the effect of the traditional argument. Results support Hypothesis 2, that foreign firm subsidiaries are more innovative than domestic firms, not only because they are part of the MNEs, but also because of their superior capabilities to convert R&D investment into product innovations. The coefficient of the interaction term between subsidiary of foreign MNE and R&D investment is positive and statistically significant. This means that for an increase in R&D spending of 1% of total sales a foreign firm subsidiary generates 3% more in new products than domestic firms.

These results suggest that a subsidiary's R&D investments enable it to generate more new products than a domestic firm's R&D investments potentially thanks to the dual competitive pressures. The host-country level competitive pressures in the consumer market based on the foreignness of the subsidiaries, not only force them to invest in R&D, but also complement it with the development of employees to be better at searching for new product ideas internationally and transform them into new products. The competitive pressures at the MNE level, particularly for charter extension, such as becoming a center of excellence in innovation, drive subsidiaries to develop skills of employees even further to be more innovative and efficient at R&D than other subsidiaries. As a result, these dual pressures result in subsidiaries having superior innovative capabilities than domestic firms. Therefore, different from technology strategy studies that argue that consumer market pressures force firms to innovate and that R&D investments have similar effect on firms' innovation (Cohen and Levinthal, 1990; Greve, 2003), this study shows that a type of firm, such as a foreign firm, adds another layer of pressures to innovate and that the impact of R&D investment on innovation varies depending on firm type.

Second, unlike previous studies that argue that firms should conform to the isomorphic pressures of the host country institutional environment by imitating behaviors of local competitors and/or other subsidiaries in the MNE to achieve legitimacy (e.g., Kostova and Roth, 2002), the present research found support for the idea that these pressures can potentially reinforce each other in driving subsidiaries to differentiate themselves from both the domestic firms and other subsidiaries.

*** Insert Table 3 about here ***

Robustness tests

I conducted additional tests to check for the robustness of the results and to rule out alternative explanations. The results of these analyses, not presented for the sake of brevity, support conclusions similar to the ones discussed here. First, I separate R&D inactive firms from those that are active in R&D and ran the test only for R&D active firms. Results are consistent with results reported above for all firms. In fact, when considering only R&D active firms, there is a bigger effect of R&D investment by foreign firm subsidiaries on their innovations than R&D investments of domestic firms on their innovations. Second, I separated total R&D investment into internal R&D and external R&D and ran the analysis using internal R&D controlling for external R&D. Internal R&D is the amount of money as a percentage of sales spent on research being conducted inside the subsidiary and inside the domestic firm. External R&D is the amount of money spent as a percentage of sales on contract R&D, which is the amount of money paid to other firms, agencies, research institutes to conduct R&D on behalf of the firm. Results indicate that internal R&D of subsidiaries has a larger impact on their innovations than that of domestic firms on their innovations. Third, I also examined whether subsidiaries tend to be more innovative in certain industries and not others to determine whether there is agglomeration of

firms in certain industries in the selected empirical setting. Of the twenty industries in which I have data, I divided firms into two categories, those that are considered to be in the high-technology industries (computers, electronic products, automobiles, precision instruments) and those that are considered to be in low-technology industries (food, beverages, textiles, leather, shoes, apparel, wood, paper, construction materials, chemicals, plastics, metallurgy, machinery, and other transportation equipment). Results indicate that foreign firm subsidiaries are more innovative in the high-technology industries than domestic firms, while there are no significant differences between these types of firms in low-technology industries. Fourth, I ran analyses with an indicator that the foreign firm owns more than 10%, 25%, or 50% of stocks of the firm, to account for different levels of control of the foreign firm. Results are consistent with those discussed in the study.

CONCLUSIONS

This study compares the innovativeness of manufacturing subsidiaries of foreign MNEs to that of domestic firms. Existing research has not properly discussed and tested whether foreign firm subsidiaries are more or less innovative than domestic firms. Developing theory to explain why they differ in their innovativeness is important, not only because their differences have implications for their competitiveness, but also because it allows us to explain why certain types of firms (e.g. foreign versus domestic) are more innovative, beyond the traditional argument that they receive innovations from other parts of the firm. I link arguments from neo-institutional theory and technology strategy, postulating that competitive pressures from host-country competitors in the consumer market and competitive pressures from other subsidiaries of the MNE in the corporate factor market can potentially reinforce each other, driving foreign firm subsidiaries to differentiate themselves from both by being more innovative and efficient in

converting R&D investments into innovations. Unlike domestic firms, which face the host country-level competitive pressures in the consumer market that all firms in the industry face, subsidiaries face the additional pressures of being affiliates of a firm with a foreign national origin (Evanschitzky et al., 2008; Shoham et al., 2006). To compensate for their foreignness and compete for customers, subsidiaries must offer products that are more innovative than those offered by their domestic competitors. As a result, subsidiaries are more likely to invest in R&D and complement it with cross-border development of skills of employees to be better at searching for new product ideas from foreign sources in conducting R&D and transform them into new products by developing complementary skills of employees in manufacturing and sales/marketing (Nonaka and Takeuchi, 1995; Teece, 1986). The additional competitive pressures at the level of the MNE for charter and its extension and associated resources (Birkinshaw and Hood, 1998; Bouquet and Birkinshaw, 2008), drive subsidiaries to develop employees further to be more innovative and efficient in innovation than other subsidiaries.

The arguments and findings presented here contribute to two streams of literature. First, they contribute to the technology strategy literature, which argues that innovation is a critical source of competitive advantage and is primarily driven by competitive pressures in the consumer market (Greve, 2003; Helfat and Raubitschek, 2000; Tripsas, 1997). The current paper explains that additional pressures for firms to innovate more can vary depending on the type of firm. Based on ideas from the application of neo-institutional theory to the study of MNEs, I argue that the behaviors of foreign firm subsidiaries are influenced both by competitive pressures in the consumer market and by competitive pressures from the MNE itself in the corporate factor market. This explains why firms that are affiliates of certain types of firms, such as foreign MNEs, innovate more than firms that lack such an affiliation. Unlike the traditional explanation

that foreign firm subsidiaries are more innovative because they receive innovations from the parent firm (e.g. Buckley and Casson, 1976; Zhao, 2006), I argue that they are more innovative and efficient in R&D because they develop skills of employees to be better at searching for new knowledge from foreign sources in conducting R&D by providing them international experiences. Additionally, they develop R&D complementary skills of employees to be superior at transforming such foreign knowledge into innovations by providing experiences in other functional areas, particularly manufacturing and sales/marketing. Competitive pressures at the MNE level for charter, its extension and associated resources force subsidiaries to develop these skills further. This argument also adds to previous findings of a positive relationship between R&D investments and innovations (e.g., Cohen and Levinthal, 1989; Helfat, 1997), demonstrating that this relationship varies depending on the type of firm. In the case of foreign firm subsidiaries, their R&D investments have a larger positive impact on their innovations than R&D investments of the domestic firms do on their innovations. Future research should take into account the different types of firms in explaining why some firms are more innovative and efficient in R&D than others.

Second, the present results contribute to the literature that applies neo-institutional theory to the study of MNEs. Subsidiaries of foreign firms are under pressure to imitate local firm behaviors and may do so in some areas of their operations. However, in the area of innovation, rather than imitating the behaviors of domestic firms and achieving a similar level of innovation, they differentiate themselves from local competitors by being more innovative and efficient in R&D. Neo-institutional theory has been useful in explaining why firms look similar, particularly through imitation and adoption of other firms' innovations. In its application to the study of MNEs, it shows that subsidiaries are under pressure to adopt the MNE's practices in order to be

similar to other subsidiaries in the firm, while simultaneously facing pressures to adopt practices of the host country environment in order to be similar to local firms (e.g., Kostova and Roth, 2002). However, by focusing primarily on why firms are similar, this theory has been less useful in explaining why subsidiaries of foreign firms innovate and differentiate themselves from domestic firms and other subsidiaries. In the present paper, I explain why these pressures, rather than exerting competing influences on subsidiary behaviors, potentially reinforce each other to drive subsidiaries to be better than domestic firms. These arguments and findings highlight the need for additional studies comparing subsidiaries of foreign MNEs and domestic firms, to determine the conditions under which a foreign MNE subsidiary imitates or differentiates itself from domestic firms and other subsidiaries. As such, I extend theory by arguing and providing evidence for more agency in the application of neo-institutional theory to the study of MNEs, beyond the idea of imitation of domestic firms by foreign firm subsidiaries.

Managers can benefit from the key idea presented in this study. The study suggests that managers should differentiate their subsidiaries from domestic competitors in the consumer market and from other subsidiaries in the corporate factor market by being better at innovation. To accomplish this, managers need to invest in R&D and complement it with cross-border development of skills of employees to be better at searching for new product ideas from foreign sources in conducting R&D and transform them into innovations by developing R&D complementary skills. These can be done by providing employees work experiences in other country subsidiaries and in other functional areas of the firm, particularly in manufacturing and sale/marketing. These skills must be developed further if subsidiaries are to be more innovative than other subsidiaries in competing for charter, its extension and associated resources from the MNE. Managers of domestic firms need to consider internationalizing their firms beyond

outsourcing the development of their knowledge and technologies from foreign sources in generating innovations.

In conclusion, this study provides a novel argument for why foreign firm subsidiaries are more innovative than domestic firms, beyond the traditional explanations that they receive innovations from the MNE. Rather than imitating the innovative behaviors of domestic firms and achieving a similar level of innovativeness, subsidiaries differentiate themselves by being more innovative.

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TABLE 1
Variables and measures

Type of variable	Variables	Measures	Values
Dependent variable	Number of product innovations	Number of product innovations achieved by the firm in the year	Positive
Independent variables	Subsidiary of foreign MNE	The firm has a foreign company as owner of some or all of the stock	1 or 0
	R&D investment	Total R&D expenditures divided by sales and multiplied by 1000	Positive
Controls	Skilled employees	Employees with a university or technical college degree, divided by total number of employees, multiplied by 100	0 to 100
	Domestic multinational	The firm does not have a foreign firm as owner of stock and has value-added operations outside Spain	1 or 0
	Division of domestic firm	The firm does not have a foreign firm as owner of stock and has another domestic company as owner of some or all of the stock	1 or 0
	Size	Value of total sales in millions of euros	Positive
	Industry	Indicator of the industry of the firm's main activity at the 2-digit level (21 industry indicators)	1 or 0
	Year	Indicator of the year of study (12 year indicators)	1 or 0

TABLE 2
Descriptive statistics and correlation matrix

	Mean	Std Dev	1	2	3	4	5	6
1. Number of product innovations	3.043	23.528	1.000					
2. Subsidiary of foreign MNE	0.206	0.405	-0.003	1.000				
3. R&D investment	6.952	22.778	0.045 ***	0.073 ***	1.000			
4. Skilled employees	8.494	15.757	0.010	0.124 ***	0.149 ***	1.000		
5. Size	5.100	11.926	0.009	0.297 ***	0.150 ***	0.116 ***	1.000	
6. Division of domestic firm	0.161	0.367	0.004	-0.223 ***	0.091 ***	0.049 ***	0.146 ***	1.000
7. Domestic MNE	0.006	0.080	-0.010	-0.041 ***	-0.013	-0.012	0.028 **	0.040 ***

Significance levels: + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

TABLE 3
Results of the analysis of the innovativeness of foreign firms in comparison to domestic companies
Dependent variable: Number of product innovations

	Random effect Poisson model						Random effect negative binomial model					
	Model 3.a		Model 3.b		Model 3.c		Model 3.d		Model 3.e		Model 3.f	
	Coeff.	Standard Error	Coeff.	Standard Error	Coeff.	Standard Error	Coeff.	Standard Error	Coeff.	Standard Error	Coeff.	Standard Error
Subsidiary of foreign MNE * R&D investment					0.003	0.001 ***					0.004	0.002 *
Subsidiary of foreign MNE R&D investment			0.207	0.044 ***	0.179	0.045 ***			0.145	0.074 *	0.095	0.048 *
			0.009	0.000 ***	0.009	0.000 ***			0.005	0.001 ***	0.005	0.001 ***
Skilled employees	0.001	0.000 ***	0.001	0.000 ***	0.001	0.000 ***	0.000	0.001	0.000	0.001	0.000	0.001
Size	0.014	0.001 ***	0.015	0.001 ***	0.015	0.001 ***	0.007	0.002 ***	0.006	0.002 **	0.007	0.002 **
Division domestic firm	-0.134	0.029 ***	-0.107	0.035 **	-0.104	0.035 **	-0.071	0.067	-0.059	0.073	-0.055	0.073
Domestic MNE	-2.641	1.186 *	-2.547	1.174 *	-2.561	1.173 *	-1.706	0.899 +	-1.662	0.896 +	-1.670	0.897 +
Industry	Included		Included		Included		Included		Included		Included	
Year	Included		Included		Included		Included		Included		Included	
Constant	-0.475	0.421	-0.416	0.417	-0.419	0.418	-1.721	0.228 ***	-1.674	0.228 ***	-1.669	0.228 ***
Observations	9420		9420		9420		9420		9420		9420	
Firms	785		785		785		785		785		785	
Chi 2	1350.520 ***		1839.580 ***		1852.350 ***		292.460 ***		339.740 ***		353.790 ***	
Log Likelihood	-30861.2		-30619.3		-30613.3		-10649		-10626		-10624	

Note: Industry and year controls were included in the analysis but are not reported here.

Significance levels: + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001