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Balancing growth across geographic diversification and product diversification: A contingency approach

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ABSTRACT

We theorize that firms simultaneously seek to balance their growth across both the geographic and product diversification domains. To achieve this balance, businesses commonly adopt a strategy of expanding an under-diversified direction at the expense of an over-diversified one. Accordingly, we depict geographic diversification and product diversification as being an endogenous relationship, from which we hypothesize that firms that have under-diversified in a given direction and over-diversified in the other will expand the former at the expense of the latter. Meanwhile, firms that have under-diversified in both directions will expand both diversification paths, while firms that have over-diversified in both directions will contract in both diversification routes. We investigate these predicted relationships and show them empirically using a sample of leading Japanese multinationals in the 1990–2000 period.

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1. Introduction

Geographic diversification and product diversification have long been acknowledged as two dominant growth strategies of firms (Caves, 1996; Mudambi & Mudambi, 2002). The ability to introduce multiple products to multiple countries can increase sales and reduce operating costs provided a firm does not over expand (Geringer, Tallman, & Olsen, 2000). Although both the separate and joint impact of geographic and product diversification on firm performance have been extensively researched (Delios & Beamish, 1999; Geringer, Beamish, & DaCosta, 1989; Hitt, Hoskisson, & Kim, 1997; Tallman & Li, 1996), relatively little attention has been given to the inter-relationships between these two growth strategies (Peng & Delios, 2006). The few studies that have considered this relationship found contradictory relationships between geographic and product diversification, including: a positive linear relationship indicating complementarity between the two strategies, a negative linear relationship indicating a substitution effect between these two growth strategies, and more complex curvilinear relationships (e.g. Davies, Rondi, & Sembenelli, 2001; Kumar, 2009; Meyer, 2006; Pearce, 1993; Wiersema & Bowen, 2008; Wolf, 1977). Hence, the exact nature of the relationships between geographic diversification and product diversification remains vague and unclear, in both a conceptual and an empirical sense.

We address these issues by developing a conceptual perspective on the relationship between geographic and product diversification that takes into account the current levels of both types of diversification when predicting future levels of these two types of diversification. We ground our arguments in the Resource Based View (RBV) and Transaction Costs Economics

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(TCE) to contend that firms seek to increase diversification and growth in underutilized directions while trying to avoid over-diversification in specific paths. In this sense, we regard a firm's growth as an attempt to balance the two diversification dimensions.

Specifically, we hypothesize that firms with low geographic and product diversification levels will increase both types of diversification. However, firms with low product diversification and high geographic diversification will increase the former and reduce the latter, while firms with high product diversification and low geographic diversification will reduce the former and increase the latter. Finally, firms with high levels of both geographic diversification and product diversification will reduce both types of diversification. This view offers an important contingency to our understanding of the relationships between geographic and product diversification as it implies that such relationships will differ for firms at different levels of both diversification types.

We test these predictions on panel data of 288 Japanese multinational corporations (MNCs) covering the years 1990–2000. During the last two decades of the 20th century, Japanese firms went through a period of rapid geographic expansion and also expanded product-wise, which allows us to capture the longitudinal profile of Japanese firms at varying stages of geographic diversification and with a good range in their level of product diversification.

Two important features of our empirical estimation method are noteworthy. First, the methodology involves separating the firms in our sample into four different quadrants representing their respective levels of geographic and product diversification as a means of distinguishing between firms that are under-diversified and over diversified in terms of geographic and product diversification. Secondly, the methodology corrects for the fact that geographic and product diversification decisions are likely to be made *simultaneously and endogenously* by running Two Stage Least Squares (2SLS) within-firm fixed effects regression models.

The rest of the paper is organized as follows. In Section 2 we present our conceptual framework. In Section 3 we describe our data and estimation methods and forwarding Section 4 we discuss our results. In Section 5 some preliminary performance implications of our study are drawn and finally in Section 6 we discuss our results and future research directions, and draw relevant conclusions.

2. Background literature and hypothesis development

2.1. The limits of diversification

Numerous studies have examined the collective impact of both product diversification and geographic diversification on the performance of firms (e.g. Hitt, Hoskisson, & Ireland, 1994; Hitt et al., 1997; Palich, Carini, & Seaman, 2000; Tallman & Li, 1996). However, only a few studies have investigated the direct relationship between product diversification and geographic diversification (Davies et al., 2001; Kumar, 2009; Meyer, 2006; Pearce, 1993; Wiersema & Bowen, 2008). These streams of research build on the view that there are limits to the positive performance implications of product diversification (e.g. Amit & Livant, 1988; Grant, Jammine, & Thomas, 1988; Lubatkin & Rogers, 1989; Palich, Cardinal, & Miller, 2000; Robins & Wiersema, 1995; Simmonds, 1990) and geographic diversification (Contractor, Sundu, & Hsu, 2003; Geringer et al., 1989; Gomes & Ramaswamy, 1999; Lu & Beamish, 2004; Sullivan, 1994).

Although both types of diversification allow for synergy exploitation and gains of economies of scale and scope (Caves, 1996; Dunning, 2000; Farjoun, 1994; Kogut, 1985; Montgomery & Wernerfelt, 1988; Teece, 1982) that lead to better returns, such expansion also incurs heightened transaction and coordination costs after a certain level of diversification has been reached (Bartlett & Ghoshal, 1989; Gomes & Ramaswamy, 1999; Hill & Hoskisson, 1987; Jones & Hill, 1988; Lu & Beamish, 2004; Montgomery & Wernerfelt, 1988). The limitations of both geographic and product diversification to enhance performance are also defined by the limits of the managerial capacity to cope with the increased complexity of a highly diversified firm (Grant, 1987; Hitt et al., 1994). Building on these views of the costs and benefits of geographic and product diversification (Lu & Beamish, 2004; Palich, Cardinal, et al., 2000; Palich, Carini, et al., 2000), scholars have developed arguments that suggest that these two strategies can complement or substitute for each other.

2.2. Arguments for complementarity between geographic and product diversification

Davies et al. (2001) claim that for differentiated products, geographic diversification and product diversification are complementary strategies that enable a firm to maximize its utilization of a firm's proprietary assets. Adopting an RBV approach, their view assumes that the same firm-specific proprietary assets may foster both types of diversification. Likewise, Delios and Beamish (1999) note that for highly diversified Japanese firms, geographic and product diversification complement each other, as the need for assets to enter distant lines of business can be met by the opportunities found to generate or acquire new assets when expanding the firm's geographic scope. This view is also supported by Kim, Hwang, and Burgers (1993), who argue that increased geographic diversification enables firms to reduce the risk of and increase returns from product diversification, since additional market opportunities are opened for product diversified firms that pursue geographic expansion. Meanwhile, Geringer et al. (2000) show that geographic and product diversification complement each other by permitting a firm to leverage its strategic rent-yielding resources from existing operations in order to increase its rents. Finally, Hitt et al. (1994, 1997) argue that the combination of high levels of geographic and product diversification creates synergies that enable firms to differentiate their products while incurring lower costs than non-diversified firms.

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2.3. Arguments for substitution between geographic and product diversification

A different view is presented by Tallman and Li (1996), who argue that geographic diversification improves the performance of low product-diversified firms by providing risk diversification and enhancing their ability to exploit economies of scope. This implies that firms are expected to combine low levels of product diversification with high levels of geographic diversification. This view is supported by Wolf (1977), who finds a negative relationship between product diversification and geographic diversification and argues that this negative relationship stems from the fact that the investments required for both types of diversification must compete for the same stock of a firm's resources. Davies et al. (2001) further find the two strategies to be substitutable in non-differentiated product industries where proprietary assets are less important. A similar pattern is predicted by Palich, Cardinal, et al. (2000), Palich, Carini, et al. (2000) who claim that geographic diversification decreases the advantages of related product diversification because of international impediments to synergy formation in marketing, production, and technology. Likewise, Meyer (2006) argues that firm growth might be facilitated by "globalfocusing" – increasing geographic diversification in a narrow set of industries. According to this view, resources that are freed from divested industries can be efficiently exploited in the pursuit of geographic diversification.

Meanwhile, by building on both RBV and TCE arguments, Wiersema and Bowen (2008) argue that geographic and product diversification are substitute strategies, where the limitation imposed by a given firm's fixed bundle of resources coupled with increased coordination and control costs is expected to lead to substitution between the two strategies, at least in the short run. Recently, Kumar (2009) has shown that geographic and product diversification are negatively associated in the short run, arguably because of limitations in replicating and transferring tacit, causally ambiguous competencies (Barney, 1991; Martin & Salomon, 2003) between the two diversification strategies.

2.4. The need for a contingency approach to reconcile the two views

Overall, there is much opportunity to develop clarity in our understanding of the reciprocal relationships between levels of geographic and product diversification. On the one hand, the ability to leverage firm specific assets, such as managerial time, efforts and attention (Barney, 1991; Penrose, 1959), lends support to the reasoning that posits complementarity between geographic and product diversification moves. On the other hand, transactional complexities, in terms of heightened control and coordination costs (Jones & Hill, 1988), lend support to substitution arguments concerning these two diversification types.

Empirical evidence also marks the complexity in the relationship between product and geographic diversification. Pearce (1993) reports an inverted U-shape between product and geographic diversification. This U-shape indicates that the direction of relationship between these two diversification strategies may change at different levels of diversification. Sukpanich and Rugman (2007) find that geographic diversification (in terms of intra-regional sales) turns the performance implications of product diversification from negative to positive (indicating complementarity), yet also turns the performance effects of extremely high levels of product diversification from positive to negative (indicating substitution).

It is noteworthy that while extant literature deviates sharply in its predictions regarding the relationship between geographic and product diversification, it either explicitly or implicitly assumes that geographic and product diversification decisions are taken simultaneously where the current levels of both diversification types are likely to affect their future levels. This assumption is based on the reasoning that at any given point in time corporate managers may choose to utilize their given bundle of resources to expand geographically and/or product-wise. Although some of these diversification decisions may be taken at the subsidiary level, most major expansion decisions are dealt with at the corporate level. Such decisions include the choice of foreign locations and business areas and involve the collection, evaluation, and dissemination of information on international and domestic operations in order to effectively control and coordinate them (Edstrom & Galbraith, 1977; O'Donnell, 2000; Tan & Mahoney, 2005).

Accordingly, there should be value in examining current levels of product and geographic diversification and then simultaneously analyzing how a company might proceed along both dimensions. As decisions about the two diversification moves are predicated on a firm's stock of existing resources and capabilities, strategies concerning the extent of growth along the two dimensions are likely to be developed simultaneously and endogenously by firms rather than independently, as implied in previous research (Kumar, 2009). Hence, current levels of both geographic diversification and product diversification should affect a firm's future moves in both directions.

To undertake such an analysis, we build on the RBV and TCE reasoning that underlies much of our understanding about the gains and limits of product and geographic diversification. We argue that geographic and product diversification are likely to complement each other at certain levels of resource utilization, while at other levels they are likely to become substitutes. This view offers an important contingency to our understanding of the relationships between geographic and product diversification as it implies that such relationships will differ for firms at different levels of both diversification types.

We develop our hypotheses from our contention that firms seek to avoid "under-diversification" and "over-diversification" as they grow. By evaluating performance feedback over time and by making comparisons with relevant peers such as industry or strategic group members (Fiegenbaum, Hart, & Schendel, 1996; Fiegenbaum & Thomas, 1995) firms aim

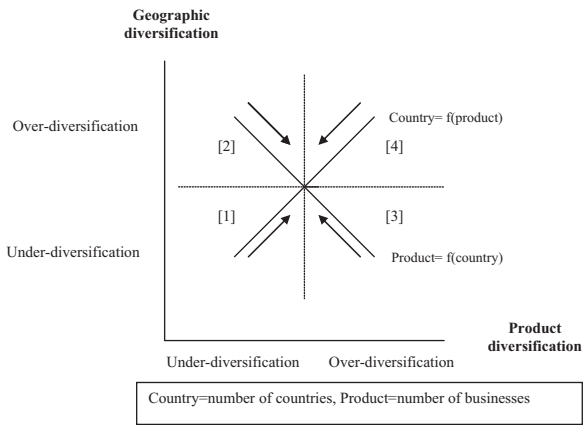

Fig. 1. The relationships between geographic and product diversification for under- and over-diversifiers.

to achieve an optimum level of diversification. The existence of an optimal level of diversification, which may vary for different types of firms operating in different environments, is the direct outcome of the limits on the positive performance implications of these two diversification types that have been extensively discussed in extant literature, as we have already reviewed.

To clarify, "under-diversification" in a given diversification path implies insufficient utilization of a given firm's fixed bundle of resources for that growth strategy. Hence, continued expansion into new countries or businesses will provide good opportunities for growth or risk reduction (Farjoun, 1994; Montgomery & Wernerfelt, 1988; Penrose, 1959). Meanwhile, "over-diversification" in a given path implies an excessive use of the firm's resource base coupled with high governance costs (Lu & Beamish, 2004) leading to diseconomies of scope. Since adding resources to a firm's given bundle of resources is a time-consuming and costly process (Barney, 1991; Montgomery & Wernerfelt, 1988; Penrose, 1959; Tan & Mahoney, 2005) and since at some point the costs of internal governance exceed the benefits of firm growth (Jones & Hill, 1988), contraction of an over-diversified path is the expected outcome.

2.5. The relationships between geographic diversification and product diversification

Fig. 1 portrays this view that the current levels of a firm's geographic and product diversification should affect their future moves in both directions. More specifically, the extent to which a firm has under-diversified or over-diversified in any such direction is likely to affect the relationship between their evolution along both paths.

Fig. 1 indicates that there can be "optimal" levels of both geographic and product diversification, which firms seek to reach. Such optimal levels may certainly be industry specific or even firm specific, yet when a given firm is under-diversified in a particular path, it is likely to increase its level of diversification along this path based on under-utilized resources. By contrast, when a firm is over-diversified, it will aim to decrease its current level of diversification and hence free resources for alternative growth directions. Overall, Fig. 1 implies that a firm that is under-diversified both geographically and product-wise will aim to increase its level of diversification in both paths (see quadrant [1] of Fig. 1). On the other hand, a firm that is over-diversified both geographically and product-wise will aim to decrease its level of diversification in both paths (see quadrant [4]).

The two diversification moves imply that underutilized resources (Barney, 1991; Montgomery & Wernerfelt, 1988; Penrose, 1959), and excessively used resources lead to a positive association between the direction of change in geographic and product diversification. We therefore hypothesize that:

Hypothesis 1. There is a positive relationship between the geographic- and product diversification moves of a firm that is either under-diversified or over-diversified in both dimensions.

On the other hand, a firm that is under-diversified product-wise, but over diversified geographically is expected to increase its product diversification at the expense of geographic diversification (see quadrant [2]). Finally, a firm that is under-diversified geographically, but over diversified product-wise is expected to increase its geographic diversification at the expense of product diversification (see quadrant [3]). In these last two cases one would expect that resources that are freed following the divestiture of specific businesses or exit from a foreign country will be directed towards expansion in the alternate diversification path within a respectively narrower range of businesses or countries (Meyer, 2006). Taken together, these changes in geographic and product diversification lead us to hypothesize that:

Hypothesis 2. There is a negative relationship between geographic and product diversification for a firm that is under-diversified in one dimension but over-diversified in the other.

3. Data and methods

3.1. Data

We tested our conceptual framework on panel data of Japanese MNCs. Japan is an appropriate setting for testing our hypotheses because we required a sample of firms at various stages of geographic and product diversification. While Japanese firms are usually considered to be more product diversified than their counterparts in the United States and Europe, Japanese firms' geographic diversification experiences are more recent than those of major firms from the United States and Europe, with the most dramatic period of expansion being the last two decades of the 20th century (UNCTAD, 2010). We focused on this period as it represents a period of expansion and growth geographically, but also product-wise, which permits us to capture the longitudinal profile of Japanese firms at varying stages of geographic diversification and with a good range in their level of product diversification. We derived our sample from the lists of multinational firms and foreign subsidiaries provided in numerous annual editions of the *Kaigai Shinshutsu Kigyou Souran* (Japanese Overseas Investments) compendium of Japanese foreign direct investments compiled by *Toyo Keizai*. We used each annual edition from 1991 to 2001 to construct the geographic diversification profiles of Japanese foreign direct investment for the 1990 to 2000 period. The rapid globalization and product expansion of Japanese firms in this period (UNCTAD, 2009) makes it particularly relevant for the study of Japanese firms' geographic and product diversification. We derived annual observations on firm specific information and geographic and product diversification profiles from the *Nikkei NEEDS* tapes and from annual editions of the fourth quarter issues of the *Japan Company Handbook*. Taken together, these data sources are among the most comprehensive for foreign subsidiary information, with coverage greater than that provided by the Harvard Multinational Enterprise project (Beamish, Delios, & Lecraw 1997). Overall, this process resulted in 1336 usable firm-year observations for the 288 MNCs for which we had data on both geographic diversification and product diversification, as reported for at least one of the years in the period 1990–2000.

3.1.1. Measures of geographic and product diversification

The geographic diversification measure we used is the number of foreign countries in which a firm had subsidiaries in a given year t (denoted as $country_t$). The equivalent measure for product diversification is the number of three-digit standard industrial classification (SIC) non-core businesses in which the firm had operated in a given year t (denoted as $product_t$). These measures were computed based on information obtained from annual editions of the *Japan Company Handbook*, *Japanese Overseas Investments*, and the *WorldScope database*. While an alternative measure could have been based on sales data by country and SIC sector, such data were unavailable for the firms in our sample. Nevertheless, subsidiary level data are a reasonable substitute for sales-weighted segment data, and tend to have high correlations with measures based on sales (Sullivan, 1994).

3.1.2. Measures of control variables

To account for firm specific effects on geographic and product diversification profiles, we included the following control variables, which were derived from the *Nikkei NEEDS* tapes:

Emp_t – The number of employees in year t; which is a measure of firm size. A positive relationship is expected between a firm's size and its level of geographic and product diversification since greater firm size is expected to enable firms to exploit economies of scale and scope, which in turn facilitate geographic and product expansion (Caves, 1996; Chandler, 1990; Penrose, 1959; Teece, 1982).

We then controlled for three variables measuring the impact of firm specific resources on geographic and product diversification (Delios & Beamish, 1999; Silverman, 1999):

INT_RD_t – R&D intensity as reflected by the ratio of R&D expenses to sales in a given year t. This measure represents firm specific technological advantages.

INT_ADV_t – Advertising intensity is represented by the ratio of advertising expenses to sales in a given year t. This measure reflects firm specific advertising advantages.

INT_CAP_t – Capital intensity is calculated as the ratio of fixed assets to sales in a given year t.

Higher values for R&D, advertising and capital intensities are expected to be positively correlated with both geographic and product diversification (Chatterjee & Wernerfelt, 1991; Kumar, 2009; Levinthal & Wu, 2010; Markides, 1995; Pearce, 1993; Silverman, 1999) since they reflect the ability of firms to effectively exploit their resources for further expansion.

Another control measure was each firm's sales at year t ($sales_t$). A greater level of firm sales is expected to be positively correlated with both product and geographic diversification. Finally, we also add control measures to test the possible effect of financial slack and financial leverage on geographic diversification and product diversification moves. Greater financial slack should enable firms to further diversify. Following Chang (1996), Mishina, Pollock, and Porack (2004), and Singh (1986), we used a firm's $current_ratio_{t-1}$ (current assets divided by current liabilities) as our measure of financial slack. In contrast, financial leverage is expected to limit a firm's further diversification moves because of the financial resource constraints it implies. We used the long term liabilities of a firm in each year ($liabilities_t$) as our measure of financial leverage.

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Table 1
Descriptive statistics and correlations (pooled sample).

Variable	*N*	*n*	Mean	SD	Country	Product	Herf_ country	herf_ product	Emp	INT-RD	INT-ADV	INT-CAP	Sales	Current ratio	Liabilities
Country	1336	288	3.72	4.04	1.00										
Product	1336	288	2.21	1.13	0.21**	1.00									
Herf_country	1336	288	0.96	0.78	0.82***	0.21**	1.00								
Herf_product	1336	288	0.65	0.25	−0.02	0.26**	0.27	1.00							
Emp (Thousands)	1336	288	4.21	3.86	0.56***	0.14**	0.50***	0.08*	1.00						
INT_RD	1336	288	0.01	0.01	0.34**	0.17**	0.31**	−0.13*	0.24**	1.00					
INT_ADV	1336	288	0.01	0.02	0.08*	−0.11*	0.06	−0.22**	0.01	0.16**	1.00				
INT_CAP	1336	288	0.57	0.46	−0.01	0.06	−0.06*	−0.10*	−0.03	0.26**	0.07	1.00			
Sales (Yen billions)	1336	288	231.44	1.02	0.22**	0.08*	0.24**	0.06	0.16**	0.15*	0.05	0.02	1.00		
Current ratio (Yen billions)	1336	288	1.21	1.15	0.04	0.03	0.01	0.01	0.08*	0.15**	0.03	0.01	0.06	1.00	
Liabilities (Yen billions)	1336	288	108.09	444.98	0.03	0.02	0.05	0.04	0.12*	0.03	0.01	0.21**	0.08*	0.11*	1.00

Note: *N*: number of observations; *n*: number of firms.
* Statistically significant at 5%, all test two-tailed.
** Statistically significant at 1%.
*** Statistically significant at 0.1%.

We log-transformed all measures to decrease their skewness levels. We present the descriptive statistics and correlations for all variables in our analysis in Table 1. Table 1 shows that the sample firms averaged 4200 employees, which is comparable to medium sized multinational corporations (UNCTAD, 2010). These firms had average sales of US $390 million and an average age of 57 years. Table 1 further indicates that, on average, the firms in our sample hold subsidiaries in 3.7 countries (not including Japan) and they operated in 2.2 three-digit SIC business segments. Overall the firms in our sample have modest levels of geographic diversification and product diversification, but there is a good range in these values.

Table 1 also shows that *country* and *product* are moderately positively correlated ($r = 0.21$). Correlations greater than 0.3 exist only between the number of employees and geographic diversification, and between R&D intensity and geographic diversification.

3.2. Empirical model

3.2.1. Model specification

Kumar (2009) made an important contribution by arguing that decisions concerning the extent of growth along the two diversification paths are likely to be made *simultaneously and endogenously* by firms after taking into consideration the availability of various resources, and not independently as implicitly assumed in past research. We follow this approach but extend it by offering the contingency of distinguishing between firms that are under-diversified and over diversified in terms of geographic and product diversification.

To test our predictions regarding the reciprocity of the relationships between geographic and product diversification, we first divided our sample into four groups according to their values of product diversification and geographic diversification. This grouping was performed in the following manner.

We first ran 2SLS within-firm fixed effects regression models on the full sample in order to test the endogenous relationships between geographic and product diversification. These 2SLS models indicated a positive linear relationship between *country* and *product* when the former is the dependent variable and a negative linear relationship when the latter is the dependent variable.[2] We then used the intersection of the two functions to compute a point which served as the proxy for the optimal levels of *country* and *product* (see the functions *product* = *f*(*country*) and *country* = *f*(*product*) in Fig. 1). This proxy was used to divide the sample into the four groups detailed in Fig. 1.

Since we control for observed and unobserved firm specific characteristics in the relationships between geographic and product diversification, the intersection of the two curves represents the point at which firms located below and to the left of the intersection (see axis in Fig. 1) are relatively under-diversified both geographically and product-wise compared with the rest of the sample. Likewise, above and to the right of the intersection point lie firms that are relatively over-diversified compared with the rest of the sample. Above and to the left of the intersection point there are firms that are relatively more geographically diversified but relatively less product diversified than the rest of the sample, while below and to the right of the intersection point lie firms that are relatively more product diversified, but relatively less geographically diversified than the rest of the sample.

[2] These relationships are possible given the fact that each equation includes a different instrumental variable (IV), as explained below.

The reasoning behind this procedure is to provide a point of evaluation for the optimum levels of product and geographic diversification for the firms in our sample. Building on the point that firms are likely to evaluate their performance over time relative to other firms (Fiegenbaum et al., 1996; Fiegenbaum & Thomas, 1995), firms are expected to expand or contract their diversification as compared with the average level observed for peer firms.

In a similar manner, we then ran separate 2SLS within-firm fixed effects regression models for each of the four quadrants of firms in order to test Hypotheses 1 and 2. 2SLS regressions (Jaccard & Wan, 1996; Kmenta, 1986) enable the researcher to test the relationships between two endogenous variables by using two stages, where in the first stage one of the endogenous variables is estimated based on all other independent variables and then this estimation is used to predict the other endogenous variable. The 2SLS technique hence enables one to account for correlation in the disturbance term across equations to produce more efficient estimates. A crucial condition for such estimation is the inclusion of an instrumental variable (IV) that is correlated with the second stage dependent variable but not with the first stage one. The IV we used for $country_t$ was a Herfindahl measure of per country subsidiary number denoted as $herf_country_t$. The $herf_country_t$ variable measures the dispersion of foreign subsidiaries of a given firm.[3] It is significantly correlated with $country_t$ but not with $product_t$ and hence meets the criteria for being an IV. The IV we used for $product_t$ was a Herfindahl measure of three-digit SIC sales denoted as $herf_product_t$. The $herf_product_t$ variable measures the dispersion of firm sales across sectors. It is significantly correlated with $product_t$ but not with $country_t$.

An important advantage of our dataset is that it permits a longitudinal analysis. Within firm-fixed effects models allow us to test within firm variance in geographic and product diversification over time while controlling for unmeasured firm specific effects on these measures. This is an important advantage over past studies that have mostly used cross sectional analyses, as well as over studies that have used change variables between two periods of time (see Kumar, 2009). The reason for this is that change variables are subject to biases such as regression towards the mean. Consequently, where possible a longitudinal analysis is preferred (Bergh & Fairbank, 2002).

3.2.2. Estimation procedure

Accordingly, using one year lagged values to capture the impact of a given diversification level at $t-1$ on the subsequent year diversification in the alternate diversification route, the specification of our 2SLS regression system was as follows:

$$product_t = f(country_{t-1},\ herf_product_{t-1},\ Emp_{t-1},\ INT_RD_{t-1},\ INT_ADV_{t-1},\ INT_CAP_{t-1},\ sales_{t-1},\ current\ ratio_{t-1},\ liabilities_{t-1}) \quad (1)$$

$$country_t = f(product_{t-1},\ herf_country_{t-1},\ Emp_{t-1},\ INT_RD_{t-1},\ INT_ADV_{t-1},\ INT_CAP_{t-1},\ sales_{t-1},\ current\ ratio_{t-1},\ liabilities_{t-1}) \quad (2)$$

The 2SLS specification does not allow us to use the above equations to test the relationships between each dependent variable and its previous year measure (because $product_{t-1}$ and $country_{t-1}$ are assumed to be correlated). Therefore, we also ran Ordinary Least Squares (OLS) within-firm fixed effects models to test within firm changes in geographic diversification and product diversification over time regardless of their impact on one another.

For these analyses, we regressed the current values of both measures with the values of geographic diversification and product diversification measures in the previous year ($t-1$), respectively. For under-diversified firms, we expected a positive correlation between a firm's previous level of either geographic or product diversification and its subsequent year's diversification, but we expected a negative correlation for over-diversified ones. We used two equation sets in our OLS within firm fixed effects models with the following specifications:

$$product_t = f(product_{t-1},\ Emp_{t-1},\ INT_RD_{t-1},\ INT_ADV_{t-1},\ INT_CAP_{t-1},\ sales_{t-1},\ current\ ratio_{t-1},\ liabilities_{t-1}) \quad (3)$$

$$country_t = f(country_{t-1},\ Emp_{t-1},\ INT_RD_{t-1},\ INT_ADV_{t-1},\ INT_CAP_{t-1},\ sales_{t-1},\ current\ ratio_{t-1},\ liabilities_{t-1}) \quad (4)$$

Overall, the inclusion of within-firm fixed effects suggests that the reported models explain within-firm variation in geographic or product diversification rather than inter-firm variation. The analysis of within-firm variation seems to be the most appropriate variation with which to test our predictions, since the logic and reasoning underlying these hypotheses pertain to the impact of a given level of diversification (either geographic or product-wise) on subsequent expansion (or contraction) in the same and in the alternate diversification paths. We are hence more interested in capturing within-firm variation in these measures than inter-firm variation.

Fixed effects models further enable us to control for the impact of unmeasured firm specific effects that do not change over time and that influence either geographic or product diversification moves; industry specific effects (as in our sample,

[3] It is noteworthy that while Herfindahl measures are often used as proxies for geographic or product diversification, such measures account for dispersion rather than the level of diversification. This implies that a given firm's level of diversification can remain the same or even be less while becoming more dispersed (Kumar, 2009).

the core industry is fixed per firm), and; year specific effects. In addition, serial autocorrelation often occurs with time series data. In order to rule out concerns of potential autocorrelation, we used the Newey–West estimator.

Finally, the use of a lagged dependent variable is required in order to model the time precedence requirement for implying causality in a relationship (Davies et al., 2001). We expect that a given level of either geographic or product diversification in a specific year will affect both diversification strategies in the following year, as per the predictions of our conceptual framework.

4. Results

The 2SLS fixed within-firm effects regression models for the whole sample revealed a positive linear relationship between *country* and *product* when the former is the dependent variable and a negative linear relationship when the latter is the dependent variable. Such a relationship is consistent with our expectations, as detailed in Fig. 1. More importantly, the intersection of the two curves depicted in Fig. 1 was at *country* = 4 and *product* = 2. According to Fig. 1, this point may serve as a reasonable proxy for the "optimal" level of geographic and product diversification for the firms in our sample since the values of country and product are very close to their mean values (see Table 1). We have therefore used this point to divide our sample into four groups according to their levels of geographic and product diversification. The results of the 2SLS fixed within-effect models for the four groups are presented in Table 2.

Table 2 reports eight models in which $product_t$ and $country_t$ are, respectively, the explanatory variables. Models 1 and 1a refer to quadrant [1] firms in Fig. 1, i.e. firms with low product diversification (PD) and low geographic diversification (GD). Models 2 and 2a refer to quadrant [2] firms (high GD and low PD), models 3 and 3a refer to quadrant [3] firms (high PD and low GD) and models 4 and 4a refer to quadrant [4] firms (high GD and high PD).

Overall, the results shown in Table 2 support Hypothesis 1, since the coefficient estimates for $country_{t-1}$ are significant and positive in models 1 and 4 and the coefficient estimates for $product_{t-1}$ are significant and positive in models 1a and 4a. These relationships imply that greater geographic diversification in a given year is positively associated with greater product diversification in the subsequent year and vice versa. In addition, Table 2 shows support for Hypothesis 2 as the coefficient

Table 2
The relationship between geographic and product diversification, results of second stage 2SLS within-firm fixed-effects models.

Explanatory variables: (lagged by one period)	Model 1 – low PD, low GD ($product_t$)	Model 2 – low PD, high GD ($product_t$)	Model 3 – high PD, low GD ($product_t$)	Model 4 – high PD, high GD ($product_t$)
$country_{t-1}$	0.446***	−0.342***	−0.532**	0.673*
$Herf_product_{t-1}$	1.155**	1.243**	−1.152*	−1.883*
Emp_{t-1}	3.079*	3.237*	3.338*	3.460*
INT_RD_{t-1}	7.756	8.830	5.705	5.523
INT_ADV_{t-1}	−13.641*	−13.232*	−11.635*	−12.251*
INT_CAP_{t-1}	−6.225	−6.358	−4.856	−3.821
$Sales_{t-1}$	0.036*	0.029*	0.028*	0.031*
$Current\ ratio_{t-1}$	1.892	1.764	1.567	1.383
$Liabilities_{t-1}$	−0.021	−0.016	−0.019	−0.015
Year dummies	+	+	+	+
Centered R^2	0.25	0.27	0.22	0.20
F-statistic	11.49***	13.25***	12.17***	10.89***
Explanatory variables: (lagged by one period)	**Model 1a – low PD, low GD ($country_t$)**	**Model 2a – low PD, high GD ($country_t$)**	**Model 3a – high PD, low GD ($country_t$)**	**Model 4a – high PD, high GD ($country_t$)**
$product_{t-1}$	0.779***	−0.733**	−0.661*	0.729*
$Herf_country_{t-1}$	1.135**	−1.169**	1.391**	−1.362*
Emp_{t-1}	3.340**	3.125 **	3.590*	3.478*
INT_RD_{t-1}	19.831**	21.458**	20.580*	21.342*
INT_ADV_{t-1}	29.919	31.628	22.739	27.651
INT_CAP_{t-1}	−5.240*	−5.433*	−5.225**	−6.744*
$Sales_{t-1}$	0.076*	0.086*	0.063*	0.091*
$Current\ ratio_{t-1}$	2.031	1.982	2.064	1.954
$Liabilities_{t-1}$	−0.043	−0.038	−0.051	−0.037
Year dummies	+	+	+	+
Centered R^2	0.29	0.30	0.20	0.18
F-statistic	12.43***	16.15***	13.64***	10.52***
N firm-years	505	471	202	158

Note: All tests are two-tailed. Intercept is not shown. PD: product diversification, GD: geographic diversification.
* Statistically significant at 5%.
** Statistically significant at 1%.
*** Statistically significant at 0.1%.

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estimates for $country_{t-1}$ are significant and negative in models 2 and 3 while the coefficient estimates for $product_{t-1}$ are significant and negative in models 2a and 3a. These relationships imply that greater geographic diversification in a given year is negatively associated with greater product diversification in the subsequent year and vice versa.

The results in Table 2 reveal the expected differences in correlations between firms that are either under-diversified or over-diversified in both dimensions and between firms where one diversification path is over-diversified and the other is under-diversified. It is also noteworthy that the firms with low levels of diversification (either geographically or product-wise) are positively correlated with the instrumental variables whereas firms with high levels of diversification (either geographically or product-wise) are negatively correlated with the instrumental variables. This result is also consistent with our expectations that under-diversified firms will expand diversification while over-diversified firms will contract diversification. However, as we have mentioned, the Herfindahl measures do not necessarily measure the level of diversification, but instead capture dispersion (Kumar, 2009). Consequently, we later test this result further (see Table 3).

Regarding the control variables, Emp_{t-1} and $sales_{t-1}$ are positively related to both diversification measures as per our expectations. In addition, $product_t$ is significantly and negatively correlated with INT_ADV_{t-1}, indicating that greater advertising intensity for the firms in our sample is associated with lesser product diversification. While the latter result is contrary to our expectations, $country_t$, is significantly and positively correlated with R&D intensity (INT_RD_{t-1}) indicating that more knowledge intensive firms are more geographically diversified. In addition, $country_t$ is significantly and negatively correlated with INT_CAP_{t-1}, indicating that greater capital intensity for the firms in our sample is associated with lesser geographic diversification. Finally, the results do not reveal significant relationships between $current_ratio_{t-1}$ and $country_t$ or $product_t$, nor between $liabilities_{t-1}$ and $country_t$ or $product_t$, indicating that financial slack or leverage do not significant affect the diversification moves of the firms in our sample (although their signs are in the predicted directions).

Table 3 presents the relationship between current and lagged product diversification and geographic diversification measures. The models correspond to the models of Table 2 in terms of Fig. 1's quadrants. Table 3 shows that firms with low product diversification tend to increase product diversification over time (models 1 and 2). Likewise firms with low geographic diversification increase their geographic diversification over time (models 1a and 2a). Meanwhile, firms with high product diversification reduce their level of product diversification (models 3 and 4) and firms with high geographic

Table 3
Changes in geographic and product diversification, results of within-firm fixed-effects OLS models.

Explanatory variables: (lagged by one period)	Model 1 – low PD, low GD ($product_t$)	Model 2 – low PD, high GD ($product_t$)	Model 3 – high PD, low GD ($product_t$)	Model 4 – high PD, high GD ($product_t$)
$product_{t-1}$	0.221**	0.129***	−0.043*	−0.260*
Emp_{t-1}	6.182*	6.143*	6.232*	7.230*
INT_RD_{t-1}	12.140	11.259	10.738	9.897
INT_ADV_{t-1}	−11.332*	−12.182**	−11.267*	−12.464*
INT_CAP_{t-1}	−2.630	−3.293	−4.601	−4.848
$Sales_{t-1}$	0.069*	0.058*	0.061*	0.071*
$Current\ ratio_{t-1}$	1.021	1.168	1.145	1.098
$Liabilities_{t-1}$	−0.062	−0.073	−0.054	−0.063
Constant	6.747**	6.181**	7.302*	6.151*
Year dummies	+	+	+	+
R^2	0.21	0.25	0.21	0.19
F-statistic	27.78***	31.54***	20.39***	18.91***
Explanatory variables: (lagged by one period)	**Model 1a – low PD, low GD ($country_t$)**	**Model 2a – low PD, high GD ($country_t$)**	**Model 3a – high PD, low GD ($country_t$)**	**Model 4a – high PD, high GD ($country_t$)**
$country_{t-1}$	0.241**	−0.358***	0.269*	−0.372*
Emp_{t-1}	5.769*	5.190 **	6.147*	5.196*
INT_RD_{t-1}	31.473**	32.542*	31.629*	31.637*
INT_ADV_{t-1}	68.979	69.636	70.728	72.643
INT_CAP_{t-1}	−7.262*	−7.265**	−6.181*	−6.985*
$Sales_{t-1}$	0.088*	0.082*	0.076*	0.069*
$Current\ ratio_{t-1}$	1.652	1.453	1.597	1.856
$Liabilities_{t-1}$	−0.033	−0.047	−0.019	−0.027
Constant	13.231*	12.744*	13.359*	12.239*
Year dummies	+	+	+	+
R^2	0.24	0.29	0.22	0.18
F-statistic	31.51***	37.68***	23.40***	21.34***
N firm-years	505	471	202	158

Note: All tests are two-tailed. PD: product diversification, GD: geographic diversification.
* Statistically significant at 5%.
** Statistically significant at 1%.
*** Statistically significant at 0.1%.

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diversification reduce their level of geographic diversification (models 3a and 4a). These results are consistent with our expectations regarding the differential diversification patterns of under-diversified and over diversified firms. The correlations with the control variables are consistent with those found in Table 2.

We conducted several robustness tests for our analyses. In order to test whether our results regarding the directions of diversification hold for longer time periods, we increased the lag structure to 2 years (for both the 2SLS and OLS regressions) and obtained similar results. While, the R^2 and F statistics were somewhat lower in the models with 2-year lags, all tests of the coefficients were significant within acceptable ranges (less than 5%). Likewise, our results remained consistent for a 3-year lag, yet, apparently because of the lower number of observations, significance was typically at the 10% level.

In order to refute the possibility that our results are dependent on the choice of our various measures, we have further run our models using alternative measures. We developed a measure of geographic diversification based on the number of foreign subsidiaries a firm had (as an alternative to the number of countries) and obtained similar results. In this case, product and geographic diversification were positively correlated for firms in quadrants 1 and 4 and negatively correlated for firms in quadrants 2 and 3, at a significance level of $p < 1\%$. The number of subsidiaries was further positively related to its one year lag for firms in quadrants 1 and 3 and negatively related for firms in quadrants 2 and 4 at a significance level of $p < 5\%$. In order to refute possible curvilinear effects within our quadrant regressions, we also ran the models specified in Tables 2 and 3 with the addition of the squared value of $country_{t-1}$ (models 1–4 in the two tables) and the squared value of $product_{t-1}$ (models 1a–4a). These models did not reveal a significant relationship between the squared values of $country_{t-1}$ or $product_{t-1}$ and the respective lagged dependent variables.

5. Diversification and firm performance

Our findings regarding the different relationships between geographic and product diversification are of particular importance when the separate and combined impact of both diversification strategies on firm performance are analyzed. Overall, our results show a good alignment with the transaction cost and resource-based reasoning that underlies much of the recent research on the relationships between geographic diversification and firm performance as well as product diversification and firm performance. This research emphasizes the curvilinearity of the diversification and performance relationships, where the inflection point of the predicted and observed curves is analogous to our conception of an optimal level of geographic or product diversification. Resources and advantages on the one hand, and governance costs and limits to growth, on the other hand, lead to expansions and contractions in diversification. Firms seek to maximize their returns from diversification led growth, but also seek to balance it under conditions of uncertainty, leading to the possibility of over- or under-diversification along either dimension. Our approach is consistent with such a transaction cost or resource based reasoning, but the leverage point we utilize for identifying the advantages and disadvantages of expanding or contracting diversification is a firm's current level of geographic and product diversification. As such, we develop contingent predictions about the interrelationships between geographic and product diversification levels depending on how a firm varies from what we conceptualize as an optimal level of either geographic diversification or product diversification.

This consideration is important as studies analyzing the collective impact of geographic and product diversification on performance (e.g. Delios & Beamish, 1999; Geringer et al., 1989, 2000; Grant et al., 1988; Hitt et al., 1994, 1997; Palich, Cardinal, et al., 2000) mostly treat geographic and product diversification as independent exogenous constructs, thus ignoring the potential impact of their interrelationships on performance. Our study implies that future studies should take into account the endogenous inter-relationships between geographic and product diversification at different levels of each path in order to correctly evaluate how the two strategies affect firm performance.

A preliminary demonstration of this point of view appears in Fig. 2. Fig. 2 presents the average Return on Assets (ROA) and Return on Sales (ROS) of the firms in the different quadrants described in Fig. 1. In this figure, it can be seen that firms

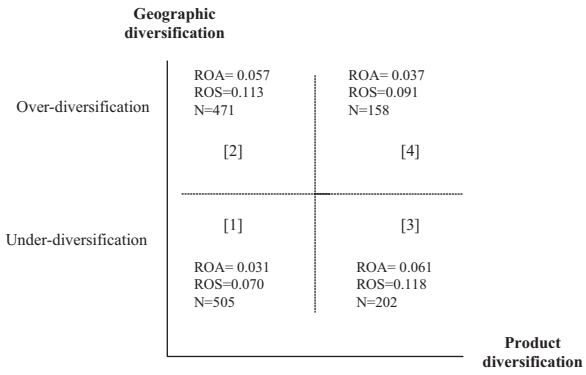

Fig. 2. Performance by levels of geographic and product diversification.

belonging to either quadrants 2 or 3 perform better than firms that are low diversifiers (quadrant 1) or high diversifiers (quadrant 4). This difference in performance is statistically significant ($p < 0.1\%$) and implies that firms that keep one diversification path low while expanding the other are likely to outperform firms that are either highly or lowly diversified along both dimensions. Fig. 2 further indicates that for the firms in our sample, high levels of diversification are somewhat more favorable in terms of performance than low levels of diversification as the firms in quadrant 4 outperform the firms in quadrant 1 along both performance measures (only for ROS is this difference statistically significant at the $p < 1\%$ level).

6. Discussion and conclusion

The main contribution of our study rests in its identification of the asymmetric set of relationships that exist between geographic diversification and product diversification. These arise, arguably, from differences in the current levels of firms' geographic and product diversification and the endogenous relationship between simultaneous decisions regarding future expansion or contractions along these two diversification paths. In this respect, the paper offers a possible way to reconcile past conflicting findings on the relationship between geographic and product diversification by explicitly considering the contingency of distinguishing between the effects of firms' under- and over-diversification in each diversification trajectory.

We have argued and shown empirically that the relationships between geographic and product diversification are not uniform as implicitly assumed in most extant research. Instead, these relationships are likely to differ according to the current levels of diversification in both directions. Our core arguments are: (1) under-diversification in one path and over-diversification in the other will lead to an expansion of the former at the expense of the latter, hence leading to a negative correlation between geographic and product diversification. Furthermore, (2) firms that are either under-diversified or over-diversified in both directions will respectively increase diversification or decrease it along both paths, hence implying a positive correlation between geographic and product diversification.

We have demonstrated that the relationship between geographic and product diversification is not identical for all firms and have specified the conditions under which a positive linear relationship and a negative linear relationship may co-exist at different levels of geographic and product diversification. Likewise, our results also mark the possible existence of a curvilinear relationship between product and geographic diversification, as such relationships can result from the joint analysis of firms belonging to different quadrants (as portrayed in Fig. 1). In other words, curvilinear relationships are likely to be observed for samples of firms drawn from quadrants [2] and [4] (where a U-shape relationship is likely to be observed) or in samples of firms drawn from quadrants [1] and [3] (where an inverted U-shape relationship is likely to be observed).

Our conceptual framework and findings further imply that future research needs to consider how and whether for some firms simultaneous expansion in both directions will enhance performance, while for other firms simultaneous contraction will enhance performance. For another set of firms, expansion in one direction paralleled by a contraction of the other will enhance performance. Thus, future work should focus on incorporating the contingencies in these relationships between growth through geographic and product diversification into studies of the performance implications of these growth decisions.

Nevertheless, it should be noted that our results need to be tempered against the setting we used to test our hypotheses. Japanese MNCs have had a strong export-orientation to serving foreign markets, with foreign direct investments (FDI) forming an important component of the production aspects of that strategy. Geographic diversification is often motivated by local production considerations, not necessarily by local market entry considerations. To the extent that firms from other nations have a greater local market-seeking motivation for their foreign investments, the relationships we have identified here might differ. Likewise, Japanese MNCs are traditionally considered to be relatively late to pursue FDI in their lifecycles and do so less extensively and in a more limited value chain of activities than MNCs from the US, UK, and other European countries. Furthermore, Japanese firms are often said to focus on sales growth more than other MNCs (Bartlett & Ghoshal, 1989; Geringer et al., 2000). Both these considerations mean that our findings cannot necessarily be generalized to non-Japanese MNCs. In addition, our sample is comprised of MNCs (and excludes domestic firms), however it is not clear whether the analyzed firms actually compare themselves to other MNCs or to their industry peers (including non MNCs). Future work examining geographic and product diversification patterns of domestic and non-domestic firms from different countries are hence required to examine the external validity of our results.

It should be noted that, while our analyses combine resource based view logic with that of transaction costs, the data available to us did not enable us to directly test the impact of the nature of firm specific resources and transactions on the chosen path of growth. Such a test requires identifying how the use of resources or their release coupled with the complexity of transactions faced by the firm affect its future diversification moves. Data allowing the examination of the accumulation of such resources and transactions are likely to be difficult to develop, but it would be important to directly analyze how resources and transactions affect the growth paths of firms. The latter point is especially relevant given the fact that a change in the market environment, such as a change in technology or a change in the diversification strategy of the firm's competitors, is likely to affect a firm's resources as well as its transaction costs. In fact, even if a firm is, at a given point of time, at an "optimal" level of diversification geographically and product-wise, such changes may drive it to change its levels of diversification. Finally, changes in external factors were not taken into account in the current study because of data availability limitations. Future research, expanding the contingency approach presented in this paper, may well need to take into account such factors as they are likely to affect geographic and product diversification decisions.

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Overall, this study highlights the complexities of simultaneously pursuing geographic and product diversification paths. We theorize that firms seek to simultaneously optimize their levels of geographic and product diversification. Hence firms that have under-diversified in either path will seek to expand their diversification in this path while firms that have over-diversified in either path will seek to contract their diversification in that path. Accordingly, we expect and observe positive correlations between the geographic and product diversification moves of firms that are either under-diversified or over-diversified in both paths and negative correlations between the diversification moves of firms that are under-diversified in one path but over-diversified in the other. Bearing in mind the limitations of this study, as stated above, we therefore conclude that decisions about resource allocations and the emphasis placed on strategies promoting geographic or product expansion need to be balanced against a firm's current levels of diversification and the strategic intents of expansion into both diversification realms.

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