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The Retail Food Industry Center
Advancing Knowledge About
Processing, Distribution,
Sales, and Food Service

Working Paper 97-02
The Retail Food Industry Center
University of Minnesota
Printed Copy \$22.50

FOOD PROCESSING FIRMS AND FOREIGN PRODUCTION INCENTIVES

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July 1997

The author gratefully acknowledges the valued comments of Jean-Francois Hennart, Jean Kinsey, Michael A. Mazzocco, Edward W. McLaughlin and Thomas Roehl on an earlier version of this paper and the helpful suggestions offered by participants at the symposium, Global Markets for Processed Foods: Theoretical and Practical Issues, sponsored by the International Agricultural Trade Research Consortium and The Retail Food Industry Center, University of Minnesota, June 28 - 29, 1996 in Bloomington, Minnesota. The author also appreciates the advice of Bruce Chassy and the cooperation of Charles Handy of the USDA Economic Research Service and food processing executives who generously shared their insights. The Retail Food Industry Center is an Alfred P. Sloan Foundation Industry Study Center.

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Abstract

As the practice of a firm in one country owning production facilities in another has increased, several theories have developed to explain why production facilities do not always have local owners who would presumably be more familiar with local business conditions. A transaction cost explanation is that a firm may have intangible assets that are sought in another country but that cannot be economically sold on account of market failure. In such a case the firm's expansion into the foreign country may be the most economical way for the foreign country to gain access to those assets. A few studies have identified firm characteristics and firm-specific assets associated with the international growth of food firms.

The present paper expands on this work by interviewing executives in two product areas (processed meats and preserved fruit/vegetable products) to discover which assets the executives perceive as important and nontransferable through market channels (and thus applicable to the transaction cost approach). The assets of product development expertise, process management knowledge, and reputation appear to be key intangible assets associated with foreign production. A regression analysis tests determinants of foreign production of the two product categories by 17 US firms in 9 global regions, yielding results consistent with the interviews. That is, the probability of having foreign production plants is significantly enhanced by higher total firm sales, being in the processed fruits and vegetables business as opposed to processed meats and locating in higher income, Western Hemisphere and European Countries.

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FOOD PROCESSING FIRMS AND FOREIGN PRODUCTION INCENTIVES

The basic question this paper responds to is whether observed business practice in the food processing industry is consistent with the transaction cost theory of foreign production. Transaction cost economics (Williamson, 1975) and internalization theory (Rugman, 1981) are related in explaining that high market transaction costs may discourage economic activity between firms, so that the desired economic activity must happen within a firm (internally). With this view, Buckley and Casson (1976), Hennart (1982), Rugman (1981), Teece (1981) and Dunning (1981) have generally agreed that a reason for a firm of one country owning production facilities in another (foreign production) is to avoid high market transaction costs. The food industry practice appears to be consistent with this theory in that high transaction costs are likely in instances of foreign production. The inquiry also reveals several factors of importance to foreign production in the food industry.

The paper considers the food processing industry as a manufacturer of finished foods, primarily in a state ready for retail sale. It is specifically focused on two groups of products: processed meats (Standard Industrial Classification [SIC] code 2013) and preserved fruits and vegetables (SIC code 203). Foreign production here is focused on horizontal integration (producing and selling approximately the same products in new markets), rather than vertical integration (e.g., sourcing food in one country for sale in another). The paper builds on, and adds to, earlier work on determinants of foreign production in food processing (e.g. Horst, 1974; Connor, 1983; Handy and Henderson, 1994; Vaughan, Malanoski, West, and Handy, 1994). It differs from previous research by identifying major producers of specific product groups and seeking to explain why they do or do not have foreign production in select foreign markets.

The first section is a very brief discussion of the theory of foreign production, with emphasis on the transaction cost theory; the second is an abbreviated review of determinants of foreign production in the food sector; the third reports on the findings from interviews of industry executives and a statistical analysis of firm and product determinants of foreign production by US processors of SIC 2013 and SIC 203 products. The concluding section summarizes the assets which firms take overseas and proposes how they might better be measured in future studies.

1. The Theory of Foreign Production

An early explanation of foreign production (a firm in one country owning production facilities in another) was that the investing firm was moving capital from a capital rich country to a capital poor country (Aliber, 1970). The issue of capital flows from one capital-rich country to another was a problem that Hymer's (1976) explanation avoided. He said that a firm investing abroad was at an inherent disadvantage by attempting business in a foreign country, but the disadvantage was overcome in cases where the firm could extend monopoly power to the host country. While this monopoly power argument fell out of favor, the shift which Hymer had made away from the financial approach became widely accepted, with Buckley and Casson (1976), Dunning (1981), Hennart (1982), Rugman (1981), Teece (1981), and Caves (1982) articulating an efficiency argument. They drew on Williamson's (1975) transaction cost economics and presented foreign production as an outcome of a firm having to extend itself overseas due to high transaction costs, preventing it from employing its assets abroad through market channels such as licenses or other contractual arrangements.

The types of transaction costs of concern here include the cost of searching for a transaction partner, negotiating the transaction, measuring or monitoring the goods or services received, and

enforcing the sales agreement. Intangible assets (knowledge and reputation, in particular) have been widely identified as subject to high transaction costs. If knowledge embodied in a recipe or in process technology is sold, it may be difficult for the buyer to be certain of what it is getting when the price is negotiated, and the precautions on the part of the seller to assure that the buyer doesn't use the knowledge beyond the terms of the agreement (e.g., by competing with the seller) may be costly. Also, in the case of selling reputation (typically by licensing a product brand name), it may be difficult for both parties to be sure the other is maintaining the integrity of the name. Interestingly, intangible assets also contribute to a firm's growth trajectory in the first place. An important property of knowledge-based intangible assets is their public good characteristic in that they may be exploited at additional production facilities at minimal marginal cost (Johnson, 1970; Horstmann and Markusen, 1989).

Knowledge has generally been measured as the ratio of research and development (R&D) expense to sales at either the industry or firm level. Grubaugh (1987), Kimura (1989), Kogut and Chang (1991), and Hennart and Park (1994) are among those who found a positive relationship between R&D and foreign production. An intangible asset of perhaps more critical importance, managerial knowledge, has received much less attention. Pugel (1981) rated the managerial knowledge of industries as a ratio of managerial to total employment. In another approach to measurement of knowledge, Swedenborg (1979) measured experience by the number of years from the foundation date of a firm's first manufacturing affiliate. She found a significant and positive relationship between her knowledge proxies and foreign production.

For the asset of reputation, a high ratio of advertising to sales is presumed to indicate that a product is highly differentiated, meaning it embodies reputation. Gatignon and Anderson (1988) are among those who found a positive relationship between this measure and foreign production. A

number of studies and, in particular, those studying foreign production by Japanese firms (e.g., Hennart and Park, 1994), found no such relationship, indicating that failure of the market for conveying brand reputation was not a necessary driver of foreign production.

The above research highlights the close connection drawn between intangible assets and foreign production. Intangible assets are also central to the analyses of foreign production specific to the food sector. This sector-specific research is briefly reviewed in the next section.

2. Foreign Production by US Food Processing Firms

An early, pre-transaction cost theory, contribution to the study of foreign production focused on the food processing sector (Horst, 1974). Horst concluded that US firms needed foreign territory for growth, and he identified the knowledge that advertising was a profitable undertaking as a key asset which US firms exploited in their European operations.

Several more recent studies of foreign production in food processing have sought to identify determinants of foreign production. In some, but not most, cases these determinants were characterized as intangible assets operating through the transaction cost framework. Connor (1981) found that size of firm sales, advertising intensity, and diversification were positive determinants of the extent of foreign food firms' ownership of U.S. operations. He also reported regression results on determinants of the foreign to domestic sales ratios of U.S. food firms (Connor, 1983). Firm size (in terms of sales), advertising, and R&D expenditure intensity were all positive determinants, though he expressed skepticism that the benefits of internalization applied to horizontal investments. In an examination of food sector investment into the U.S., Pagoulatos (1983) found that foreign investment comprised a much larger percentage of U.S. sales in certain food groups (e.g., cookies and crackers) than others. Connor, Rogers, Marion, and Mueller (1985) stated that testing for determinants of

foreign direct investment (FDI) is particularly challenging, because of the need for firm-, industry-, and location-specific factors that must be incorporated. The present research is an effort to address this need.

Handy and McDonald (1989) observed that 82% of sales of foreign affiliates of U.S. food processing firms are in the country of production (higher than the 66% figure for all U.S. manufacturers) suggesting that foreign production of processed food is primarily motivated by market seeking, the motivation suggested by Horst some fifteen years earlier, and the motivation found in the present study.

Handy and Henderson (1994) found an association between firm size (whether measured by assets, employees, or shipments) and multinationality in a sample of U.S. and other food firms. They found that U.S. firms with foreign affiliates are more diversified (into non-food sectors) than U.S. firms without foreign affiliates. However, finding that foreign-oriented multinational firms have fewer brand names and product lines than more domestic-oriented multinationals, they were unable to find support for an association of diversification with foreign production. For a sample of firms reporting intangible assets in their financial statements, multinational firms had a higher ratio of intangible to total assets than did firms without foreign operations. Henderson, Voros, and Hirschberg (1993) analyzed a sample of food and beverage firms and found foreign production (measured by the percentage of firm shipments originating from foreign affiliates) positively associated with high home market share, large size, high net income as a percent of total sales, and high investment in firm-specific assets.

The US Department of Agriculture's Economic Research Service (ERS) has compiled data on foreign production behavior by U.S. food processing firms, described in Handy and Henderson (1994). Reed and Ning (1996) performed a regression analysis on 34 US multinational food

processing food firms in the ERS sample and found the number of SIC 4-digit industries (as a measure of diversification) to be a significant and positive determinant of foreign production, with diversification serving as a firm-specific advantage that helps overcome the inherent disadvantage of operating in a foreign country.

Vaughan, Malanoski, West and Handy (1994) interviewed senior executives of 17 multinationals (mostly U.S.) regarding their firms' international operations. The most often stated reason for establishment of foreign affiliates was slow growth at home. Interviewees expressed strong desire to maintain control over the following intangible assets: "reputation and quality of branded products, process technologies, commodity trading, customer service, and skills related to marketing and market development" (p. 11).

While the above studies have taken different approaches to identifying determinants of foreign production, they have all identified firm-specific advantages that are associated with foreign production. Of these advantages, most are not characterized as intangible assets driving foreign production through a transaction cost effect. Handy and Henderson's (1994) measure of intangible assets as reported in firm financial statements serves as a direct test of the transaction cost approach.

In a study of on Australian and Spanish wine entry into the US market, Abbot and Solana (1996, p. 26) found that "internationalization mode choices can differ by narrow subsector, by firm, and even by market for a single firm." The empirical analysis that follows considers subsector and market differences.

3. An Analysis of Foreign Production by Two Food Processing Sectors

The above research has taken a variety of approaches to analyzing foreign production in the food processing sector. Three measures of the extent of foreign production were: foreign to

domestic sales ratios of firms (Connor, 1983); whether the firm had any foreign affiliates (Handy and Henderson, 1994); and whether over 10% of a firm's assets resided in foreign countries (Reed and Ning, 1996). Regarding the establishment of an affiliate in a foreign region as a defining act of the firm, the present research measures foreign production simply by whether the parent firm has a subsidiary (with 50% or more ownership) in specific regions. While all of the studies (except for Abbott and Solana, 1996), aggregated all processed food products for analysis, the present study distinguishes between specific product groups. In identifying determinants of foreign production, firm size and diversification are measured as in previous studies, regarding them as intangible assets that would be positively associated with foreign production. Interviews yield insights on additional determinants, as well as on how these determinants operate.

Like some of the previous studies, the present research focuses on foreign production in many countries by U.S. firms. In order to ask why some U.S. firms making a product practice foreign production and others do not, this research identifies two specific product groups: processed meats (SIC 2013) and preserved fruits/vegetables (SIC 203) and identifies the major U.S. public firms in those groups (Tables 1 and 2 show the estimated domestic and foreign sales and foreign country where production is conducted for 17 U.S. firms.). Of 17 total firms, 8 are major SIC 2013 firms, and 11 are major firms in SIC 203. Two firms, ConAgra and Philip Morris, are active in both areas. The study then identifies whether each firm is producing the indicated product (of which it is a major producer in the U.S.) in each of nine global regions. Thus, there are 171 observations (19 firm/products times 9 regions). Firms in these product groups, as well as some in related groups, were interviewed, and several characteristics of the seventeen firms were tested as determinants of foreign production by regression analysis. This method has the potential of enabling analysis of firm, product, and location variables simultaneously.

3.1 Interviews:

Interviews of executives of four large food processing firms revealed several insights concerning the motivation for establishment of foreign operations and the nature of intangible assets.¹ Facility visits and on-site interviews included Kraft (Philip Morris), ConAgra, Hormel, and Pillsbury. The paper also draws on shorter interviews (primarily at trade shows and conferences) of executives or former executives of Smuckers, Dean Foods, Jerome Foods, Nestle, Universal Foods, Unilever, Procter and Gamble, and others. Additional telephone interviews were with personnel of most of the 17 firms.

Consistent with findings in the previous section, nearly every interviewee reported going abroad as part of a strategy of growth, based on concern that domestic markets offered little room for growth. One of the larger firms specifically noted that sourcing was not a major motivation for foreign production because “you can go to some broker and have global sourcing without having to go anywhere.” A firm with active licensing arrangements overseas but no foreign production, illustrated licensing as “putting your toe in the water,” compared to foreign production, which was “taking a bath.” The firm explained its interest in foreign production as a result of its need for growth and its difficulty in “growing” a license business.

To identify intangible assets that might be central to the firms’ foreign production, a question asked of nearly every interviewee was what assets they were contributing as they entered foreign countries with production operations. The answer was almost invariably “capital” (especially in the case of acquisitions, which characterize the vast majority of foreign production entries), followed by “production” and “marketing knowledge.”

¹ For confidentiality as well as reader convenience, interviews are characterized as with “firms,” though any given firm interview may have actually consisted of interviews of more than one person from that firm.

While the capital transfer responses may seem like a case of the capital transfer/portfolio theories of foreign investment (Aliber, 1970), the financial flows were not specifically movements of capital from capital-rich to capital-poor countries. Rather, it appears that the investing firms were using their reputation and knowledge to gain access to funds that were otherwise unavailable to the target firms. What the multinational firm was really contributing in this respect was reputation, not in the brand sense, but as a successful track record at bringing products to market. In at least one case, two firms in the sample competed for the same European acquisition target, with the larger capitalized firm winning. Certainly one determinant of acquisition (or greenfield investment) is the financial strength of the acquiring company.

Table 1. Meat Processing (SIC 2013)* Firms, (Data in million \$, effective 1993)

Name	Sales	Estimated Food Sales	Estimated SIC 2013 Sales	Estimated Foreign Production Food Sales	Regions of Foreign Production
Philip Morris	60,901	33,777	2,000	11,945	w
ConAgra	23,512	18,727	1,400	1,311	w,n
Sara Lee	15,536	7,562	3,100	2,344	m,w
Tyson	4,707	4,707	518	0	
Hormel	2,854	2,854	1,627	0	
Smithfield	1,143	1,143	560	0	
Thorn Apple Valley	730	723	401	0	
Doskocil	648	648	648	0	
TOTAL	110,031	70,141	10,254	15,600	

* Slaughter operations were excluded to the extent possible in forming this sample.
Source: ERS and original data

Table 2. Preserved Fruits and Vegetables (SIC 203) Firms*
(Data in millions, \$ effective 1993)

Name	Sales	Estimated Food Sales	Estimated SIC 203 Sales	Estimated Foreign Production Food Sales	Regions of Foreign Production**
Philip Morris	60,901	33,777	*2,570	11,945	c,m,l,e,w
ConAgra	23,512	18,727	3,640	1,311	w
American Home	8,305	936	856	0	
Heinz	7,047	7,047	5,642	3,020	p,l,e,w,a,n,j
CPC	6,738	6,738	4,326	5,660	c,m,l,e,w,a
Campbell	6,586	6,586	4,124	1,931	c,m,w,n
Dean Foods	2,431	2,411	787	5	m
Del Monte	1,555	1,555	1,555	230	m,w
Gerber	1,270	803	803	126	l,e
Curtice-Burns	879	879	674	47	c
Smucker	512	512	522	58	c,w,n
TOTAL	119,736	79,971	25,499	24,333	

* Note that this product group includes such diverse products as mayonnaise and dried soups.

** Regions considered are: Canada (c); Mexico (m); Latin America (l); Eastern Europe (e); Western Europe (w); Japan (j); China (p); other Asia (a); Australia/New Zealand (n).

Source: ERS and original data

Management and process control were other assets mentioned by several firms. Critical assets may depend on host region. One firm that had no European production plants said that successful entry into Europe would require some kind of market distribution advantage over competitors. Lacking such assets, the firm intended to focus on developing countries where its process control knowledge would be particularly valuable.

One large firm, speaking of its foreign acquisitions, said that a major asset it was contributing was an awareness of the benefits of managerial freedom, that it profitably freed the managers from the constraints placed on them by the previous owners. This may also be region-specific, as one firm with an affiliate in Poland disagreed, arguing that Eastern European managers were not ready for

empowerment. On the other side of the transaction, there appeared to be some consensus on the point that a key asset being *acquired* in an acquisition is management. One suggestion was that it is cheaper to buy management by buying the company than by starting from scratch and trying to recruit entirely new staff. That is, labor markets are costly and can be internalized by acquiring entire companies.

The importance of a firm asset that might be called organizational coordinative skill was suggested by a firm with an affiliate in the former East Bloc. It observed that production and distribution knowledge were both present in the host country, but they were administratively separated. A major asset the firm was contributing, it suggested, was the know-how to coordinate the production and marketing aspects of food processing. It seems reasonable to view this as an intangible asset, embedded in the firm, and difficult to sell through a license or other contract mechanism.

Reputation of the firm was offered as an asset, with one comment that as the firm “positions itself as a global player to be dealt with,” its importance goes up, making it easier to gain the cooperation of other firms. The interviewee said that while other firms may not at first wish to do business with the newcomer, they realize that at some point they may need some technical or other help from the entering firm or its parent. Corporate size is then a factor in achieving success in international markets. Local governments, suppliers, and distributors wonder what they will do if the foreign-owned operation fails, and that concern is heightened if the foreign operation is not part of a known entity.

A story which revealed problems with trying to transfer reputation through market channels is the case of a firm that had a canned product that had been introduced to several foreign markets through export channels. The firm long ago entered into licensing agreements for production of the

product, but as the firm has shifted its perception of foreign markets from a source of bonus income to sources of growth, it has become disappointed that the licensees are not aggressively developing their markets or product lines. The inability to assure aggressive promotion by the licensee is itself a transaction cost. While many profitable licensing agreements exist (Chiquita Brands is even advertising the availability of its name for license in its Internet homepage), it is unclear if that approach is optimal in a strategic sense or if it is the result of unavailable financial resources to engage directly in foreign production.

One of the issues raised in the previous section concerns the influence of diversification in contributing to foreign production. The interviews did not lead to a clear consensus. A common view was that too much diversification is distracting. When asked for opinions of Sara Lee's rather remarkable diversification (food, apparel, shoe polish), two less diversified firms suggested that Sara Lee's major asset was its chairman who could take any acquisition and inspire its management to make it profitable. One interviewee suggested that a range of products was helpful in entering a new market because, if the initial product failed, the firm would readily have other products in its stable to switch to. There is pressure on expatriate staff to make a production facility successful even if the product is completely different from that originally planned. The primary role of diversification, then, appears to be an experience-based knowledge asset.

If the US firms' assets which are critical to foreign production are best exploited internally, an explanation is needed for the frequency of co-packing, whereby the manufacturing of the product is outsourced. The Green Giant brand of canned and frozen vegetables (owned by Pillsbury which is in turn owned by the British firm Grand Metropolitan), for example, exited processing in the early 1990s in order to focus on marketing. Green Giant, then, is a brand/marketing asset, rather than a production asset. The approach raises the question of why all foreign production is not done on an

outsource (i.e., co-pack) basis. One executive's answer is consistent with the transaction cost view. Namely, outsourcing is hardly a turnkey operation. In Japan, a major market for Pillsbury, for example, the company invests considerable resources in identifying, training, and monitoring its co-packers in order to assure quality standards. The maintenance of co-pack relationships and avoidance of interference of competitors with co-packers is difficult to assure, suggesting that the establishment and maintenance of co-packing operations may itself be subject to high transaction costs. In another case, a firm with major international ingredient operations explained that co-packing was not an attractive option because customers may trust the reputable firm with proprietary information about their sales volumes but they are reluctant to reveal that information to lesser known entities, such as co-packers.

It was apparent from the interviews that U.S. food processing firms were going overseas because that is where the greatest growth opportunities appeared to be. While they were taking the assets of management skills, and production and marketing knowledge with them, they were also taking organizational reputation, which allows resources (including capital) to be focused in a production/marketing operation. While production technology can be transferred, it must be readily adapted to the dictates of the market, and those adaptation skills are an intangible asset lacking an adequate market. The idea of selling those skills in a consulting capacity could not serve the growth objectives of the firm. Similarly, licensing agreements allow the firm to grow its brand equity, but not its product development asset base. The latter appears to be fundamental to the food companies interviewed. These findings indicate that foreign production in food processing is a result of inadequate markets for transferring the skills of the firm in a manner that affords future growth opportunities. The analysis which follows has results that are consistent with this finding.

3.2 Regression Analysis

While this model is novel in that it tests for determinants of all foreign production in select regions for specific products, the independent firm variables (size, diversification, and product) are suggested by the literature reviewed in the first two sections of this paper. Data for the study are for the meat processing and preserved fruits and vegetables industry 1993, and sources include a database developed by the USDA Economic Research Service as well as direct inquiry of the firms and a variety of secondary sources including 10-k reports, journalistic accounts, and stock analysts' reports.

The host regions considered for the study include Canada, Mexico, Latin America/Caribbean, Western Europe, Eastern Europe, China, Japan, Australia/New Zealand, and the rest of Asia. They were selected to allow differentiation between near countries (Americas and Europe) and more distant countries (Asia and Pacific), and also between industrialized markets and developing economies. Also, the firms indicated that they often targeted regions rather than countries for first entries.

A logistic regression model (Amemiya, 1981; Maddala, 1983) of the following form is used to test for determinants of the probability of foreign production:

$$P(Y_{ijk} = 1) = 1/(1 + \exp(-\mathbf{a} - \mathbf{X}_{ijk}\mathbf{b})),$$

where $Y_{ijk} = 1$ if firm i manufactured product j in country k in 1993, given that it produced product j in the US, and $Y_{ijk} = 0$ otherwise.

\mathbf{X}_{ijk} = the vector of independent variables for the ijk^{th} observation.

Independent variables include a binary categorical variable for product SIC code (PRODB) and the firm-level variables of size (LGTFSAL and LOGTSALE), and diversification (TWO DIGB). Two location variables, distance from the US (DISTANC2) and regional GNP per capita (REGGNPT) are included as controls. It was expected that size and diversification at the SIC four-digit (but not two-

digit level) would be positive determinants of foreign production, and also that shorter distance and higher GNP per capita would positively affect foreign production.

Size and Diversification:

Size, whether expressed as the log of total firm sales (LOGTSALE) or the log of total firm food sales (LGTFSAL), is highly correlated (over .8) with the number of product groups at the SIC 4-digit level and less so with the number of industries at the SIC 2-digit level (TWODIGB) (Table 3). Using a log scale reflects the expectation that an additional increment of sales (e.g., \$100 million) is expected to have more impact on a relatively small firm such as Smucker, than on a large firm such as Philip Morris.

The high correlation of sales and four-digit product count makes it difficult to identify the respective effects of diversification and size. Size and four-digit product count are both highly significant when run separately. While diversification in itself may appear significant, size may be driving both diversification and foreign production. The reported regression model (Table 4) excludes four-digit diversification because of this correlation. The experience and knowledge represented in diversification are assets that were identified in the interviews as valuable for foreign production. As a firm characteristic, there are several reasons that diversification is correlated with size. One is the financial power to establish diverse operations. The interviews suggest that the clout that accompanies size is also an asset of great value in foreign production.

Consistent with the interviews, diversification at the two-digit level is not significant for explaining the probability of foreign production. This is not necessarily inconsistent with Handy and Henderson (1994) finding that food sales accounted for a lower percentage of total firm sales for firms with foreign affiliates than for firms with no foreign affiliate. It may be that some diversity of

experience is beneficial, but that diversification into too many sectors may strain managerial resources.

Product:

There is much more foreign production activity in the SIC 203 product group than the SIC 2013 group, and accordingly product (PRODB) is a significant and positive determinant of foreign production in the regression model (Table 4). Only the three largest SIC 2013 firms have foreign SIC 2013 production, and none of those firms is in more than 2 regions. American Home Products Corp. is the only SIC 203 firm with no foreign SIC 203 production. American Home has by far the smallest ratio of food to total sales, and it is quite international in its core health-care businesses. No evidence was found that the low level of foreign SIC 2013 production was in any way compensated by a high level of licensing.

Several interviewees suggested that, in general, SIC 2013 has more challenging sanitation concerns from raw material input to final consumption, and that fostering a management system for addressing those challenges would be difficult by either license or foreign production. Also, SIC 2013 is the more fragmented of the two product groups (evidenced by preliminary unpublished US census data on 1992 industry concentration ratios), very likely on account of the relatively short shelf life of the product. This fragmentation has provided sufficient acquisition targets for growth without need for venturing abroad.

Location:

While there is at least some foreign production of the subject products in each of the regions of the study, location is a positive determinant of foreign production. The lesser extent of investment in Asia and the Pacific, may be due, in part, to the inconvenience of travel from the U.S. Unfortunately, the diversity of cultures among the Asia and Pacific countries precludes inclusion of a cultural distance variable for the entire region. The weak degree of significance of GNP per capita is likely due to investment barriers in Japan (one of the higher income regions) and to an interest in regions that show potential for rapid income growth. Some of the entries into China and Eastern Europe occurred since those regions were identified as potential rapid growth areas. Analysis by country would add substantial data collection and methodological challenges, but enable a richer explanation of foreign production.

4. Conclusion

The statistical and interview data both indicate that firms engaged in foreign food production possess assets that may be difficult to exploit abroad through license markets, a finding consistent with the transaction cost theory of foreign production. Regarding foreign production as the foreign employment of a firm's assets, the assets of product development expertise, process management knowledge, and reputation may be even more critical than those of production technology and brand names.

The high correlation between size and diversification (by SIC 20 product count) in the sample prevents a conclusion that diversification (irrespective of firm size) is a significant driver of foreign production. Firms with higher sales were more likely to have foreign production. The expectation that product characteristics would be important determinants of foreign production was met. There is a significantly more foreign production of fruits and vegetables than meats. Location factors were also found to be significant determinants of foreign production. The Western Hemisphere and Europe were most likely locations. Higher GNP increased the probability of a foreign location. Unfortunately, the disaggregation of foreign production of specific products by location and firm is very difficult due to unavailability of data. This study is believed to be the first to take this methodological approach, particularly in the food processing sector, and further studies can be envisioned that might build on this approach by the addition of more firm variables (such as a count of new product introductions by the firm) and by comparison with licensing activity in the same regions and products.

Table 3. Correlation Matrix of Independent Variables

	DISTANC2	LGTF SAL	PRODB	TWODIGB	LOGTSALE
DISTANC2	1.000				
LGTF SAL	.000	1.000			
PRODB	.000	.064	1.000		
TWODIGB	.000	*** .484	** .156	1.000	
LOGTSALE	.000	*** .938	.018	*** .524	1.000
REGGNPT	.003	.000	.000	.000	.000

*** p<0.01 ** p<0.05

**Table 4. Parameter Estimates for Logistic Regression Model:
Determinants of Foreign Production**

Variable Name	Description	Coefficient (Wald statistic)
LOGTSALE	Log of total firm sales	.4710*** (7.9493)
PRODB	Dummy for product 1 = SIC 203 -1 = SIC 2013	1.0032*** (13.0997)
TWODIGB	Number of SIC 2-digit industry codes	-.0968 (1.2726)
DISTANC2	Dummy for distance 1 = Western Hemisphere & Europe -1 = Asia/Pacific	.7613*** (10.0312)
REGGNPT	GNP per capita of region	.0473* (2.8837)
	Intercept	-6.1907*** (2.8837)

*** p<0.01 * p<0.1

model chi-square: 38.264

p value: 0.000

N: 171

McFadden's pseudo R square: .24

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