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The Relationship between Product and International Diversification: The Effect of Asset Dispersion and Asset Diversity on Firm Performance

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ABSTRACT

THE RELATIONSHIP BETWEEN PRODUCT AND INTERNATIONAL DIVERSIFICATION:

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YULIA MUZYRYA

There is little consensus on the diversification-performance relationship in the diversification literature. We aim to contribute to this literature by looking simultaneously at product and international diversification and the relationship between both. Furthermore, we distinguish theoretically and empirically between two different components of any diversification strategy, i.e. the degree of diversification and the type of diversification. We test our hypotheses on panel data covering 115 firms. We find that the dispersion of a firm's activities, both internationally and in different product markets, results in higher levels of performance. Contrary, we find that higher levels in the diversity of the firm's activities are negatively associated with firm performance. We also find evidence that firms can disperse their activities simultaneously in different product and geographic markets, however, they face trade-offs when it comes to having more diversity in their activities in different geographic and product markets. Our findings help us explain some of the apparent contradictions in the diversification literature and they offer guidance to managers on how to pursue an optimal diversification strategy.

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ACKNOWLEDGEMENT

To Prof. Ilya Cuypers

DEDICATION

To my grandpa AK Muzyrya

INTRODUCTION

Diversification has been one of the most popular corporate strategies since the 1960s. Theoretically, several benefits, which are related to economies of scope, transaction costs and risk reduction, have all been attributed to diversification (Lewellen, 1971; Penrose, 1959; Williamson, 1979). With these benefits in mind, managers often entered into new product and/or geographical markets in order to improve performance of their companies. However, in practice, diversification proved to be a much more controversial strategy with some companies diversifying successfully while others failing. As a result, several scholars and practitioners examined if and how diversification as a corporate strategy can also destroy value (Hyland & Diltz, 2002; Porter, 2008) and advanced a number of new theoretically arguments. These arguments relate to factors such as the increased complexity of managing product and geographically diverse firms, growing global competition (Hitt, Hoskisson, & Kim, 1997) and/or managerial opportunism (Jiraporn, Kim, Davidson, & Singh, 2006).

Not only are the theoretical arguments related to diversification mixed and often incompatible with each other, the empirical evidence is mixed as well. Several studies found a positive relationship between a firm's level of diversification and performance (e.g. Jacquemin and Berry (1979); Jose, Nichols and Stevens (1986); Kim and Lyn (1986)). However, other studies found a negative relationship between diversification and performance. For example, Berger and Ofek (1995) found evidence of a diversification discount, i.e. the firm's stock market price is lower than the sum of value of its separate segments. They found that this diversification discount can be as large as 13 to 15%. Yet other scholars found evidence of a non-linear U-shaped relationship (e.g. Ruigrok and Wagner (2003)), a non-linear inverse U-shaped relationship (e.g. Grant, Jammine and Thomas (1988); Gomes and Ramaswamy (1999)), a sigmoid relationship (e.g. Contractor, Kundu and Hsu (2003); Lu and Beamish (2004)) or no significant relationship at all (e.g. Montgomery (1985), Tallman et al. (1996)). Hence, the empirical results and theoretical arguments looking at the effects of both geographic and product diversification on performance are inconclusive and often contradictory (Datta, Rajagopalan, & Rasheed, 1991; Hennart, 2007; Ramanujam & Varadarajan, 1989).

Furthermore, the relationship between product and geographical diversification and the reciprocity of this relationship is equally ambiguous (Amit & Livnat, 1988; Grant, Jammine, & Thomas, 1986). In this study we aim to address the lack of consensus in the diversification literature by looking at the diversification-performance relationship and the relationship between product and geographic diversification simultaneously. More specifically, we address the lack of consensus in the literature and thereby aim to contribute to the literature in three ways.

Firstly, contrary to most studies in the diversification literature, we will consider international and product diversification side-by-side. Empirically, either ignoring product or international experiences might bias results as it might lead to underestimating the firm's actual level of diversification. As a result our findings should capture the effects of international and product diversification more accurately.

Secondly, by looking at both types of diversification we do not only avoid any possible omitted-variable bias, it also allows us to investigate the relationship between both types of diversification. Although, several scholars have shown that a relationship exist between product and international diversification, our understanding of the nature of this relationship remains incomplete. Therefore, we aim to contribute to the literature by showing that the nature of the relationship between both types of diversification is contingent.

Thirdly, although researchers argued that diversification is a multidimensional concept, most studies conceptualize and operationalize diversification as a unidimensional concept. Goerzen and Beamish (2003) distinguishing between a quantitative component, i.e. the degree of diversification, and a qualitative component of diversification, i.e. the type of diversification, can offer new insights. Therefore, we follow their approach and we aim to resolve some of the apparent contradictions in the literature by differentiating between the degree and type of diversification.

Overall, our theoretical refinements and findings will offer guidance to managers to make more optimal diversification choices. More precisely, it will help managers pursue opportunities in other product and geographic markets more efficiently.

LITERATURE REVIEW

Product and International Diversification

Initially scholars looked at product diversification, which focuses on a firm's expansion of its activities into new products markets. These scholars also highlighted that the nature of the organization changes when it enters new products markets as this creates a number of new administrative linkage mechanisms (Ramanujam et al., 1989). Soon after scholars also took an interest in international diversification, which relates to the firm's decision to expand the scope of its activities beyond its domestic market (Hitt et al., 1997). In general, firms pursue product and international diversification to exploit underutilized resources within the firm, and to take advantage of imperfections of markets, which creates new opportunities for growth (Penrose, 1959; Rugman, 1979).[1]

Historically, scholars have looked at product and international diversification separately. However, recently Kumar (2009) showed that there is a close relationship between product and geographical diversification and that this relationship is reciprocal.

[1] We will discuss the benefits of and reasons for diversification in more detail below.

One possible explanation for this relationship and the reciprocity of the relationship is that managers carry out decisions on both diversification strategies simultaneously.

Although researchers now acknowledged the existence and complexity of such relationship and necessity to explore it in detail (Hitt et al., 1997; Wolf, 1977), it often remains unexplained. Therefore, we will contribute to the existent literature by looking at product and international diversification simultaneously and by exploring the link between both in more detail.

The Degree and Type of Diversification

Several researchers argued that a firm's diversification strategy can be described in quantitative (the degree of diversification), and qualitative (the type of diversification) terms. The degree of diversification generally refers to the dispersion of a firm's assets across different markets while the type of diversification refers to diversity between the different businesses, in which the firm is active (Datta et al., 1991).

In other words, the degree of diversification solely refers to dispersion of a firm's activity in terms of its assets or sales among different markets without considering any differences between these markets. Hence, the degree of diversification is generally conceptualized and operationalized as the number and the relative importance of the international or product markets a firm is active in.

Contrary, the type of diversification aims to capture the diversity among the businesses a firm is active in. One such distinction that is often made is the distinction between related and unrelated diversification. Related diversification involves operating businesses in industries that are related to each other and, therefore, offers more opportunities to share operating assets and capabilities as well as financial resources. Hence, firms are generally better able to enjoy economies of scope when diversification is related. Unrelated diversification involves operating businesses in industries that are not related to each other in straightforward way. As a result firms are not able to share most of their resources among the different businesses and they might be limited to solely share financial resources (Jones & Hill, 1988). Depending on the context relatedness can refer to various aspects of a firms businesses: product relatedness (Ansoff, 1957; Penrose, 1959; Rumelt, 1974), technological relatedness (Penrose, 1959; Robins & Wiersema, 1995), R&D relatedness (Chatterjee & Wernerfelt, 1991), marketing relatedness (Capron & Hulland, 1999), advertising relatedness (Chatterjee et al., 1991), human resource relatedness (Farjoun, 1994), managerial logic relatedness (Prahalad & Bettis, 1986), knowledge relatedness (Tanriverdi & Venkatraman, 2005), cultural relatedness (Hofstede, 2001), and institutional relatedness (Henisz, 2000).

Although researchers acknowledged that diversification is a multidimensional concept, they generally conceptualized diversification as a unidimensional concept and they operationalized diversification in a way that captured the qualitative and quantitative aspects of diversification in a single measure. As we will discuss in more detail below, this often lead to mixed empirical results. This prompted a small number of scholars to theoretically and empirically consider the multidimensionality of diversification. Goerzen and Beamish (2003) split international diversification in a degree component, i.e. geographical asset dispersion, and a type component, i.e. country environment diversity. This distinction showed to be fruitful as they revealed that the quantitative and qualitative aspects of multinationality displayed a substantially different effect on firm's performance. Nevertheless, up to date relatively little effort has been made in the diversification literature to conduct a similar study to differentiate between the degree and type of product diversification. Therefore, we build on Goerzen and Beamish's (2003) work by applying their concepts of asset dispersion (the quantitative aspect of diversification) and asset diversity (the qualitative aspect of diversification). More specifically, we aim to contribute to the literature by differentiating between the degree and type of <u>*both*</u> product and international diversification in this study.

Performance-Diversification Relationship

Over the last decades an extensive body of research has looked at the diversification-performance relationship without coming to an unambiguous conclusion. Scholars have found a linear positive relationship (e.g. Jacquemin and Berry (1979); Jose, Nichols and Stevens (1986); Kim and Lyn (1986)), a linear negative relationship (e.g. Amit and Livnat (1988); Palich, Cardinal and Miller (2000); Denis, Denis and Yost (2002), a non-linear U-shaped relationship (e.g. Ruigrok and Wagner (2003)), a non-linear inverse U-shaped relationship (e.g. Grant, Jammine and Thomas (1988); Geringer, Tallman & Olsen (2000); Gomes and Ramaswamy (1999)), a sigmoid relationship (e.g. Contractor, Kundu and Hsu (2003); Lu and Beamish (2004)) or no significant relationship at all (e.g. Montgomery (1985), Tallman et al. (1996)). The examples above as well as review papers on the diversification-performance relationship (Datta et al., 1991; Grant et al., 1988; Hennart, 2007; Ramanujam et al., 1989) indicate that the results are contradictory and that there is no consensus in the literature. Figures 1 and 2 illustrate this graphically by summarizing the results of a number of key studies.

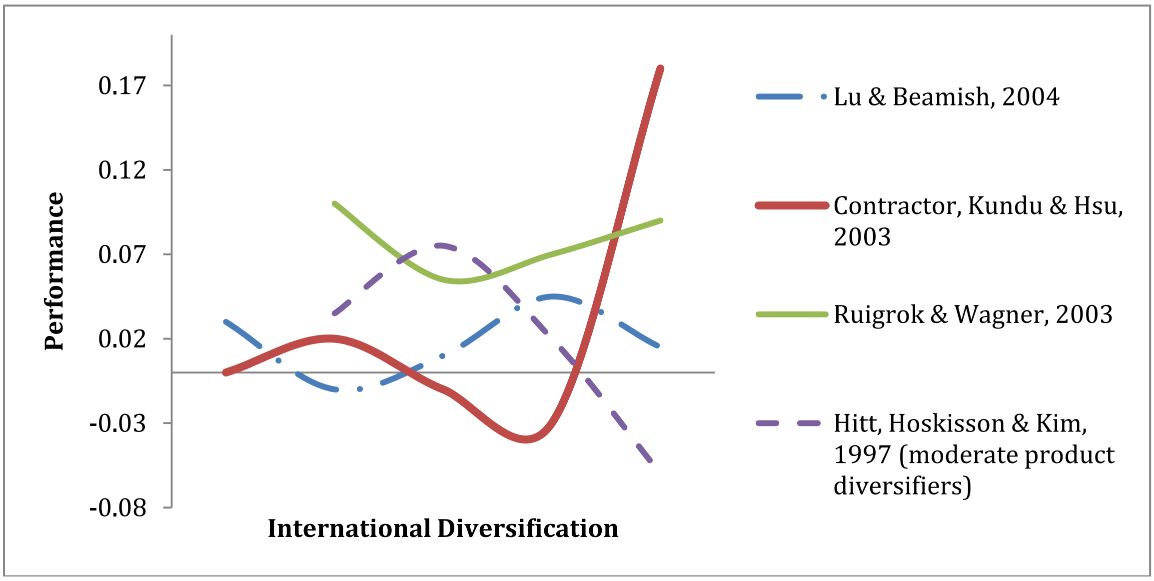

Figure 1. Relationship between International Diversification and Performance based on results of recent studies

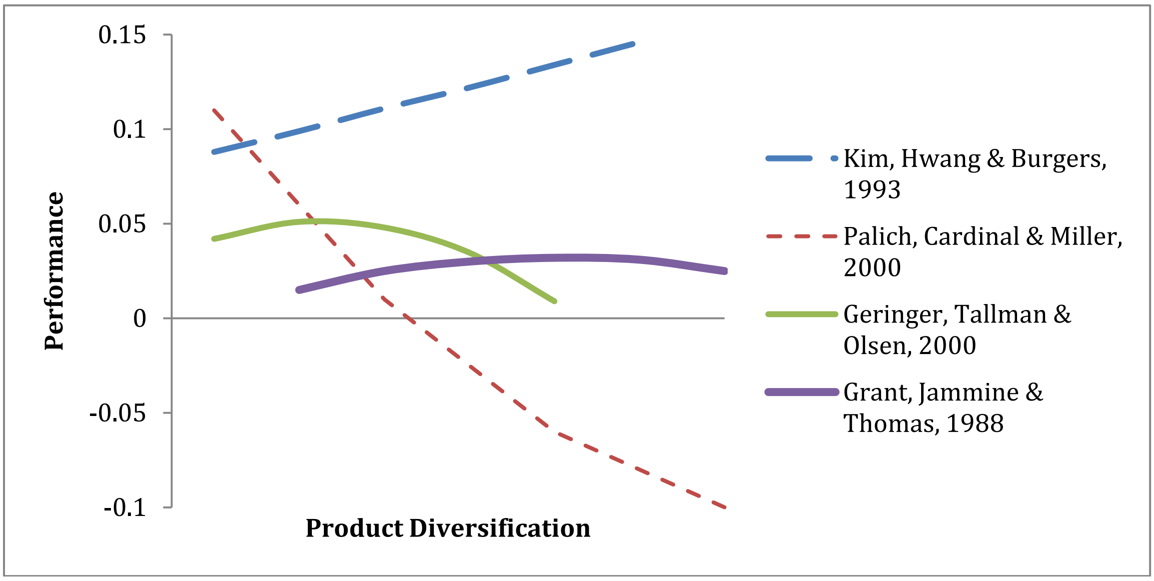

Figure 2. Relationship between Product Diversification and Performance based on results of previous studies

Some scholars attempted to explain these mixed results by identifying a number of contingencies, which moderate the diversification-performance relationship. Hitt, Hoskisson and Kim (1997) found a positive moderating effect of the level of product diversification on relationship between international diversification and performance. Vermeulen and Barkema (2002) report a negative moderating effect of product scope on the relationship between number of foreign subsidiaries and profitability. Geringer, Tallman and Olsen (2000) hint in the conclusion of their study that simultaneous high levels of product and international diversification might lead to a reduction in performance. Tallman and Li (1996) and Simmonds and Lamont (1996) suggested a number of additional moderating effects but failed to find any convincing support. Overall, the generalizability of the contingencies all these scholars proposed turned out to be limited. Still confronted by contradictory empirical findings a second wave of researchers tried to come up with additional contingencies, which might matter. These can be classified in two categories: external contingencies, and internal contingencies. The external factors include industry characteristics (Montgomery, 1985; Wiersema & Bowen, 2008), characteristics of the economy as a whole (Chakrabarti, Singh, & Mahmood, 2007), differences between time period (Geringer et al., 2000), while the internal factors different include the firm’s levels of R&D and advertising intensity (Delios & Beamish, 1999; Kim et al., 1986), differences in the firm’s ownership and managerial structure (Jiraporn et al., 2006). Although incorporating all these contingencies has improved our understanding of the diversification-performance relationship, it has not resolved the ambiguity of the direct relationship between diversification and performance. We aim to remove some of this ambiguity by (1) simultaneously considering a firm’s international and product diversification strategies and by looking at the interaction between these two types of diversification, and by (2) differentiating between the degree and type of diversification.

THEORETICAL DEVELOPMENT

Diversification Benefits

The main theoretical frameworks used in diversification literature that have provided arguments in favor of diversification are the resource-based view (RBV), transaction cost economics (TCE) and portfolio theory. Lubatkin (1983) summarizes this literature by arguing that a firm is able to benefit from diversification in three ways. More specifically he argues that firms can achieve three types of economies: technical economies (e.g. marketing and production economies), pecuniary economies (e.g. market power), and portfolio economies (e.g. risk reduction).

The Resource-based view (RBV) provides the earliest theoretical arguments in favor of diversification. Penrose (1959) points out that at any point in time a firm has certain productive resources, which can be used to exploit productive opportunities to allow the firm to grow successfully. Researchers indentified a wide range of resources that create a unique advantage for a company by sharing them across businesses. For example, Goold and Campbell (1998) highlighted the benefits of sharing know-how and tangible resources, coordinated strategies, vertical integration, and pooling negotiating power. These resources allow a firm to generate economies of scale and scope by increasing the efficiency in the use of these resources (Contractor et al., 2003; Hitt et al., 1997). Hence, from the Resourced-Based View a firm should try to maximize exploiting the valuable resources it has by sharing them across as many businesses as possible.

Subsequently Transaction Cost Economics (TCE) supplemented this view by informing us when firms should organize new activities within the boundaries of the firm and how firms can benefit from sharing resources across different businesses within their own firm boundaries. This theoretical framework suggests that diversification allows firms to obtain greater market power by blocking out competitors and through vertical integration. More specifically, diversified companies are able to cross-subsidize their businesses, and reduce prices, which helps raising barriers for entry and/or squeezing competitors out of the market (Miller, 2006; Montgomery, 1994; Palepu, 1985). Vertical integration allows companies to avoid market costs, control product quality and prevents its technology from spilling over to suppliers, and other intermediaries (Ansoff, 1957; Penrose, 1959). Hence, from a transaction cost perspective firms should diversify whenever doing so increases their market power and/or they can organize the additional activities more efficiently than the market or their competitors.

Finally, several scholars have tried to explain the benefits of diversification using portfolio theory. These scholars argue that the allocation of assets across different markets with independent of cash flows reduces the impact of unsystemic risk resulting from external contingencies in each of the various markets (Lewellen, 1971). Hence, diversification reduces firms' exposure to risk. Leontiades (1986) also found that diversified companies enjoy higher leverage and debt capacity.

Overall, we have discussed arguments coming from three theoretical streams, which highlight various benefits of diversification above. These benefits results from a more efficient exploiting of resources across business, operating at lower transaction costs, and from risk reductions due to portfolio effects. Hence, a higher degree of diversification (keeping the type of diversification constant) should allow a firm to be more profitable. In other words, an increase in asset dispersion (at constant levels of asset diversity) implies that the firm can capture the benefits from diversification more without incurring extra costs.

Firms can diversify in terms of international markets and product markets. International diversification offers firms a number of opportunities to realize both economies of scale and scope. In addition, mutual learning and knowledge sharing between the focal company and locally embedded subsidiaries increase the firm's organizational knowledge and experience (Contractor et al., 2003; Hennart, 2007). The transfer of core competencies to overseas subsidiaries often allows the firm to achieve higher levels of market power outside its home market. Furthermore, transferring core competencies overseas allows a firm to exploit its home country advantage as local firms often lack similar resources (Dunning, 1980). Finally, international diversification reduces the levels of overall risk a firm is exposed to. Kim, Hwang and Burgers (1993) state that operating in different countries allows firms to minimize the effect of adverse changes in a single country's interest rates, wage rates, and commodity and raw material prices by providing a firm the option to shift production between countries and to offset the adverse effects in one country by its operations in other countries. Based on these theoretical arguments which are in line with Goerzen and Beamish (2003) predictions, we expect higher levels of international experience (keeping the type of diversification constant) to be more beneficial. Hence, we hypothesize:

Hypothesis 1a. Ceteris paribus, an increase in a firm's International Asset Dispersion is positively related to its subsequent performance.

Product diversification can also help firms to achieve economies of scope and scale. A firm's tangible resources, common managerial and technological knowledge, and its unique competitive advantages, often can be leveraged in new product areas (Chatterjee et al., 1991; Penrose, 1959; Tanriverdi et al., 2005). Moreover, by diversifying into new product markets a firm internalizes some of its transactions, thus reducing their cost. Finally, a firm reduces its exposure to the risk in a single product market by operating in a larger portfolio of product markets. In line with these arguments, we expect firms to benefit from higher levels of product diversification. Accordingly, we expect:

Hypothesis 1b. Ceteris paribus, an increase in a firm's Product Asset Dispersion is positively related to its subsequent performance.

So far we have solely focused on the benefits of diversification. However, there are also a number of costs, which we will discuss next.

Diversification Costs

There are a number of costs associated with diversification. Firstly, Zander and Kogut (1995) state that replicating and transferring tacit knowledge, which is often the sources of a firm's competitive advantage, is not easy and requires time and effort. In other words, a firm's core capabilities are often "sticky" (Szulanski, 1996) or even inapplicable to particular needs of adjoined businesses (Ravenscraft & Scherer, 1987). The transfer of knowledge becomes even more problematic when the businesses between which knowledge is transferred are less related (Goold et al., 1998; Zollo & Reuer, 2010). Hence, the costs of diversification increase considerably the more unrelated and diverse the product and geographic markets are in which a firm is active.

From TCE perspective, a firm should only internalize an activity when the benefits exceed the additional costs. Every transaction that is internalized needs to be at least partially integrated within the existing activities of the firm and needs to be managed by the firm. This results in an increase of so-called coordination costs (Williamson, 1979). These costs include time delays as well as cost of information distortions and incompleteness. Furthermore, coordination costs tend to increase when the activities of the firm become more diverse (Kostova & Zaheer, 1999).

Several scholars in the portfolio theory literature argued that the addition of new segments might reduce risks as we discussed above, however, it also creates new risks for the company. According to Goold and Campbell (1998) these include risk of wrong management decisions, tensions between headquarters and subsidiaries, as well as other unforeseen problems that arise with an increase in the level of diversity in which a firm operates.

Finally, managers are boundedly rational and limited in their cognitive capacities (Cohen & Levinthal, 1990). As a result they are not able to absorb all information from their environment. Kumar (2009) and Goerzen & Beamish (2003) argued that environmental dissimilarity makes it more costly for firms to learn and respond the conditions in the environment. As a result, firms' absorptive capacity limits a firm's ability to diversify in more distant product or geographic markets.

Overall, we have discussed several costs that are associated with diversification. These costs tend to increase as a function of the diversity in and the distance between the environments the firm is active in. Hence, we suggest that asset diversity captures differences among geographical markets and captures the cost side of diversification. Following these theoretical arguments which are in line with Goerzen and Beamish (2003) predictions, we hypothesize:

Hypothesis 2a. Ceteris paribus, an increase in a firm's International Asset Diversity is negatively related to its subsequent performance.

The sources of dissimilarity between geographic and product markets differ. Namely product markets tend to differ in terms of demand conditions, technology, and product life-cycles among other factors (Farjoun, 1994), while geographical markets vary in terms of the cultural and institutional environment, demand conditions, etc. (Henisz, 2000; Hofstede, 2001), Nevertheless, we expect that the dissimilarity in general and not the sources of dissimilarity should not matter. Hence, the effect of international and product asset diversity on performance should be similar. Thus, we predict that higher levels of asset diversity across product markets lead to decreased performance:

Hypothesis 2b. Ceteris paribus, an increase in a firm's Product Asset Diversity is negatively related to its subsequent performance.

The Interaction between Product and International Diversification

Furthermore, we find it important to study the effects of international and product diversification on performance relationship simultaneously. Kumar (2009) showed that both the international and product dimensions are closely related and should be studied side-by-side. Accordingly, we will look at how both dimensions interact and under which conditions firms face a trade-off between diversifying on both dimensions.

If it is valuable to share across one dimension then it makes sense to exploit on the other dimension as well, a firm who does both probably uses its resources and capabilities more efficiently.

Firstly, when a firm is able to benefit from diversifying in one dimension (the product diversification or international diversification dimension) it should also be able to grasp similar benefits from diversifying on the other dimension. For example, a firm that has a valuable set of resources and exploits these in different product markets would most likely also benefit from exploiting these same valuable resources in a number of different international markets as well. This is supported by several scholars who showed that several resources including a firm’s dynamic capabilities and experience can be utilized across different both different product and international markets (Burgelman, 1983; Hitt, Hoskisson, & Ireland, 1994). Hence, a firm that harvests the benefits of diversification through both types of diversification will be utilizing its resources more efficiently than a firm that only harvests the benefits of diversification only through one type of diversification. Accordingly, we expect:

Hypothesis 3a. Ceteris paribus, the interaction between a firm’s International Asset Dispersion and its Product Asset Dispersion is positively related to its subsequent performance.

Secondly, the amount of resources available to a firm is limited and, especially in terms of the amount of attention managers can allocate to different business. As a result and as we discussed before (Hypotheses 2a and 2b) firms face constraints in the way they can diversify. Moreover, Kumar (2009) argued firms face a trade-off between diversifying in different dimensions, i.e. international or product markets. We argued before that the costs associated with diversification are a function of the level of diversity among the business in which the firm is active. Hence, if a firm faces a lot of diversity in one dimension it will stretch its resources and face more costs which will limit how many resources it can allocate or cost it can bear in the other dimension (Kumar, 2009). As a result, we expect that firms, which face high levels of diversity in both their product and international markets, will show lower performance. Similarly, firms that face low diversity in both product and international markets will be underutilizing their capacity to deal with diversity and will show lower performance as well. Accordingly, we hypothesize:

Hypothesis 3b. Ceteris paribus, the interaction between a firm's International Asset Diversity and its Product Asset Diversity is negatively related to its subsequent performance.

RESEARCH DESIGN

Data

We test our hypotheses using panel data on firm's product and international diversification covering a period from 1995 until 2009. The primary source of our data was Compustat. More specifically, we used Compustat Segments to collect data on the segmentation of firms' activities. In case Compustat Segments did not provide complete information, we manually completed the data using SEC filings[2], which we obtained from the EDGAR database. Alternatively, we used the annual reports posted on firms' websites to complete the data. We obtained our performance variables from the Compustat Global database.

We excluded from our sample firms (1) which were only active in a single product segment (measured at the 4-digit SIC level) or a single country[3], (2) which did not have information about their geographic diversification at the country-level, and (3) which only provided information that could not be matched with a particular 4-digit SIC code or with Hofstede's cultural scores. After using these three selection criteria we

[2] We used the firms' 10-K forms for the US firms and F-20 forms for non-US firms.

[3] We believe that the diversification processes of single country/product segment companies are substantially different from those in multiproduct-multinational companies (Gertner, Scharfstein & Stein, 1994; Markides, 1992). The former remain uninfluenced by diversification decisions on the other dimension (Kumar, 2009; Lang, Poulsen, & Stulz, 1995) and generally have a different management structure (Rumelt, 1974; Jones & Hill, 1988; Anderson, Bates, Bizjak & Lemmon, 2000). This assumption is consistent with the most other studies in this literature. Thus, some of the theoretical arguments we make are not relevant for single segment companies.

ended up with a final sample of 115 firms with 722 firm-year observations. Hence, we were able to track the firms in our unbalanced panel on average for 6.278 years.

The firms in our sample are fairly large with average annual revenues exceeding US$11 billion, average assets of almost US$19 billion, and average number of employees of approximately 6,000. These characteristics are common for the firms in diversification research (Goerzen et al., 2003; Vermeulen et al., 2002). These firms also come from a wide range of home countries: US (48.5%), Europe (24.5%), Asia (10%), Canada (8.5%), Latin America (4%), and other locations (4.5%). Furthermore, the firms in our sample are active in various sectors: manufacturing (62%), services (16%), mining & construction (10%), transport & communications (8%), and trade (4%).

Our sample differs from several of these studies (e.g. Bercovitz & Mitchell, 2007; Goranova et al., 2007; Kumar, 2009) because we use more recent data rather than pre-2000 data. The advantage of our more recent data is that we benefit from improvements in the way firms report the segments in which they operate. Secondly, several other studies have used balanced panels (Vermeulen et al., 2002) while we use an unbalanced panel. Although using unbalanced panels may pose some minor constraints when it comes to the empirical analysis, unbalanced panels reduce survivorship bias and mitigate the loss of the sample size (Baum, 2006).

Model Specification and Estimation

In our sample we have longitudinal data for a considerable number of firms. Therefore, we need to use an empirical approach, which takes the unique characteristics of such a data structure into consideration to ensure the robustness of our results. Therefore, we need to use a panel data model, which allows us to incorporate firm- and year-effects into our estimation equation. On the one hand, by introducing firm-effects into our estimation equation we deal with any source of unexplained (firm-level) heterogeneity (Balestra, 1996; Hsiao, 1985). On the other hand, by incorporating time-effects into our estimation equation we deal with any possible trends or shocks that have an impact on firms' diversification strategies (Chakrabarti et al., 2007). To further highlight the appropriateness of a panel model, we conducted Ramsey's RESET test (see Appendix 2 for details). This test indeed confirmed that it is suitable for our study.

The most commonly used panel models are fixed-effects, random-effects or dynamic panel models. However, some preliminary analysis revealed that our data suffers from heteroscedasticity across panels and autocorrelation (see Appendix 2). Therefore, random- or fixed-effects linear models are not suitable, as they rely on the assumption of homoscedasticity and independent autocorrelation. Dynamic panel data model also has similar assumptions (Greene, 2008). Therefore, we use suitable Generalized Least Squares Regression which allows for efficient estimates in presence of first order autocorrelation, and heteroscedasticity (Baum, 2006; Greene, 2008). More specifically, we use the Feasible Generalized Least Squares (FGLS) estimator. This estimator allows for time-series heteroscedasticity and autocorrelation in panels with relatively short time periods, as is the case in our sample (Arellano, 2003; Baum, 2006; Greene, 2008; Kiefer, 1980). This estimator takes the following form:

$$\hat{\beta}_{FGLS} = \left(\sum_{i=1}^{N} X_i^{*\prime}\hat{\Omega}^{-1}X_i^{*}\right)^{-1}\sum_{i=1}^{N} X_i^{*\prime}\hat{\Omega}^{-1}y_i^{*},$$

where $\hat{\Omega}$ is a covariance matrix, such that $\hat{\Omega} = \Omega(\hat{\theta})$,

$\hat{\theta}$ is a consistent estimator of θ, and

$\Omega(\theta)$ is a known positive definite matrix.

The set of parameters $\hat{\theta}$ differs from θ by having one additional unknown parameter to deal with any possible heteroscedasticity: $\hat{\sigma}_i^2 = \sigma_i^2 z^{\theta}$. Furthermore, to achieve full efficiency for the FGLS estimator we do not need an efficient estimator of θ, but only a consistent one (Greene, 2008). Hence, all this makes it the most suitable estimator to test our hypotheses.

Following Baum (2006), we specify our final empirical model as:

$$Performance_{i(t+1)} = \hat{\beta}_0 \iota^* + \hat{\beta}_k X_{kit} + u^*_{it},$$

where ι^* is a units vector, and X_{kit} are the independent variables.

In particular, the detailed model is as follows:

$$\begin{aligned} Performance_{i(t+1)} = \hat{\beta}_0 \iota^* &+ \hat{\beta}_1 Product\ Asset\ Dispersion_{it} + \\ &+ \hat{\beta}_2 International\ Asset\ Dispersion_{it} + \\ &+ \hat{\beta}_3 Product\ Asset\ Diversity_{it} + \\ &+ \hat{\beta}_4 International\ Asset\ Diversity_{it} + \\ &+ \hat{\beta}_5 Performance_{it} + \\ &+ \hat{\beta}_6 Size_{it} + \\ &+ \hat{\beta}_7 Industry\ Profitability_{it} + u^*_{it} \end{aligned}$$

In this model serial correlation is handled following an autoregressive process of the first order for stationary series as suggested by Baum (2006). This is generally considered a suitable approach to capture the complex underlying processes that are inherent in panel data and displayed in the form of autocorrelations (Greene, 2008).

The above model specification also shows that we measure our dependent variable in period t+1 while we measure our independent variables (including a lagged dependent variable) in period t. This allows us to infer the causality of our hypothesized relationships.

Dependent Variable

Our Dependent Variable is the firm’s performance measured as its annual Return on Assets (ROA). This is a widely used measure in diversification-performance literature

(Amit et al., 1988; Bowen & Wiersema, 2005; Grant et al., 1988; Hitt et al., 1997) and the literature at large. Furthermore, several studies have found that ROA measures correlate highly with other performance measures (e.g. Kim, Hoskisson & Wan, 2004). In order to infer the causality of our hypothesized relationships we look at the firms ROA in the subsequent period t+1.

Explanatory Variables

To test our hypotheses we need a number of dispersion and diversity indexes. In the literature we generally find indexes based on firms' sales (e.g. Geringer, Tallman, & Olsen, 2000; Grant, Jammine, & Thomas, 1988; Kumar, 2009; Robins & Wiersema, 2003; Tallman et al., 1996). However, increasingly scholars are concerned that sales and revenue-based measures might be endogenous to the firms' performance, and therefore, they might be capturing diversification success rather than diversification per se. Therefore, measures based on assets or employees are considered to be more appropriate. While we have accurate data on the firms' assets in Compustat, the data on firms' employees is scarcer and less accurate. Therefore, we base all the indexes we describe below on the firm's assets.

International and Product Asset Dispersion (H1a-H1b)**:** In order to capture the dispersion of a firm's assets across different geographic and product markets, we use two entropy indexes. Entropy measures developed by Jacquemin and Berry (1979) and Palepu (1985) are widely used in the diversification literature. Some entropy measures also try to capture the qualitative differences between related and unrelated diversification (Rumelt, 1974). However, we aim to capture these differences using a separate measure. Therefore, we use an entropy measures developed by Kim (1989) and used by Goerzen and Beamish (2003), which takes the number of product/geographic segments a firm is active in and their relative importance determined by the amount of assets the firm allocated in each segment into account. This measure can be formalized as:

$$\sum_{i=1}^{N} P_i \ln(\frac{1}{P_i}),$$

where P_i is the proportion of assets assigned to a geographical/product segment i, and

N is the number of product/geographic segments a firm is active in.

A higher score on International/ Product Asset Dispersion index means a firm has its portfolio of assets balanced over larger number of geographic and product segments.

International and Product Asset Diversity (H2a-H2b)**:** A diversity measure should indicate a degree of commonality/difference among/between a firm's segments. In terms of product diversity such difference can be captured using the industry code assigned to various segments, while diversity among firm's geographical segments can be captured using cultural distance scores (Hofstede, 2001)[4]. We use an index suggested by Caves, Porter, Spence and Scott (1980)[5].

Their Weighted Index of Diversification can be written as:

$$\sum_{i=1}^{N} P_i d_i,$$

where P_i is the proportion of assets assigned to a geographical/product segment i,

N is the number of product/geographic segments a firm is active in, and

d_i is a weighting score.

[4] Kogut and Singh's (1988) cultural distance index is based on Hofstede's four cultural dimensions (uncertainty avoidance, individualism, masculinity, and power distance) can be written as:

$$CD_{uj} = (\sum_{i=1}^{4} \frac{(I_{ij} - I_{iu})^2}{V_i})/4, \quad \text{where}$$

I_{ij} is the index for the *i*th cultural dimension of country *j*,

I_{iu} is the index for the *i*th cultural dimension of country *u*, and

V_i is the variance of the index for the *i*th cultural dimension.

[5] We opted not to use Goerzen & Beamish (2003) measure of Asset Diversity for two reasons. First, their measure is time-invariant because firms occasionally change their geographic and/or business segments (on average once or twice every decade). Second, their entropy measure is sensitive to the number of segments a firm is active. This is all the more problematic as we aim to separate dispersion and diversity.

For product segments, the weighting score is based on SIC classifications. More specifically, as suggested by Caves et al. (1980) this score takes the value 2 when the segment shares same first three digits of SIC with the firm's primary industry, the value 3 when they share the same first two digits of SIC, the value 4 when they share the same first digit of SIC, and the value 5 when their SICs have different first digit. For geographic segments, the weighting score is based on Kogut and Singh's (1988) cultural distance index.

A higher score on International/ Product Asset Diversity index imply a firm is active in a more diverse set of respectively geographic and product segments.

Control Variables

We control for a number of additional factors that may influence the future performance of a firm. First, several studies found a relationship between a firm's performance and its prior performance (e.g. Chacar and Vissa, 2005). Therefore, we control for the firm's prior performance using the firm's Return on Assets (ROA)[6]. Second, the majority of studies looking at the diversification-performance relationship investigate firms that are larger than average firm in the entire population. Nevertheless, there is sufficient variance in size among the firms in these studies. Hence, most studies control for the size of a firm (Denis et al., 2002; Goranova et al., 2007; Tallman et al., 1996). Following Lu and Beamish (2001) and Goerzen and Beamish (2003), we control for the firm's size using the natural logarithm of firm's total employment in a given year.

[6] According to Keele & Kelly (2005) testing theories that include dynamic components is preferably done with a lagged dependent variable (LDV) rather than with static models adjusted for autocorrelation. Furthermore, even in the presence of autocorrelation LDV-models do not induce a significant bias to the coefficients provided that the data is stationary. In our model all independent variables including the prior performance measure are captured at the same period (t), and our dependent variable is measured in the subsequent period (t+1) Hence, our model is not a typical lagged dependent variable model, i.e. a model in which all variables are measures in the same period (t) except the lagged dependent variable (t-1). Nevertheless, our approach of adding the firm's prior performance is believed to be preferred. Furthermore, a test for the stationarity of the data further supports this (see Appendix 2, Table 4 for details).

Third, previous research has suggested that industry performance can both influence a firm's diversification strategy (Wiersema et al., 2008) and its performance (Tanriverdi et al., 2005). Accordingly, we control for the average performance in the firm's primary industry (Stimpert & Duhaime, 1997) using a measure which captures the average Return on Assets of all the firms with the same first three digit SIC during a 3-year window (t-1, t, t+1).

RESULTS

Descriptive Statistics

Descriptive statistics and correlations can be found in Table 1[7]. Table 1 shows that firms on average have a return of assets of 3.8%. Firms on average have similar levels of Product Assets Dispersion and International Asset Dispersion. However, firms' level of Product Asset Diversity and International Asset Diversity can be compared only using standardized measures. Weighted indexes for diversity are based on SIC and Hofstede's cultural measures, which scales do not allow straightforward comparison. The correlations of our dispersion and diversity measures are comparable with those in Goerzen & Beamish (2003). In addition, examination of the distribution of our variables showed that all variables displayed acceptable deviations from normality (Greene, 2008).

We analyzed the variance inflation factors (VIFs) in each of our models[8] and we added our hypothesized variables step-wise[9]. The VIFs in all our models are below the acceptable threshold and our coefficients remain stable when we add them in step-wise (Kutner, Nachtsheim, & Neter, 2004). This provides additional evidence that our results do not suffer from any collinearity related problems.

[7] Additional information about the distribution of our variables can be found in Appendix 1.
[8] Information on VIFs is in Appendix 2, Table 5.
[9] Detailed step-wise regressions are in Appendix 3.

Table 1. Descriptives and Correlations[10]

no	Variable	Obs	Mean	SD	Perf (t+1)	PADisp	PADiv	IADisp	IADist	Disp Int	Disv Int	Perf (t)	Firm Size	Ind Prof
	Performance (t+1)	1091	3.856	7.510	1.000									
1	**Product Asset Dispersion**	1126	0.326	0.175	-0.0188	1.000								
2	**Product Asset Diversity**	1126	2.093	0.779	-0.0707	0.8116[11]	1.000							
3	**International Asset Dispersion**	862	0.304	0.187	0.1429	0.2732	0.1247	1.000						
4	**International Asset Diversity**	862	0.684	0.789	0.0457	0.1116	-0.0018	0.6350[12]	1.000					
5	**Dispersion Interaction Term**	811	0.111	0.106	0.0791	0.7114	0.4896	0.8005	0.4691	1.000				
6	**Diversity Interaction Term**	811	1.454	1.823	0.0205	0.3298	0.2829	0.6261	0.9100	0.6239	1.000			
7	**Prior Performance**	1248	3.943	7.542	0.6211	-0.0524	-0.0828	0.1238	0.0594	0.0534	0.0194	1.000		
8	**Firm Size**	1193	8.689	2.173	0.1611	0.2420	0.1481	0.3897	0.3029	0.3802	0.3045	0.1528	1.000	
9	**Industry Average Profitability**	1228	0.610	4.433	0.0256	0.0602	0.1885	0.0670	0.0226	0.0489	0.0666	0.0437	0.1539	1.000

[10] Number of observations is 729. Absolute correlations above 0.0725 are significant at $p<0.05$
[11] Correlation adjusted for within-panel collinearity is 0.721
[12] Correlation adjusted for within-panel collinearity is 0.576

Tests of Hypotheses

The models to test our hypotheses are reported in Table 2. Model 1 presents a baseline model that includes all control variables. In Model 2 we add the Product Asset Dispersion and Product Asset Diversity measures whereas Model 3 includes the International Asset Dispersion and International Asset Diversity measures. This allows us to compare our results more directly to those of Goerzen and Beamish (2003) whose specification is very similar to our Model 3. Model 4 includes both the International and Product Dispersion and Diversity measures simultaneously. Finally, Model 5 includes our interaction effects. The Wald Chi-squared statistics show that all models perform well and are significant ($p<.001$).

Several of our control variables are significant. Not surprisingly we find that a firms performance is associated strongly with its future performance ($p<.001$). Secondly, we find that firm size is positively associated with the firm’s future performance ($p<.05$) albeit that this effect disappears in the fully specified Model 4.

The results are consistent with Hypotheses 1a and 1b. Namely, in Model 2 we find a positive and significant ($p<.001$) relationship between International Asset Dispersion (Hypothesis 1a) and the firm’s future performance and in Model 3 we find a similar positive and significant ($p<.01$) relationship between Product Asset Dispersion (Hypothesis 1b) and the firm’s future performance. In the fully specified Model 4 our results remain supportive of our hypotheses albeit that the significance levels of the Product Asset Dispersion ($p<.05$) and the International Asset Dispersion ($p<.01$) measures decrease marginally.

Table 2. Results of Cross-section Time-series FGLS Regression for Heteroscedastic Panels and Autocorrelation

	Performance (t+1)	Model 1	Model 2	Model 3	Model 4 (Main Effects Model)	Model 5 (Interaction Model)
	cons	1.495	1.374**	-0.226	0.306	12.445***
		(0.409)	(0.462)	(0.537)	(0.492)	(1.920)
	Firm Effects	Yes	Yes	Yes	Yes	Yes
	Year Effects	Yes	Yes	Yes	Yes	Yes
	Prior Performance	0.647***	0.607***	0.648***	0.737***	-0.115***
		(0.023)	(0.024)	(0.026)	(0.024)	(0.028)
	Firm Size	0.097*	0.093*	0.098†	0.070	-0.955***
		(0.043)	(0.046)	(0.057)	(0.053)	(0.209)
	Industry Average Profitability	0.012	0.017	-0.021	-0.012	0.196***
		(0.022)	(0.023)	(0.023)	(0.021)	(0.039)
H1a	**International Asset Dispersion**		2.572***		1.810**	-5.708**
			(0.583)		(0.541)	(2.104)
H2a	**International Asset Diversity**		-0.403**		-0.379**	3.144***
			(0.150)		(0.146)	(0.856)
H1b	**Product Asset Dispersion**			2.409**	1.865*	-0.265
				(0.898)	(0.872)	(2.410)
H2b	**Product Asset Diversity**			-0.678***	-0.466*	-0.429
				(0.194)	(0.192)	(0.409)
H3a	**Dispersion Interaction Term**					16.187**
						(6.098)
H3b	**Diversity Interaction Term**					-1.212**
						(0.407)
	Sample Size	1046	763	983	722	722
	Number of Firms	167	121	161	115	115
	Average Length of Panel	6.263	6.306	6.106	6.278	6.278
	Wald Chi2	841.38***	722.89***	677.63***	1015.49***	62.68***

Main Effect variables are mean-centered in the interaction model.
Standard Errors are reported in parentheses.
Significant at: *** - 0.001 level; ** - 0.01 level; * - 0.05 level; † - at 0.1 level.

In Models 2 and 3 we also find a negative and significant relationship between respectively the firm's International Asset Diversity ($p<.01$) and the firm's Product Asset Diversity ($p<.001$), and the firm's subsequent performance. The results in Model 4 remain identical except for a small decrease in the level of significant ($p<0.05$) of the Product Asset Diversity measure. Hence, we find strong support for Hypotheses 2a and 2b.

It is also worth noting that our results in Model 2 are consistent with the results in Goerzen and Beamish (2003). Namely, they found a similar positive effect of International Asset Dispersion and a similar negative effect of International Asset Diversity. This highlights the validity of our results.

Finally, in Model 5, we find support for Hypotheses 3a and 3b. Namely, we find that the interaction term between Product Asset Dispersion and International Asset Dispersion (Hypothesis 3a) is positive and significant ($p<0.01$). Contrary, we observe that the interaction term between Product Asset Diversity and International Asset diversity (Hypothesis 3b) is negative and significant as predicted ($p<0.01$).

Practical Magnitudes

Examining the practical magnitudes of the hypothesized effects shows that the results are not only statistically significant but also practically significant. Based on the coefficients[13] in Model 4, we find that a one-standard-deviation increase in the firm's International Asset Dispersion increases the firm's return on assets (ROA) in the subsequent period by 0.34%. Similarly, a one-standard-deviation increase in Product Asset Dispersion results in an increase in the firm's return on assets (ROA) in the next period by 0.32%. Hence, both Product and International Asset Dispersion have a very similar effect on the firm's performance.

[13] We use standardized coefficients to interpret the size of effect (see Appendix 4).

The results in Model 4 reveal that a one-standard-deviation change in International Asset Diversity leads to a decrease in the firm's subsequent return on assets (ROA) by 0.30%. Likewise, a one-standard-deviation increase in Product Asset Diversity results in a decrease in the firm's subsequent return on assets (ROA) by 0.36%. Thus, the effects of Product Asset Diversity and International Asset Diversity, respectively, on the firm's performance are very similar in size.

To facilitate the interpretation of our interaction effects (Hypotheses 3a & 3b) and their practical magnitude, we plotted the effects of the interaction terms on the firm's return on assets (ROA) in Figures 3 and 4. To do so, we followed a procedure recommended by Aiken and West (1991), Jaccard, Turrisi & Wan (1990) and Krishnan, Martin and Noorderhaven (2006). More specifically, in Figure 3 we plotted the relationship between the firm's Product Asset Dispersion and the firm's performance over the entire observed range of Product Asset Dispersion on the basis of the regression coefficients from Models 4 and 5[14]. The plotted lines represent different levels of the firm's International Asset Dispersion.

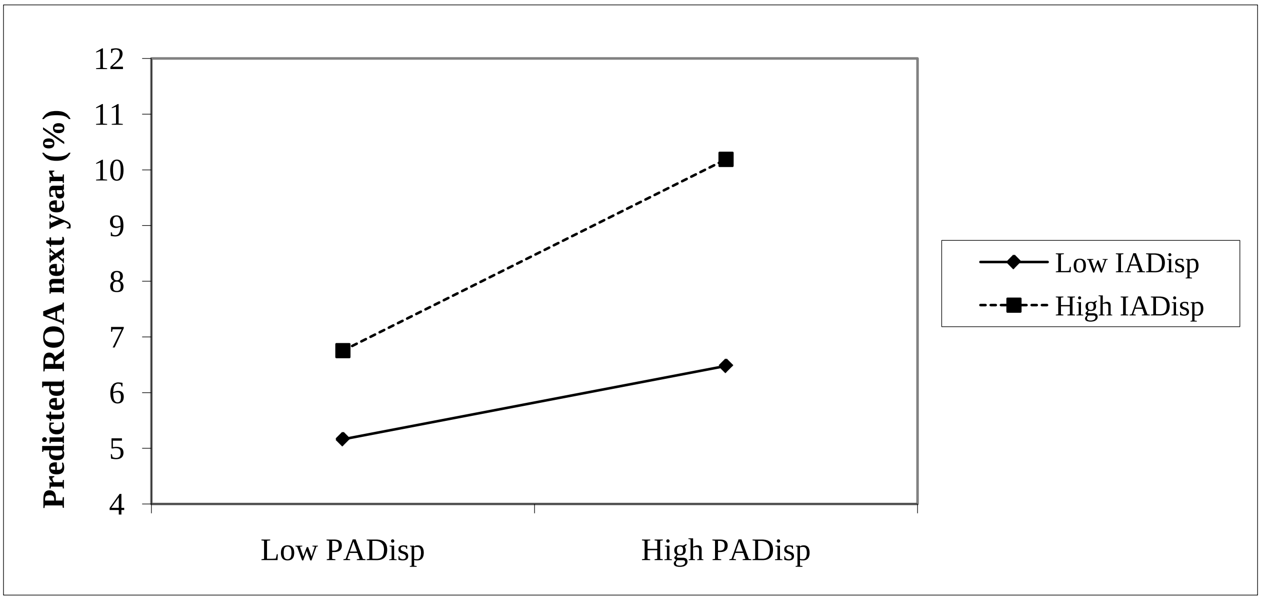

Figure 3. Positive Moderating Effect of International Asset Dispersion on Relationship between Product Asset Dispersion and Future Performance

[14] Control variables were standardized in order to obtain accurate values of Dependent Variable

Figure 3 illustrates that 0.32% increase in return on assets next year arising from one-standard-deviation increase in Product Asset Dispersion will be improved by additional 1.71% for each one-standard deviation increase in International Asset Dispersion.

In Figure 2 we take an identical approach to look at the effect of the interaction between respectively the firm's Product Asset Distance and International Asset Distance on its performance using the coefficients from Models 4 and 5.

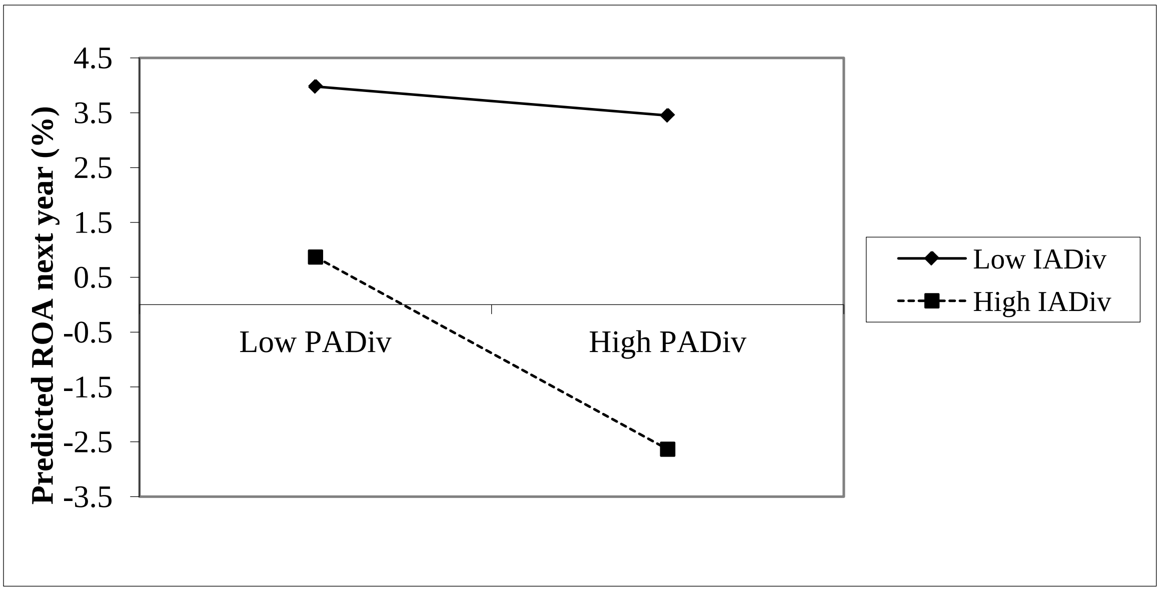

Figure 4. Negative Moderating Effect of International Asset Diversity on Relationship between Product Asset Diversity and Future Performance

In Figure 4 we take an identical approach to look at the effect of the interaction between respectively the firm's Product Asset Distance and International Asset Distance on its performance using the coefficients from Models 4 and 5.

Figure 4 reflects how 0.36% decrease in return on assets next year resulting from one-standard-deviation increase in Product Asset Diversity will be enhanced by additional 2.21% decrease for each one-standard deviation increase in International Asset Diversity.

Both Figure 3 and 4, graphically support our hypotheses 3a and 3b and highlight that our results also have a substantial economic impact of the firm's future performance.

Robustness

To ensure our results are robust we performed several additional checks and analyses. Firstly, we replicate our results using an alternative dependent variable. More specifically we used a Return on Sales measure instead of a Return on Asset measures. Secondly, we used an alternative specification for our explanatory variables using total firm assets as opposed to total segment assets. Thirdly, we also used a number of alternative control variables including the firm's Return of Sales and logsales at t as a control for prior performance, as well as several measures for average industry profitability (at different SIC-levels and with different measurement-window). Finally, we added country dummies and industry dummies at 1st and 2nd-digit SIC. Overall the results are robust, albeit that the levels of significance of the interaction terms are lower.

We also used a number of alternative technical specifications to estimate our coefficients and post-estimation tests. Firstly, we performed a Wald test. We conduct this test because alternative tests such as the likelihood-ratio test, and AIC and BIC based tests, are only available for the models with independent autocorrelation structure. More specifically we first perform a FGLS customized Wald test for groupwise heteroscedasticity (Appendix 2) to justify the restrictions reflected in our choice of estimator. The null hypothesis of homoscedasticity was rejected ($p<.001$). Therefore, we conclude that our estimator is suitable for our data. Next we use the point and VCE estimates of the unrestricted model to evaluate whether there is evidence that the restrictions we imposed are false (Baum, 2006) for simple and composite linear models. The null hypothesis of $\beta_{FGLS} = 0$ was rejected ($p<.001$) (Table 2) for all models. Thus, every model is significant relative to intercept-only model.

Secondly, the R^2 statistic cannot be reliably used to compare the models estimated by GLS. Furthermore, in a panel data setting R^2-like measures are purely descriptive. Although they do not represent the proportion of variance explained, Greene (2008) suggests that squared correlations between actual and predicted values can be used to assess the agreement of model with the actual data. Therefore, we compare the squared correlations between predicted and actual values of dependent variable for models estimated using within-group GLS, dynamic panel data (DPD) estimation, and FGLS. The results can be found in (Appendix 5, Table 8). They show that values predicted by within-group model (xtreg, fe command in Stata) and dynamic panel data model (xtabond command in Stata) do not correlate with the actual values This confirms that the estimates made under conditions of homoscedasticity and independent autocorrelations are very weak approximations of the actual data. Furthermore, the squared correlations for FGLS models (except for Model 5, which contains interaction terms) are at the levels acceptable for panel data. Hence we can conclude that our choice of the estimator is justified.

Overall, our results are robust to different variable and technical specifications.

DISCUSSION

In this paper we contribute to the diversification literature. The results advance our understanding of the relationship between diversification and firm performance. More precisely, we find that both the level of international (Hypothesis 1a) and product (Hypothesis 1b) asset dispersion are positively related to firm performance. This highlights that firms indeed benefit from exploiting their resources across as many product and geographic markets as possible. We also find that there is no trade-off in terms of having higher levels of asset dispersion in geographic market and product markets (Hypothesis 3a). Thus it makes sense for firms to exploit their advantages on both as many geographic and product markets.

However, we also find a negative relationship between international (Hypothesis 2a) and product (Hypothesis 2b) asset diversity, respectively, and firm performance. This supports those scholars that diversification is often costly. This is further supported by the trade-off we observe between geographic asset diversity and product asset diversity

(Hypothesis 3b). In other words, if a firm opts to diversity in more diverse product markets it has to reduce its has to invest in less diverse geographic markets in order to avoid a reduction in the firm's performance.

These findings highlight its key to distinguish between a quantitative component, i.e. the degree of diversification, and a qualitative component of diversification, i.e. the type of diversification. This distinction also helped us to indentify when a firm faces a trade-off between diversifying in geographic and product markets and when such a trade-off is not relevant. Namely, such a trade-off is not relevant when the level of asset dispersion increases (more) and the level of asset diversity does not increase (as much) and vice versa.

We also see that the practical magnitude of the benefits and cost of international and product diversification are similar. Although firms seem to be looking increasingly overseas for new opportunities, this suggests might be able to benefit to a similar extent from opportunities they find in their domestic market but in different product markets.

Our findings also help us provide a number of recommendations to managers. Managers should aim at maximizing the levels of both product and geographic asset dispersion, while keeping the level of diversity at a minimum. Hence, firms are better of expanding first in product and geographic markets that are more similar. As the number of "close" opportunities is limited and since there is no trade-off between product and international dispersion firms might be able to optimize their diversification strategy best by having moderate levels of both international and product diversification. Namely, having higher levels in one of both types is likely to increase the level of diversity more.

Overall, this study offers new insights in diversification, which are valuable for scholars and practitioners.

REFERENCES

1. Aiken, L. S. & West, S. G. 1991. Multiple Regression: Testing and Interpreting Interactions. Newbury Park: Sage.
2. Amit, R. & Livnat, J. 1988. Diversification Strategies, Business Cycles and Economic Performance. Strategic Management Journal, 9(2): 99.
3. Anderson, R. C., Bates, T. W., Bizjak, J. M., & Lemmon, M. L. 2000. Corporate governance and firm diversification. Financial Management, 29(1): 5.
4. Ansoff, H. I. 1957. Strategies for Diversification. Harvard Business Review, 35(5): 113-124.
5. Arellano, M. 2003. Panel Data Econometrics: Oxford University Press.
6. Balestra, P. 1996. Introduction to Linear Models for Panel Data. In L. Matyas & P. Sevestre (Eds.), The Econometrics of Panel Data, 2nd, rev. ed., Vol. 33: Kluwer Academic Publishers.
7. Baum, C. F. 2006. An Introduction to Modern Econometrics Using Stata. College Station, Texas: Stata Press Publication.
8. Bercovitz, J. & Mitchell, W. 2007. When is more better? The impact of business scale and scope on long-term business survival, while controlling for profitability. Strategic Management Journal, 28(1): 61-79.
9. Berger, P. G. & Ofek, E. 1995. Diversification's effect on firm value. Journal of Financial Economics, 37(1).
10. Bowen, H. P. & Wiersema, M. F. 2005. Foreign-based competition and corporate diversification strategy. Strategic Management Journal, 26(12): 1153-1171.
11. Burgelman, R. A. 1983. A process model of internal corporate venturing in the diversified firm. Administrative Science Quarterly, 28: 223-244.
12. Capron, L. & Hulland, J. 1999. Redeployment of Brands, Sales Forces, and General Marketing Management Expertise Following Horizontal Acquisitions: A Resource-Based View. The Journal of Marketing, 63(2): 41-54.
13. Caves, R. E., Porter, M. E., Spence, A. M., & Scott, J. 1980. Competition in the Open Economy: Harvard University Press.
14. Chacar, A. & Vissa, B. 2005. Are Emerging Economies Less Efficient? Performance Persistence and the Impact of Business Group Affiliation. Strategic Management Journal, 26.
15. Chakrabarti, A., Singh, K., & Mahmood, I. 2007. Diversification and performance: evidence from East Asian firms. Strategic Management Journal, 28(2): 101-120.

16. Chatterjee, S. & Wernerfelt, B. 1991. The Link between Resources and Type of Diversification: Theory and Evidence. Strategic Management Journal, 12(1): 33-48.
17. Cohen, W. M. & Levinthal, D. A. 1990. Absorptive Capacity: A New Perspective On Learning And Innovation. Administrative Science Quarterly, 35(1): 128.
18. Contractor, F. J., Kundu, S. K., & Hsu, C.-C. 2003. A Three-Stage Theory of International Expansion: The Link between Multinationality and Performance in the Service Sector. Journal of International Business Studies, 34(1): 5-18.
19. Datta, D. K., Rajagopalan, N., & Rasheed, A. M. A. 1991. Diversification and Performance: Critical Review and Future Directions. Journal of Management Studies, 28(5): 529-558.
20. Delios, A. & Beamish, P. W. 1999. Geographic Scope, Product Diversification and the Corporate Performance of Japanese Firms. Strategic Management Journal, 20(8): 711-727.
21. Denis, D. J., Denis, D. K., & Yost, K. 2002. Global Diversification, Industrial Diversification, and Firm Value. Journal of Finance, 57(5): 1951-1979.
22. Dunning, J. 1980. Toward an Eclectic Theory of International Production: Some Empirical Tests. Journal of International Business Studies, 11(1): 9-31.
23. Farjoun, M. 1994. Beyond Industry Boundaries: Human Expertise, Diversification and Resource-Related Industry Groups. Organization Science, 5(2): 185-199.
24. Geringer, J. M., Tallman, S., & Olsen, D. M. 2000. Product and International Diversification among Japanese Multinational Firms. Strategic Management Journal, 21(1): 51-80.
25. Gertner, R. H., Scharfstein, D. S., & Stein, J. C. 1994. Internal versus External Capital Markets. Quarterly Journal of Economics, 109: 1211-1230.
26. Goerzen, A. & Beamish, P. W. 2003. Geographic scope and multinational enterprise performance. Strategic Management Journal, 24(13): 1289.
27. Gomes, L. & Ramaswamy, K. 1999. Empirical Examination of the Form of Relationship between Multinationality and Performance. Journal of International Business Studies, 30(1): 173-188.
28. Goold, M. & Campbell, A. 1998. Desperately seeking synergy. Harvard Business Review, 76(5): 131-143.
29. Goranova, M., Alessandri, T. M., Brandes, P., & Dharwadkar, R. 2007. Managerial ownership and corporate diversification: a longitudinal view. Strategic Management Journal, 28(3): 211-225.
30. Grant, R. M., Jammine, A. P., & Thomas, H. 1986. The Impact of Diversification Strategy Upon the Profitability of British Manufacturing Firms. Academy of Management Proceedings: 26-30.

31. Grant, R. M., Jammine, A. P., & Thomas, H. 1988. Diversity, Diversification, and Profitability among British Manufacturing Companies, 1972-84. The Academy of Management Journal, 31(4): 771-801.

32. Greene, W. 2008. Econometric Analysis (6th ed.): Pearson Education.

33. Henisz, W. 2000. The Institutional Environment for Economic Growth. Economics and Politics, 12: 1-31.

34. Hennart, J.-F. 2007. The Theoretical Rationale for a Multinationality-Performance Relationship. Management International Review, 47(3): 423.

35. Hitt, M. A., Hoskisson, R. E., & Ireland, R. D. 1994. A mid-range theory of the interactive effects of international and product diversification on innovation and performance. Journal of management, 20: 297-326.

36. Hitt, M. A., Hoskisson, R. E., & Kim, H. 1997. International Diversification: Effects on Innovation and Firm Performance in Product-Diversified Firms. The Academy of Management Journal, 40(4): 767-798.

37. Hofstede, G. 2001. Culture Consequences: comparing values, Behaviours, institutions and organizations across nations (2nd ed.). Thousand Oakes: Sage.

38. Hsiao, C. 1985. Benefits and Limitations of Panel Data. Econometric Reviews, 4(1): 121-174.

39. Hyland, D. C. & Diltz, J. D. 2002. Why firms diversify: An empirical examination. Financial Management, 31(1): 51.

40. Jaccard, J., Turrisi, R., & Wan, C. K. 1990. Interaction Effects in Multiple Regression: Sage Publications.

41. Jacquemin, A. P. & Berry, C. H. 1979. Entropy Measure of Diversification and Corporate Growth. The Journal of Industrial Economics, 27(4): 359-369.

42. Jiraporn, P., Kim, Y. S., Davidson, W. N., & Singh, M. 2006. Corporate governance, shareholder rights and firm diversification: An empirical analysis. Journal of Banking & Finance, 30(3): 947-963.

43. Jones, G. R. & Hill, C. W. L. 1988. Transaction cost analysis of strategy structure choice. Strategic Management Journal, 9(2): 159.

44. Jose, M. L., Nichols, L. M., & Stevens, J. L. 1986. Contributions of Diversification, Promotion and R&D to the Value of the Multiproduct Firms: a Tobin's q Approach. Financial Management, 15(4): 33-42.

45. Keele, L. & Kelly, N. 2005. Dynamic Models for Dynamic Theories: the Ins and Outs of Lagged Dependent Variables. Political Analysis, 14(2): 186.

46. Kiefer, N. 1980. Estimation of fixed effect models for time series of cross-sections with arbitrary intertemporal covariance. Journal of Econometrics, 14(2): 195.

47. Kim, H., Hoskisson, R. E., & Wan, W. P. 2004. Power dependence, diversification strategy, and performance in keiretsu member firms. Strategic Management Journal, 25(7): 613-636.

48. Kim, W. C. & Lyn, E. 1986. Excess Market Value, the Multinational Corporation, and Tobin's Q Ratio. Journal of International Business Studies, 17(1): 119-125.

49. Kim, W. C. 1989. Developing a Global Diversification Measure. Management Science, 35(3): 376-383.

50. Kim, W. C., Hwang, P., & Burgers, W. P. 1993. Multinationals' Diversification and the Risk-Return Trade-Off. Strategic Management Journal, 14(4): 275-286.

51. Kogut, B. & Singh, H. 1988. The Effect of National Culture on the Choice of Entry Mode. Journal of International Business Studies, 19(3): 411-432.

52. Kostova, T. & Zaheer, S. 1999. Organizational Legitimacy under Conditions of Complexity: the Case of the Multinational Enterprise. Academy of Management Review, 24: 82-98.

53. Krishnan, R., Martin, X., & Noorderhaven, N. 2006. When Does Trust Matter to Alliance Performance? Academy of Management Journal, 49(5): 894-917.

54. Kumar, M. V. S. 2009. The relationship between product and international diversification: the effects of short-run constraints and endogeneity. Strategic Management Journal, 30(1): 99-116.

55. Kutner, M., Nachtsheim, C., & Neter, J. 2004. Applied Linear Statistical Models (4th ed.). Boston: McGraw-Hill.

56. Lang, L., Poulsen, A., & Stulz, R. 1995. Asset Sales, Firm Performance, and the Agency Costs of Managerial Discretion. Journal of Financial Economics, 37: 3-37.

57. Leontiades, M. 1986. The Rewards of Diversifying Into Unrelated Businesses. Journal of Business Strategy, 6(4): 81-87.

58. Lewellen, W. G. 1971. A Pure Financial Rationale for the Conglomerate Merger. The Journal of Finance, 26(2): 521-537.

59. Lu, J. W. & Beamish, P. W. 2001. The internationalization and performance of SMEs. Strategic Management Journal, 22(6/7): 565.

60. Lu, J. W. & Beamish, P. W. 2004. International Diversification and Firm Performance: the S-

Curve Hypothesis. Academy of Management Journal, 2004(47): 598-609.

61. Lubatkin, M. 1983. Merger and the Performance of the Acquiring Firm. Academy of Management Review, 8: 218-225.
62. Markides, C. C. 1992. Consequence of Corporate Refocusing: Ex ante Evidence. Academy of Management Journal, 35: 398-412.
63. Miller, D. J. 2006. Technological diversity, related diversification, and firm performance. Strategic Management Journal, 27(7): 601-619.
64. Montgomery, C. A. 1985. Product-Market Diversification and Market Power. Academy of Management Journal, 28(4): 789.
65. Montgomery, C. A. 1994. Corporate Diversification. The Journal of Economic Perspectives, 8(3): 163-178.
66. Palepu, K. 1985. Diversification Strategy, Profit Performance and the Entropy Measure. Strategic Management Journal, 6(3): 239-255.
67. Palich, L. E., Cardinal, L. B., & Miller, C. C. 2000. Curvilinearity in the Diversification-Performance Linkage: An Examination of over Three Decades of Research. Strategic Management Journal, 21(2): 155-174.
68. Penrose, E. 1959. The Theory of the Growth of the Firm (2nd (1995) ed.). New York: Oxford University Press Inc.
69. Porter, M. 2008. On Competition (2 ed.): Harvard Business School Press.
70. Prahalad, C. K. & Bettis, R. A. 1986. The Dominant Logic: A New Linkage between Diversity and Performance. Strategic Management Journal, 7(6): 485-501.
71. Ramanujam, V. & Varadarajan, P. 1989. Research on Corporate Diversification: A Synthesis. Strategic Management Journal, 10(6): 523-551.
72. Ravenscraft, D. J. & Scherer, F. M. 1987. Mergers, Sell-offs and Economic Efficiency. Washington D.C.: The Brookings Institution.
73. Robins, J. & Wiersema, M. F. 1995. A Resource-Based Approach to the Multibusiness Firm: Empirical Analysis of Portfolio Interrelationships and Corporate Financial Performance. Strategic Management Journal, 16(4): 277-299.
74. Robins, J. A. & Wiersema, M. F. 2003. The measurement of corporate portfolio strategy: Analysis of the content validity of related diversification indexes. Strategic Management Journal, 24(1): 39.
75. Rugman, A. M. 1979. International diversification and the multinational enterprise. Lexington,

MA: Lexington Books.

76. Ruigrok, W. & Wagner, H. 2003. Internationalization and Performance: an Organizational Learning Perspective. Management International Review, 43(1): 63-83.

77. Rumelt, R. P. 1974. Strategy, Structure and Economic Performance: Harvard University

78. Simmonds, P. G. & Lamont, B. T. 1996. Product-market/International Diversification and Corporate Performance. International Journal of Organizational Analysis (1993 - 2002), 4(3): 252.

79. Stimpert, J. L. & Duhaime, I. M. 1997. Seeing the Big Picture: The Influence of Industry, Diversification, and Business Strategy on Performance. The Academy of Management Journal, 40(3): 560-583.

80. Szulanski, G. 1996. Exploring Internal Stickiness: Impediments to the Transfer of Best Practice Within the Firm. Strategic Management Journal, 17: 27-43.

81. Tallman, S. & Li, J. 1996. Effects of International Diversity and Product Diversity on the Performance of Multinational Firms. The Academy of Management Journal, 39(1): 179-196.

82. Tanriverdi, H. & Venkatraman, N. 2005. Knowledge relatedness and the performance of multibusiness firms. Strategic Management Journal, 26(2): 97-119.

83. Vermeulen, F. & Barkema, H. 2002. Pace, rhythm, and scope: Process dependence in building a profitable multinational corporation. Strategic Management Journal, 23(7): 637.

84. Wiersema, M. F. & Bowen, H. P. 2008. Corporate diversification: the impact of foreign competition, industry globalization, and product diversification. Strategic Management Journal, 29(2): 115-132.

85. Williamson, O. 1979. Transaction-Cost Economics: the Governance of Contractual Relations. Journal of Law and Economics, 22(2): 233-261.

86. Wolf, B. M. 1977. Industrial Diversification and Internationalization: some empirical evidence. Journal of Industrial Economics, 26(2): 177-191.

87. Zander, U. & Kogut, B. 1995. Knowledge and speed of the transfer and imitation of organizational capabilities: an empitical test. Organization Science, 6(1).

88. Zollo, M. & Reuer, J. 2010. Experience spillovers across corporate development activities. Organization Science.

APPENDICES

APPENDIX 1. VARIABLE DISTRIBUTION STATISTICS

Table 3. Variable Distribution Statistics

	Min	Max	Skewness	Kurtosis
Performance (t+1)	-33.900	33.800	-1.236	8.214
Product Asset Dispersion	0.005	0.820	0.378	2.620
Product Asset Diversity	1.005	4.517	0.587	2.548
International Asset Dispersion	0.001	0.915	0.804	3.231
International Asset Diversity	0.0003	3.520	1.395	4.280
Dispersion Interaction Term	0.0003	0.562	1.560	5.248
Diversity Interaction Term	0.0005	10.504	2.064	8.277
Prior Performance	-33.900	36.500	-1.042	8.416
Firm Size	0.526	12.799	-0.812	3.806
Industry Average Profitability	-13.865	10.906	-0.748	3.904

APPENDIX 2. OMITTED VARIABLE, HETEROSCEDASTICY, AUTOCORRELATION, TREND AND COLLINEARITY TESTS

Omitted Variable Test

Ramsey RESET test on OLS with industry, country and year dummies using powers of the fitting values of Performance (t+1)

H0: Model has no omitted variables

F (3, 647) = 1.53

Prob>F = 0.2052

We cannot reject the hypothesis of no omitted variables in the model.

Trend Test

$$z_t = \mu + \lambda z_{t-1} + \beta_{year} + \varepsilon_t$$

If $\lambda - 1 \neq 0$ and $\beta = 0$, then the series are stationary

Table 4. Testing for Stationarity of Time-Series

Variable	λ−1	β	Trend
Performance (t+1)	-1.343	-0.017	No
Product Asset Dispersion	-1.052	-0.003	No
Product Asset Diversity	-1.045	0.000	No
International Asset Dispersion	-1.070	-0.004	No
International Asset Diversity	-1.036	-0.001	No
Performance (t)	-1.339	0.058	No
Firm Size	-1.011	0.001	No
Industry Average Profitability	-1.090	0.001	No

Autocorrelation

Wooldridge Test for Autocorrelation in Panel Data confirms the existence of serial correlation.

H0: no first-order autocorrelation

F (1,104) = 136.132

Prob > F = 0.0000

Heteroscedasticity

Heteroscedasticity between observations

Breusch-Pagan/ Cook-Weisberg Test indicates that there is a significant degree of heteroscedasticity between observations in the Main Effects Model.

H0: Constant variance

Variables: fitted values of Performance (t+1)

chi2(1) = 99.82

Prob > chi2 = 0.0000

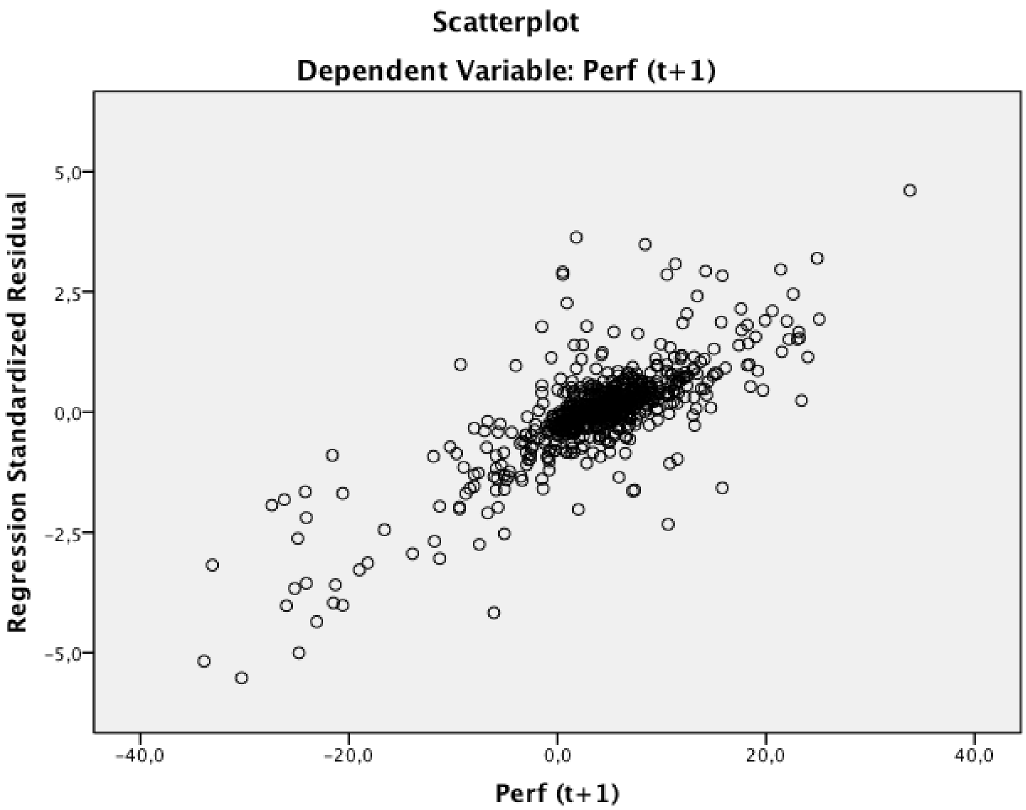

Figure 5. Residual-Dependent Variable Plot (Main Effects Model)

Plot of Standardized Residuals and Dependent Variable Values (Fig. 5) confirms the conclusion of Breusch-Pagan/ Cook-Weisberg Test on the existence of heteroscedasticity between observations in the Main Effects Model.

Heteroscedasticity between groups of observations

SD-test

H0: Group variances are equal

W0 = 3.297 df (121,607) Pr>F=0.0000

W50 = 2.204 df (121,607) Pr>F=0.0000

W10 = 3.260 df (121,607) Pr>F=0.0000

The null hypothesis of equality of variances is rejected by all three sd-test statistics. Thus, we can conclude that there is heteroscedasticity between panels.

Modified Wald test for groupwise heteroscedasticity in cross-sectional time-series FGLS model

H0: $\sigma_i^2 = \sigma^2$

Chi2(115) = 4.1e+05

Prob>chi2 = 0.0000

The null test of constant variance is strongly rejected.

Collinearity

Variance inflation factors for the Main Effects Model in Table 5 below indicate no evidence of unacceptable collinearity between explanatory variables.

Table 5. VIF (Main Effects Model)

Variable	VIF	1/VIF
Product Asset Dispersion	3.39	0.295
Product Asset Diversity	3.26	0.307
International Asset Dispersion	1.93	0.518
International Asset Diversity	1.71	0.584
Performance (t)	1.27	0.790
Firm Size	1.10	0.909
Industry Average Profitability	1.05	0.955
Mean VIF	1.96	

APPENDIX 3. DETAILED STEP-WISE REGRESSIONS

Table 6. Detailed Step-Wise Regressions

Performance (t+1)			**Model 1**		**Model 2**		**Model 3**
cons	1.015***	0.476	0.495	1.023*	1.374**	0.289	-0.226
	(0.095)	(0.406)	(0.409)	(0.433)	(0.462)	(0.504)	(0.537)
Firm Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Prior Performance	0.709***	0.652***	0.647***	0.598***	0.607***	0.625***	0.648***
	(0.020)	(0.022)	(0.023)	(0.024)	(0.024)	(0.027)	(0.026)
Firm Size		0.097*	0.097*	0.123**	0.093*	0.056	0.098†
		(0.043)	(0.043)	(0.045)	(0.046)	(0.054)	(0.057)
Industry Average			0.012	0.015	0.017	-0.029	-0.021
Profitability			(0.022)	(0.023)	(0.023)	(0.025)	(0.023)
Product Asset				-0.250*	-0.678***		
Diversity				(0.101)	(0.194)		
Product Asset					2.409**		
Dispersion					(0.898)		
International Asset						1.655***	2.572***
Dispersion						(0.455)	(0.583)
International Asset							-0.403**
Diversity							(0.150)
Sample Size	1085	1046	1046	983	983	763	763
Number of Firms	169	167	167	161	161	121	121
Average Length of Panel	6.420	6.263	6.263	6.106	6.106	6.306	6.306
Wald Chi2	1231.51***	864.60***	841.38***	631.86***	677.63***	618.63***	722.89***

Standard Errors are reported in parentheses.
Significant at: *** - 0.001 level; ** - 0.01 level; * - 0.05 level; † - at 0.1 level.
We define the sequence for adding control and explanatory variables based on their correlation with dependent variable, i.e. variable with the highest correlation is added first etc. (Kutner et al., 2004)

APPENDIX 4. REGRESSION STANDARDIZED COEFFICIENTS

Table 7. Standardized Coefficients

	Performance (t+1)	Model 4 (Main Effects Model)	Model 5 (Interaction Model)
	cons	-0.016	-0.001
		(0.011)	(0.064)
	Firm Effects	Yes	Yes
	Year Effects	Yes	Yes
	Prior Performance	0.740***	-0.115***
		(0.024)	(0.028)
	Firm Size	0.020	-0.276***
		(0.015)	(0.060)
	Industry Average Profitability	-0.007	0.116***
		(0.012)	(0.023)
H1a	**International Asset Dispersion**	0.045**	-0.142**
		(0.013)	(0.052)
H2a	**International Asset Diversity**	-0.040**	0.330***
		(0.015)	(0.090)
H1b	**Product Asset Dispersion**	0.043*	-0.006
		(0.020)	(0.056)
H2b	**Product Asset Diversity**	-0.048*	-0.044
		(0.020)	(0.042)
H3a	**Dispersion Interaction Term**		0.228**
			(0.086)
H3b	**Diversity Interaction Term**		-0.294**
			(0.099)
	Sample Size	722	722
	Number of Firms	115	115
	Average Length of Panel	6.278	6.278
	Wald Chi2	1015.49***	62.68***

Standard Errors are reported in parentheses.
Significant at: *** - 0.001 level; ** - 0.01 level; * - 0.05 level; † - at 0.1 level.
Standardized coefficients are obtained by standardizing all variables (subtracting mean and dividing by s.d.) and running the same regression (Jaccard et al., 1990).

APPENDIX 5. COMPARISON OF ACTUAL AND PREDICTED SQUARED CORRELATIONS

$$r^2_{y,\hat{y}} = corr^2(y, \hat{y}) = corr^2(y, x'\hat{\beta})$$

Table 8. Comparison of squared correlation between predicted and actual values of dependent variable across various models

	WG GLS	DPD	FGLS
Model 1	0.0030	0.0004	0.3772
Model 2	0.0002	0.0000	0.3822
Model 3	0.0002	0.0001	0.3885
Model 4	0.0014	0.0000	0.3931
Model 5	0.0012	0.0002	0.1002

Table 8 compares squared correlations between predicted and actual values of dependent variable for models estimated using within-group GLS, dynamic panel data (DPD) estimation, and FGLS.