CONTRACTION FOR THE SAKE OF EXPANSION – AN OXYMORON?

ABSTRACT

International and business diversification are two common strategies of firms. We present novel theoretical arguments and empirical evidence suggesting that contracting a given diversification path (be it in the international or business dimension), does not only allow firms to expand the other path in the short term, but also to again diversify the initially contracted path, thereby expanding both diversification paths in the long term. We argue and show that when firms contract a given diversification path, they spark two subsequent processes: They free up non-scale free resources from the contracted diversification path to invest in the other diversification path, which allows them to expand this path. In turn, this expansion creates new scale free resources that also facilitate renewed diversification along the initially contracted path.

KEYWORDS: contraction, business diversification, international diversification, firm growth, divestment.

INTRODUCTION

A common way for firms to grow is through international and business diversification. The resource-based view of the firm suggests that there are firm-specific optimal levels at which international and business diversification maximize firm performance at given points in time (Bowen & Sleuwaegen, 2017; Mackey, Barney & Dotson, 2017). The vast literature on international and business diversification has discussed many of the combinations of international and business diversification moves that firms follow over time to reach their optimal diversification levels. These moves include simultaneous expansion of both diversification paths, expansion of one path at the expense of the other, contraction of both paths and so forth. [1] In the current study, we highlight a novel unobserved diversification move that we call "contraction for the sake of expansion" - contracting a given diversification path (be it in the international or business dimension) in the short term, not only as means to expand the other diversification path, but, importantly, to also to further diversify the initially contracted path in the long term.

Two key mechanisms drive this diversification move. First, a firm's position within each diversification path bears the opportunity costs of employing and committing the firm's non-scale free resources[2] (Levinthal & Wu, 2010; Wu, 2013), such as the attention and cognitive load of internally trained managers (Hitt, Hoskisson & Kim, 1997; Joseph & Ocasio, 2012; Penrose, 1959). This implies that contracting a given diversification path frees up such non-scale free resources, which in turn can be used for diversifying the other diversification path. This argument is not new and was made before within the specific contexts of international or business diversification as well as in other contexts (e.g. Berry, 2010; Kaul, 2012; Vidal & Mitchell, 2015; Wu, 2013). However, this argument bears an important extension.

[1] See Bowen and Sleuwaegen (2017) and Hashai and Delios (2012) for extensive reviews.

[2] In this study, we prefer the term "resources" to the term "capabilities" originally used by Levinthal and Wu (2010), since resources is a broader term that also can encompass cognitive capacity, brands, financial capital, etc.

Diversifying the other diversification path creates new scale free resources (Levinthal & Wu, 2010; Wu, 2013), such as new brands and product technologies (in the case of business diversification) or intimate familiarity with foreign consumer preferences and access to foreign technologies (in the case of international diversification). These scale free resources facilitate renewed diversification along the initially contracted path, thereby enabling firms to expand both diversification paths in the long term. Importantly, the aforementioned process is subject to adjustment costs (Dierickx & Cool, 1989; Penrose, 1959) that requires gradual adjustment, with some lag between the contraction (or expansion) of a firm's position in a given diversification path and the expansion of the other path.

For example, firms that narrow down the variety of businesses where they operate, can use freed managerial time and attention to gradually penetrate more foreign countries and thereby expose themselves to new technologies and sources of knowledge as well as diverse consumer preferences and demands (Berry, 2014; Cantwell & Mudambi, 2005). In turn, the increased familiarity with these new environments and new stimuli may well allow firms to identify new opportunities in product markets where they do not operate, and thereby support the expansion of these firms into new business segments.

While controlling for the likely endogeneity between international and business diversification (Kumar, 2009; Mayer, Stadler & Hautz, 2015), our analysis of panel data with the international and business diversification moves of about 1,600 U.S. based firms in the 1997 to 2011 period lends support to the existence of this novel diversification move. Firms that contract their International (business) diversification level at a given year are shown to increase their lagged business (international) diversification more than firms that do not contract. In turn, such firms exhibit a positive association between this lagged business (international) diversification and their probability to increase *both* their *additionally lagged* international and business diversification levels (relative to the base year). The use of

time lags in our analysis captures the idea of a gradual adjustment of firms from one combination of diversification levels to another.

Our theoretical framework and findings highlight a novel diversification path where firms initially contract a given path as means to increase their diversification level in the other path, and subsequently expand both diversification paths relative to their initial level. Hence, firms can reduce their business diversification level while increasing their international diversification, in order to become able to expand both diversification paths. In a similar vein, firms can reduce their international diversification level while expanding their business diversification in order to expand both diversification paths. More generally, the study suggests that withdrawal from a given strategic path (such as international or business diversification level) may be part of a more far-sighted, long term process, where a withdrawal on one path allows expansion another path, which will eventually lead to renewed expansion also in the originally withdrawn path. The analyses of these more elaborate dynamics enhance our knowledge about the ways in which firms evolve over time, beyond simply predicting investment or divestment at a given point in time.

THEORETICAL FOUNDATIONS

Two key mechanisms drive our proposed process of contracting a firm's given diversification path in the short term, as means of expanding the other diversification path, but also the originally contracted path in the long term. The first mechanism is the substitution between the use of non-scale free, scarce resources for international or business diversification. The second mechanism is the creation of new resources due to the diversification of the firm's other diversification path. In particular, we are interested in the creation of scale free resources that promote renewed diversification in the originally contracted diversification path, thereby allowing the expansion of both diversification paths in the long term. Both

mechanisms are subject to adjustment costs that are involved in moving from one combination of international and business diversification levels to another. Below we elaborate on the two mechanisms and the gradual adjustment with which they are involved.

Substitution between non-scale free resources

Arguments and empirical evidence suggesting the existence of substitution between international and business diversification moves (Kumar, 2009; Mayer et al., 2015; Meyer, 2006; Wiersema & Bowen, 2008) are grounded in the Penrosian view, stressing the limits of managerial time and efforts (Penrose, 1959). **I**nternational and business diversification decisions often make use of a similar pool of non-scale free resources. Non-scale free resources (Levinthal & Wu, 2010; Wu, 2013) are resources that their utilization within a given diversification path bears significant opportunity costs in terms of their use in the other diversification path. Such non-scale free resources include the time, attention and cognitive load of internally experienced managers (Joseph & Ocasio, 2012; Hitt, et al. 1997). These managers might be deployed to either penetrate new foreign countries or enter new product categories, but are limited in their capacity to engage in both types of diversification. Non-scale free resources may also refer to financial resources that can be allocated to either diversification path, but are typically constrained. Overall, we acknowledge the existence of *substitution* between international and business diversification moves, which implies that reducing the level diversification along one path, frees up non-scale free resources that can be used for expanding the other diversification path.

This view is consistent with the literature acknowledging the role of opportunity cost as a determinant of firm divestment decisions. Berry (2010) has shown that lower-cost production and new market opportunities in foreign markets can provide a better use of existing firm resources and posit that these opportunities are likely to influence firm divestment of home-country operations. Kaul (2012) shows that technological innovations prompt firms to redeploy resources in segments of new opportunity while

divesting out of marginal businesses. Vidal and Mitchell (2015) find that divestitures free up financial resources and managerial capacity that firms can use for future growth. Finally, Bennett and Feldman (2017) provide descriptive results that support the idea that firms use sequential divestments and acquisitions to improve the allocation of managerial attention within their organizations.

Creating new scale free resources

In essence, operating in more business segments opens opportunities for firms to expand to new international markets, as it offers them a greater variety of scale free firm-specific resources that can be used for entering new international markets or expanding presence in existing ones, and vice versa. In contrast to non-scale free resources, scale free resources are resources whose utilization within a given diversification path does not bear significant opportunity costs in terms of their use in the other diversification path (Levinthal & Wu, 2010; Wu, 2013). Hence, the creation of such scale free resources while expanding a given diversification path, allows a firm to use these resources to also expand another diversification path without facing significant (or any) resource constraints.[3]

For instance, when it comes to business diversification, the technological knowledge or brands underpinning that firms possess through their operations across different businesses typically serve as key scale free resources for expanding internationally (Dunning, 1988, 1993; Caves, 2007). Familiarity with the demand characteristics of a greater range of consumers (that are served across different businesses) further grants firms the capabilities to successfully penetrate new international markets. Firms operating in many businesses should therefore be able to use their close familiarity with the preferences of different customer segments, to penetrate more international markets (Delios & Beamish, 1999). In a similar vein,

[3] Indeed the expansion of a diversification path can also lead to the creation of non-scale free resources such as distribution channels and production facilities. However, because such resources bear opportunity costs firms are likely to be constrained in their ability to use such non-scale free resources for diversifying another path.

greater business diversification experience has been shown to support the development of managerial capabilities to facilitate international diversification (Geringer, Tallman & Olsen, 2000; Hitt et al., 1997; Mayer, et al., 2015). It follows that firms can use the scale free resources created through their business diversification to compete more successfully in international markets.

Similarly, when it comes to international diversification, firms' exposure to foreign knowledge and resources, as well as interactions with customers, competitors, suppliers, and partners in foreign markets grants them a wide range of scale free resources that can be used to diversify their business segments. Operating in more international markets exposes firms to a greater diversity of demand types across countries that can serve a greater range of businesses. It further grants firms with more diverse non-location specific resources (for instance, new technologies originating in foreign markets, see Berry, 2014; Cantwell & Mudambi, 2005) to support a greater range of businesses. The combination of a wider foreign resource range and more diverse international demand serves as stimuli for business diversification. Taken together, the discussion above supports the view that the scale free resources gained through one diversification path can support further diversification in the other.

Adjustment costs and resulting time lags

Adjustment costs reflect the costs that firms possess when moving from one combination of international and business diversification levels to another. The existence of such costs explains why firms cannot seamlessly move from their current levels of international and business diversification to another. They are the main explanation why firms make gradual rather than instantaneous changes in their levels of international and business diversification.

The main drivers of adjustment costs are time compression diseconomies in resource development (Dierickx & Cool, 1989). Time compression diseconomies imply that, within a given time frame, large changes in a firm’s diversification level are disproportionately more expensive than small

changes (Mahoney & Pandian, 1992; Tan & Mahoney, 2007). For example, this disproportionate cost increase may result from the fact that firms need to develop internally experienced managers who can be deployed in a given diversification path (Jiang, Beamish & Makino, 2014). As it takes time to create and integrate new resources within a firm's existing routines (Barkema & Schijven, 2008; Miller, Fern & Cardinal, 2007), firms that expand radically in a given diversification path within a short time period face more challenges than firms that expand at a more moderate pace (Knott, Bryce & Posen, 2003).

Change requires managerial attention, administrative effort, and time (Joseph & Occasio, 2012; Hitt et al., 1997; Penrose, 1959). Firms therefore must allocate substantial administrative resources for this task. When they enter a large number of new foreign markets or business segments in a short time span, time compression diseconomies will increase the managerial costs of such efforts compared to a more moderate expansion (Dierickx & Cool, 1989). In other words, the marginal cost of change increases when the rate of change is accelerated (Knott et al., 2003:193).

Given that managers take such adjustment costs into consideration, the implication is that adjustments towards different combinations of international and business diversification levels will likely be gradual and require some lag. For instance, the process of contraction is likely to result in a time lag, because the process of contraction itself typically requires managerial resources (Moliterno & Wiersema, 2007; Shimizu & Hitt, 2005). Hence, in the short term the reduction of one diversification path may actually constrain resources even more. Only, when the contraction process is complete, the managerial resources that were previously occupied by the contracted path, as well as the resources that were used to manage the contraction process are freed up. In addition, the creation of new scale-free resources typically takes time. This is because learning is largely a function of time spent in a market, be it a foreign market or a new business segment (Ginsberg, 1990; Pennings, Barkema & Douma, 1994; Zahra, Ireland & Hitt, 2000).

Contraction for the sake of expansion

The combination of the substitution between the use of non-scale free resources for international and business diversification and the creation of scale free resources while expanding either diversification path, are the key drivers of the novel diversification move that we highlight in this paper. As discussed above, both mechanisms are subject to adjustment costs and time compression diseconomies and, hence, are likely to be gradual. First, firms that contract a given diversification path free-up non-scale free resources that can be used to gradually expand their other diversification path. Subsequently, such expansion grants firms with scale free resources that will allow them to resume diversification in the originally contracted path, thereby expanding both diversification paths in the long term.

Figure 1 depicts this process. The contraction of a a given diversification path (at time t) is expected to free non-scale free resources at time t+w (w>0), which can be, in turn, directed towards the other diversification path and promote its diversification in time t+x (x>w). The time lags w and x result from the adjustment costs in the shift of non-scale free resources, discussed above, indicating that the diversification of the other path is not expected to occur concurrently with the contraction of the original path, but rather will require some time lag between the two interrelated processes.

[Insert Figure 1 about here]

Our first hypothesis is therefore:

Hypothesis 1 – Contraction of a given diversification path is positively associated with a lagged expansion of the other diversification path.

Reverting to Figure 1, the expansion of the other diversification path in t+x, is expected to result after some additional time lag (t+y, y>x) with the creation of new scale free resources. These scale free resources (e.g. new product brands or new technological knowledge) can be used to resume diversification in the initially contracted path, after some additional time lag z (z>y). Once again, the

adjustment costs in the development of scale free resources required to support either international or business diversification, imply that the resumed diversification of the initially contracted diversification path will occur after some additional time lag from the expansion of the other diversification path.

Importantly, it is noteworthy that being scale free, the created resources do not halt the continued expansion of the other diversification path. In fact, firms can also build on the resources created in the other diversification path to further expand this path itself, thus allowing firms to expand both of their diversification paths. Hence, by contracting a given diversification path in the short term (t), firms become able to expand their other diversification path at t+x and subsequently expand both their international and business diversification levels in the long term (t+z). We therefore complement Hypothesis 1 and hypothesize that:

> *Hypothesis 2 – Firms that expand their other diversification path, after contracting a given diversification path, increase their probability of expanding both diversification paths after an additional time lag.*

DATA AND METHODS

Sample

The main data source for testing the proposed hypotheses is Standard and Poor's COMPUSTAT database. This database includes consolidated accounting and financial data for all US publicly traded firms. We classified firms into industries according to the North American Industry Classification System (NAICS) that changes every five years. To avoid distortions from too many conversions, we restrict our sample period to cover three different industry classification system versions (NAICS 1997, 2002 and 2007) and focus on the time frame of 1997–2011. Had we included data for more years, the added industry classification conversions might have distorted our analyses. We chose to classify all firms' main industry according to the 2002 NAICS version, the midpoint between the other two NAICS versions.

The final sample is an unbalanced panel dataset consisting of 1673 firms and 6973 firm-year observations. The research sample is relatively small, mainly because our analyses are based on a series of contraction and expansion steps that last over six consecutive years, so the number of firms with continuous data over this time interval is limited. The final sample also includes firms that were dropped from the COMPUSTAT database at some point, for various reasons, thus greatly reducing selection bias concerns.

Estimation approach

There is no straightforward way to test the research hypotheses by using simple regressions. Thus, we construct two equivalent set of models to test the research hypotheses, using panel data regressions. Each set of models includes three interdependent models across a six-year period, running in parallel (see Figure 2). Both sets are based on the same order of successive steps, where we assume a lag between an initial change in the level of diversification (either contraction or expansion) in a given path and its effect on the other path. Since the contraction and expansion of business segments and geographic areas are complex and time-consuming activities (Shimizu & Hitt, 2005), this interval aims to capture the gradual adjustment between shifts in the contraction and expansion of diversification levels.

The first set of models (left side of Figure 2, labeled ID contraction) tests the influence of contracting the International Diversification (ID) level in year t+1 (relative to year t) on the two year lagged (year t+3) change in Business Diversification (BD) level, as well as on the subsequent two year lagged change in year t+5 of BD and the initially contracted ID path itself. The second set of models (right side of Figure 2, labeled BD contraction) examines the opposite direction: the effect of contracting the BD level on the increase in ID in t+3, and, later on, on the level of ID and the initially contracted BD path in t+5. Since the two sets share the same logic, the three models in the first set (1 to 3) are parallel to the three models in the second set (4 to 6). This analogous identity between the sets creates three pairs of similar

models (1 and 4; 2 and 5; 3 and 6). Following Hypotheses 1 and 2 we expect that firms that have decreased their diversification level in a given path between t and t + 1, will increase the other diversification path at t + 3. After two more years, at t + 5, this increase in the other diversification path is expected to lead such firms to higher diversification levels in both paths, relative to the levels at the reference year (t). It follows that we exploit an interval of six firm-year observations for our analyses.

[Insert Figure 2 about here]

Model specification and measurement

Dependent and independent variables

International expansion and entry into new businesses are both complex and multifaceted phenomena (Amit & Livnat, 1988; Wiersema & Bowen, 2011). The two phenomena represent the outcome of a diversification strategy, but in different directions: the international path versus the business path. It, therefore, makes sense to use compatible metrics for the two variables. Following the extant literature, we applied the entropy measure, as it the most widely used measure for both diversification paths. The entropy measure has been used numerous times both for measuring ID (Hitt et al., 1997; Chang & Wang, 2007; Qian, Khoury, Peng, & Qian, 2010) and business diversification (Chakrabarti, Singh & Mahmood, 2007; Wiersema & Bowen, 2008; Kim, 2016; Chin & Semadeni, 2017; Mohr, Batsakis, & Stone, 2018). The entropy measure is a two-dimensional metric of diversification that is based on the number of geographic/business segments in which a firm operates and the distribution of sales across different segments. Entropy is calculated as $\sum P_i \ln\left(\frac{1}{P_i}\right)$, where P_i is the relative share of a firm's total sales in segment *i*, and the term ln $(1/P_i)$ indicates the weight of the segment. Low values of this measure represent low levels of diversification.

Our first set of regressions examines whether there is a difference between firms whose ID (BD) level decreased and those whose ID (BD) level did not, and their two year lagged BD (ID). Therefore, in model 1 (and model 4), we construct a binary independent variable that assigns a value one to firms that have a negative change in their ID (BD) between t and t+1, and zero otherwise. The dependent variable is a continuous variable, defined as the change (delta) in BD (ID) two years later. Running model 1 (and model 4) on the whole sample and not only on firms whose ID (BD) level contracted at t + 1, allows us to compare the two groups of firms.

The rest of the models examine the influence of the continuous delta BD (ID) at time t + 3 (compared to time t) on subsequent changes in both paths, only for those firms for which the ID (BD) path contracted at time t + 1. In models 2 and 3 (and respectively models 5 and 6), the dependent variables are binary variables, estimated via linear probability models (LPMs)[4]. Model 2 (and Model 5) examines the probability that the delta BD (ID) at time t + 3 will lead to an increase in BD (ID) level at time t + 5, compared to the reference year (time t). Accordingly, we construct a binary dependent variable that assigns the value one if the change in BD (ID) between t + 5 and t is greater than zero, and zero otherwise.[5] Model 3 (and model 6) examines whether the delta BD (ID) at time t + 3 increases the probability that the ID (BD) level at time t + 5 will be greater than at time t. For this purpose, we create a binary dependent variable that assigns the value one if the change in ID (BD) between t + 5 and t is greater than zero, and zero

[4] An LPM assumes a linear relationship between the probability of a particular event to occur and a number of explanatory variables. Let P_i be a probability of the occurrence of an event in object i: $P_i = P(Y_i = 1 \mid X_{1_i}, \dots, X_{k_i})$, and let $(1 - P_i)$ be the complementary probability (the probability of failure of the occurrence of an event) $1 - P_i = P(Y_i = 0 \mid X_{1_i}, \dots, X_{k_i})$. The probability of the occurrence of an event, given $X_{1_i}, \dots, X_{k_i}$, is: $P_i = \alpha + \beta_1 X_{1_i} + \dots + \beta_k X_{k_i}$. Therefore, the model can be formulated as: $P(Y = 1|\mathrm{X}) = \alpha + \beta_1 X_{1_i} + \dots + \beta_k X_{k_i}$. As a result, the interpretation of the coefficients in the LPM is that a one unit increase in the independent variable is associated with a beta percent change (increase or decrease) in the probability that the dependent variable will occur.

[5] As the two paths of diversification are mutually dependent (Bowen & Sleuwaegen, 2017; Kumar, 2009), we also include in model 2 (and model 5) a control variable of *firm diversification* level in the path that is not represented by the dependent and independent variables.

otherwise. Together these models test whether the initial contraction of a given diversification path (between t and t+1) will lead to a greater probability of increasing the diversification levels in both paths at t+5.

Control variables

We control for multiple firm specific variables that can influence international and business diversification. Previous studies showed that international and business diversification are influenced by *firm age* (Autio, Sapienza, & Almeida, 2000; Xie & O'Neill, 2014). Following the extant literature (Pástor & Veronesi, 2003; Chay, Kim & Suh, 2015) firm age is calculated with reference to a firm's initial public offering (IPO) year (the year of listing). Prior research found evidence of a positive relationship between *firm size* and ID (e.g., Tihanyi, Johnson, Hoskisson & Hitt, 2003), as well as BD (Xie & O'Neill, 2014). A positive relationship is expected between a firm's size and its international and business diversification, as greater size is expected to help firms better exploit economies of scale and scope (Penrose, 1959; Teece, 1982; Chandler, 1994; Caves, 2007). We operationalize firm size by the natural logarithm of firm market capitalization (Sharfman & Fernando, 2008; Sørensen, 2002).

Firm R&D intensity was found to be related to both types of diversification (Delios & Beamish, 1999; Kumar, 2009; Bowen & Wiersema, 2005). R&D intensity is calculated as the ratio of annual R&D expenses to total sales (Caves, 2007; Delios & Beamish, 1999). Consistent with past literature, we control for *firm financial performance* (Tihanyi et al., 2003; Zahra et al., 2000; Bowen & Wiersema, 2005). In line with previous studies (Bamiatzi, Bozos, Cavusgil, & Hult, 2016; Shi, Connelly, & Hoskisson, 2017), we use an accounting performance measure and not a market-based measure, operationalizing firm financial performance with returns on assets (ROA). A well-accepted notion is that firm *risk* influences the propensity to diversify (Reeb, Kwok, & Baek, 1998; Tihanyi et al., 2003; Goranova, Alessandri, Brandes, & Dharwadkar, 2007; Figueira-de-Lemos, Johanson, & Vahlne, 2011; Alessandri & Seth, 2014). Thus, in line

with our accounting performance measure and with past literature, we control for *firm risk* via a measure capturing the standard deviation of return on assets (ROA) for the three previous successive years.

Firm leverage was found to influence both types of diversification, but in different directions. *Leverage* was shown to be negatively related to ID and positively related to BD (Burgman, 1996; Chen, Cheng, & Kim, 1997; Singh, Davidson, & Suchard, 2003). It is measured as total debt (long term + short term) divided by equity (Kochhar & Hitt, 1998; Gore, Matsunaga & Yeung, 2011). Firms' international and business diversification levels are also likely to be a function of their existing resources and assets; therefore, we control for *firm asset intensity* as calculated by dividing a firm's total assets by its total sales (Kama & Weiss, 2013).

Following Hutzschenreuter and Grone (2009), we include two industry level controls. The first control is *industry value added*, measured as the ratio of industry value-added to GDP. The ratio is calculated with data from the US Bureau of Economic Analysis (BEA). The second control is *industry productivity*, measured as the ratio of industry value added to industry total employees. The employment statistics were taken from the US Bureau of Labor Statistics (BLS). Finally, we control for industry and time fixed effects. We include 2-digit industry dummies to control for differences stemming from specific characteristics of a firm's industry, which can influence its international and business diversification (Kumar, 2009). To control for any economy and industry wide time-specific effects that might influence diversification strategies (e.g. the 2008-9 recession), we include year dummies in the models.

Econometric strategy

Our theoretical framework implies that international and business diversification changes are theoretically endogenous. This view is consistent with the extant literature on the relationships between these variables (Bowen & Sleuwaegen, 2017; Hashai & Delios, 2012; Kumar, 2009). A different and potentially more serious source of bias occurs when both the independent and dependent variables are

influenced by a third variable. Failure to control for such a common determinant may lead to the estimation of spurious relationships between the focal variables. The firms in the sample are likely to vary systematically in their levels of and changes in both focal variables due to the influence of unobservable, firm-specific characteristics, such as managerial skills, organizational culture, or other unmeasured capabilities. These influences, in turn, might lead to spuriously significant coefficients on our regressions estimates. For example, suppose that there are unobserved, firm-specific capabilities that affect a firm's ability to expand internationally and its ability to diversify its businesses. In that case, the relationships between these dimensions would be inflated, and we would risk estimating a significant effect of ID on BD and vice versa—even if no such causal link exists in reality.

One strategy to deal with endogeneity, is to implement an instrumental variable technique in our models. Yet, the extensive literature on diversification has shown that a variable that affects one diversification path would most likely affect the second path as well (Hitt, Tihanyi, Miller, & Connelly, 2006; Hoskisson & Hitt, 1990; Wiersema & Bowen, 2008), making it a weak instrument (Bascle, 2008). Instead, we use the Arellano and Bond (AB) panel data system generalized method of moments (GMM) (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998), which uses internal instruments generated by first-differencing multiple lags of the regressors, instead of exogenous instruments. [6] This approach allows us to mitigate endogeneity concerns, control for unobserved firm-specific heterogeneity, and implement robust standard errors in the presence of heteroskedasticity and arbitrary patterns of autocorrelation within firms (Greene, 2008; Roodman, 2009). Although our models are not dynamic in nature (i.e., our dependent variable is not a lag-dependent variable), the AB panel data system GMM has

[6] Another advantage of choosing the AB system GMM is that it also allows us to estimate discrete endogenous independent variables, and binary choice models (LPM). As long as there is a temporal variation in discrete endogenous variables, they can be considered in the same manner as continuous variables, and can be treated by first differencing in panel data models as well (Wooldridge, 2009). Thus, no special treatment is needed for estimating an LPM in AB system GMM static panel data model.

been shown to be suitable for static panel models as well (Roodman, 2009). Furthermore, some of our control variables are endogenous as well, including R&D intensity (Salomon & Shaver, 2005; Ito & Lechevalier, 2010), financial performance (Berry & Kaul, 2016), and firm risk (Kwok & Reeb, 2000; Belderbos, Tong & Wu, 2014). The AB system GMM allows us to account simultaneously for several endogenous variables.

As all the dependent variables are functions of ID and BD in a given year, they are affected by the level of factors in the previous year (Wiersema & Bowen, 2008). Therefore, we lag all right hand-side variables in one year (Bernard & Jensen, 1999; Baum, 2006). Lagging all right-hand side variables facilitates generation of causal inferences from the models (Hashai, 2015).

We further ran a Wald test to justify the inclusion of industry dummies. In all models, the null hypothesis was significantly rejected ($p < 0.05$); that is, the inclusion of industry dummies was justified. In addition, we ran a Wald test that checked whether all year dummies are jointly equal to zero. The results indicate that the null hypothesis is rejected, i.e., their inclusion was statistically validated. The incorporation of time dummies in all models further helps remove universal time-related shocks from the error terms and prevents cross-individual correlation, when running an AB panel data system GMM regression (Roodman, 2009). To ensure that the estimation is not biased due to multicollinearity, we ran diagnostic tests after all models that show that the maximum variance inflation factor (VIF) does not exceed the critical value of ten (Kleinbaum, Lawrence, Muller, & Nizam, 1998; Hair, Black, Babin, & Anderson, 2010).

RESULTS

Table 1 provides descriptive statistics and cross-correlations of the study's variables. On average, the firms in our sample are more internationally diversified (mean 0.432) than business diversified (mean 0.096). In

addition, the sample firms tend to expand internationally (mean 0.021), but contract business-wise (mean -0.005). The average ID contraction between the reference year and the following year is -0.091, while the average BD contraction at time t + 1 is -0.100 (not reported in the table). Firm performance (ROA) average is negative (-0.254). This statistic results from the significant portion of public firms actually having losses in the sample period (which includes the 2008-9 recession).

[Insert Table 1 about here]

Table 2 presents the results of our first set of models concerning the effects of the contraction of firms international presence. Model 1 compares firms whose ID contracted between t and t+1 and firms whose ID did not contract, with respect to their change in BD two years later (at t+3). As our main explanatory variable is discrete, the significant coefficient indicates that, other things being equal, firms with a negative change in ID have a greater positive change in their BD level of 0.034 units, than firms whose ID did not contract (thereby supporting hypothesis 1). Apparently, even though the coefficient size seems relatively small, compared to the average of the delta BD in our entire sample (-0.005), this is a substantial difference.

Model 2 examines the influence of delta BD – the dependent variable in model 1, on the probability of seeing a positive increase, in the same path, two years later (at t+5). The significant coefficient of 0.638 indicates that a one unit increase in the delta BD between t and t+3 increases the probability of having an increase in BD at period t + 5 (relative to t) by about 64%, for firms whose ID contracted at t + 1. In addition, model 3 examines the influence of the delta BD on the probability of having a positive increase in the other path (ID) at t+5. The significant coefficient indicates that a one unit increase in the delta BD between t and t+3 increases the probability of an increase in ID at t + 5 by 41%, for firms whose ID contracted at time t + 1. Models 2 and 3 thereby lend support to hypothesis 2. The

three models together pointedly support our theoretical arguments that an initial contraction in ID leads, through a diversification process over several years, to higher levels in both paths.

In general, most of our firm level controls, except firm leverage, are significantly associated with our dependent variables, in models 1-3. The industry level controls, however, are generally insignificant. In addition, model 2 shows that the firm's lagged ID level has a significant negative influence (-0.124) on the probability of increasing BD, supporting the argument of short-term substitution between the two diversification paths.

[Insert Table 2 about here]

Table 3 reports the results of the second set of models concerning the effect of contracting business areas. In model 4, the independent variable is binary, allowing us to examine whether there is a difference between firms whose BD level contracted between t + 1 and t and firms whose BD level did not contract, with regard to the change in ID two years later (at t+3). The results of model 4 show that, other things being equal, firms whose BD contracted between t + 1 and t have a greater positive change (0.07 units) in ID two years later, compared to firms whose BD did not contract. Comparing the independent variable coefficient size to the average change in ID of the entire sample (0.021) demonstrates that the difference between the two groups of firms is meaningful (but relatively smaller than the respective change in BD observed in model 1).

Model 5 tests the influence of delta ID between t and t+3 on the probability of having a higher ID level four years after the first contraction in BD (i.e. at t+5), compared to its level at t. The interpretation of the independent variable's coefficient (0.853) is that a one unit increase in delta ID between t and t+3 enhances the probability of having a higher ID at t+5 by 85.3%. Model 8 examines the influence of the delta ID between t and t+3 on the probability of seeing BD level at t+5. The significant coefficient of the independent variable indicates that a one unit increase in delta ID between t and t+3 increases the

probability of having a higher BD level at t+5 relative to its ID level at t, by 27.7%. Taken together, models 4 to 6 yield solid support for the hypotheses that an initial contraction of BD increases the probability of reaching higher levels in both diversification paths, after several years.

All our firm level controls, except firm asset intensity, are generally significant, but the industry level controls are insignificant across all the models of Table 3. As expected, firm BD level, which is included as a control in model 7 has a significant negative influence on the probability of having a positive change in ID in the following year.

[Insert Table 3 about here]

Overall, the results reported in Tables 2 and 3 provide comprehensive support for the research hypotheses that contracting a given diversification path allows lagged expansion of the other path. Subsequently, the increase in the other path eventually leads to higher levels in both paths, compared to the baseline levels before contraction started. The results of all the tests reported at the bottom of Tables 2 and 3 indicate high level of fit for our models (with Wald chi-squared probabilities < 0.001). We also refute autocorrelation concerns as indicated by the significant AR(1) ($p < 0.05$), but insignificant AR(2), across our models. Further, the null hypothesis of the Hansen test of over-identifying restrictions regarding the exogeneity of the instruments as a group is not rejected, across all models,[7] indicating that our instruments are valid.

Robustness tests

We ran several tests to check the robustness of our results (all are available upon request). In one set of tests, we wanted to check how an expansion of BD (ID) between t and t+3 affects the probabilities of expanding BD and ID in following year (t+4). While we do find that the probabilities of expanding ID and

[7] Since we used robust standard errors, the Sargan statistic in this case is not relevant and the Hansen test is the appropriate one.

BD in t+5 increase (as our main results indicate), we do find that and expansion of BD (ID) between t and t+3 results is positively associated with the probabilities that our sample firms will either maintain their past level of ID or BD or increase it. These results support our argument that the expansion of a diversification path (as a result of contraction of another diversification path) is likely to lead to the emergence of scale free resources, that are not subject to opportunity costs and that will allow firms continued diversification along both paths.

Our results further remain robust when we: (1) replicate all models using return on sales (ROS) to measure firm financial performance and, accordingly, use ROS to measure firm risk by calculating the standard deviation of performance for the three previous years; and (2) replace firm leverage with the ratio of firm debt to total assets, across the models, as a different measure of the firms' capital structure (Lim, Celly, Morse & Rowe, 2013).

DISCUSSION

This study highlights the existence of novel combination between firms' international and business diversification moves – the contraction of a given diversification path in the short term for the sake of expanding both diversification paths in the long term. We argue and show that firms that initially contract a given diversification path, be it international or business diversity can diversify not only diversify the other diversification path, but actually become able to reach higher diversification levels than their original ones on both the international and business domains. We contend that this process does not only allow to transfer non-scale free resources from the contracted path to the other path in the short term as observed by Berry (2010), Kaul (2012), Vidal and Mitchell (2015), and Wu (2013) among others, but importantly allows the generation of new scale free resources that can support renewed diversification in the initially contracted diversification path. Contracting internationally in order to diversify into more

business segments can facilitate the development of new scale free resources such as familiarity with a greater variety of consumer demands, or unique foreign technologies that allows renewed international diversification at some point. Focusing the firm's business scope in order to expand into more countries can facilitate the development of new resources, such as product related technological knowledge, brands or familiarity with the preferences of new customer segments, which ultimately allows renewed business diversification at some point.

The study makes several contributions. First, we offer a novel motivation for the widely observed phenomenon of firm boundary contraction. Several studies have indeed noted that firms contract not only because they fail to generate positive gains in specific countries or business, but also as means to transfer scarce resources to other (more profitable) countries or businesses (Bennet & Feldman, 2017; Berry, 2010; Sakhartov & Folta, 2015; Vidal & Mitchell, 2015). Yet, our model takes this observation one step forward, by showing that contraction can actually lead to expansion in the *originally contracted* path in the long term. This happens when the transfer of non-scale free resources to another path, grants firms with new resources that support further diversification in the originally contracted one.

More generally, this paper makes a contribution to the study of the 'coevolution' of firms' strategic trajectories, which has long been a central theme in strategic management research (Lewin & Volberda, 1999). The application of the logic of "contraction for the sake of expansion" may enhance our understanding of a plethora of strategic trajectories, such as the coevolution of: technological knowledge and product scope (Helfat & Raubitschek, 2000; Kaul, 2012); technological knowledge and internationalization (Golovko & Valentini, 2011) or exploitation and exploration (Levinthal & March, 1993).

The managerial implications of the current study mainly relate to the importance of 'navigating' the firm's expansion towards being more business diversified and internationally diversified. Managers

should therefore orchestrate their resources wisely (Teece, 2007) when shifting between international and business diversification. They should also take into account the mutual interdependence between international and business diversification levels, rather than treat expansion along the two paths as separate. As international and business diversification may likely be managed by different top management team executives (typically the chief marketing officer or the head of an international division in the former and the chief technology officer in the latter), an upper-echelon point of view is important for coordinating diversification decisions along these paths while realizing their mutual interdependence. In particular, realizing that a "tactical" contraction in one path can not only enable expansion in the other path, but can also grant firms with the capability to resume diversification in the originally contracted path, is a key factor for improving top management team decisions about their firms' diversification paths.

Our results must be tempered against the setting used to test our model. This setting mainly refers to large, publicly traded US based firms. Such firms are likely to be, on average, more internationally or business diversified than other firms. To the extent that firms from other countries possess systematically different resources and capabilities to support their international and business diversification moves, the diversification patterns of such firms should be analyzed in order to generalize our theoretical framework and findings. Likewise, the diversification patterns of private US based firms (that are often smaller and younger from the ones analyzed in this study) should be studied in order to establish the external generalizability of our study. Finally, it should be noted that exogenous changes in firms' resources and capabilities as well as changes in the economic wide and business environments may clearly affect the ability of firms to diversify both their international and business domains. Our theoretical framework ignores such exogenous changes (yet, our empirical setting tries to control for them as much as possible). In reality it is clear that any such changes may influence our predictions. In that respect, one interesting

future research avenue stemming from the current study is to systematically model and estimate the effects of specific exogenous changes on firms' international and business diversification moves.

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Figure 1 – The consequences of contracting a given diversification path

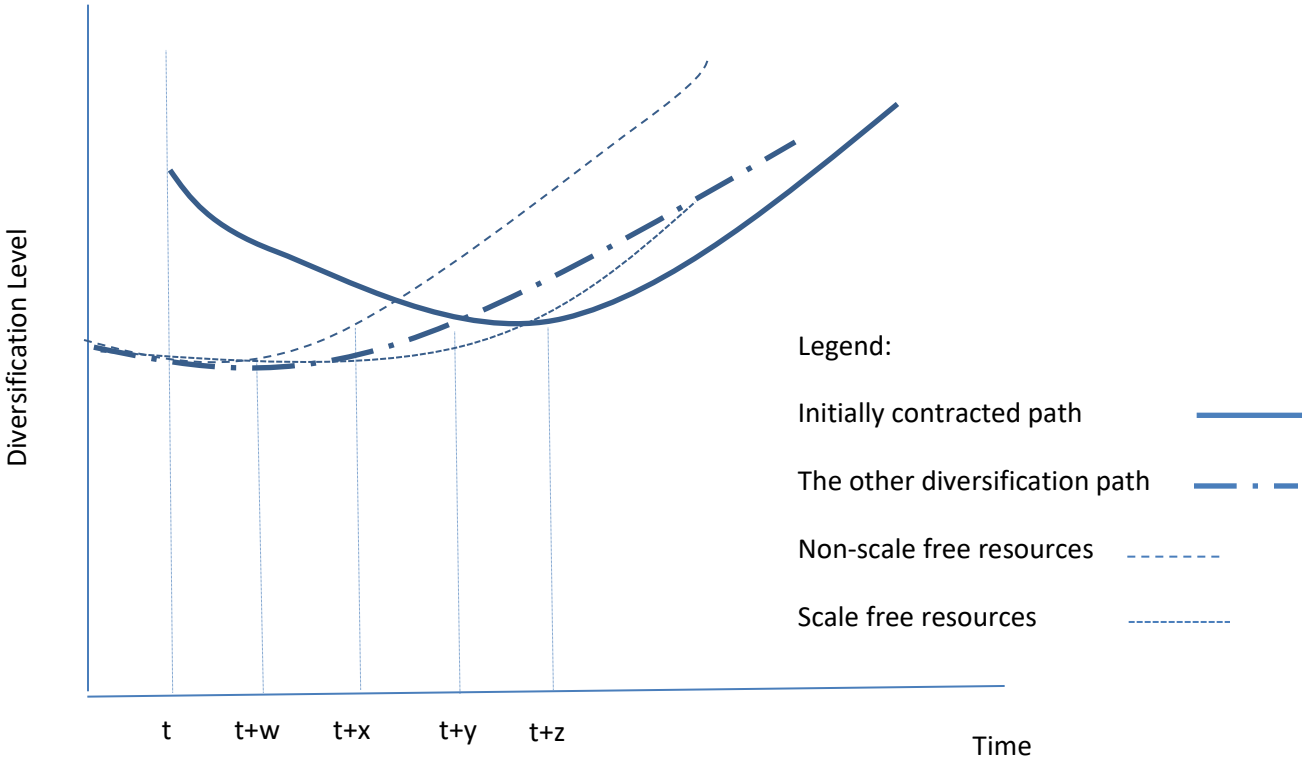

Figure 2 – Schematic map of estimation approach

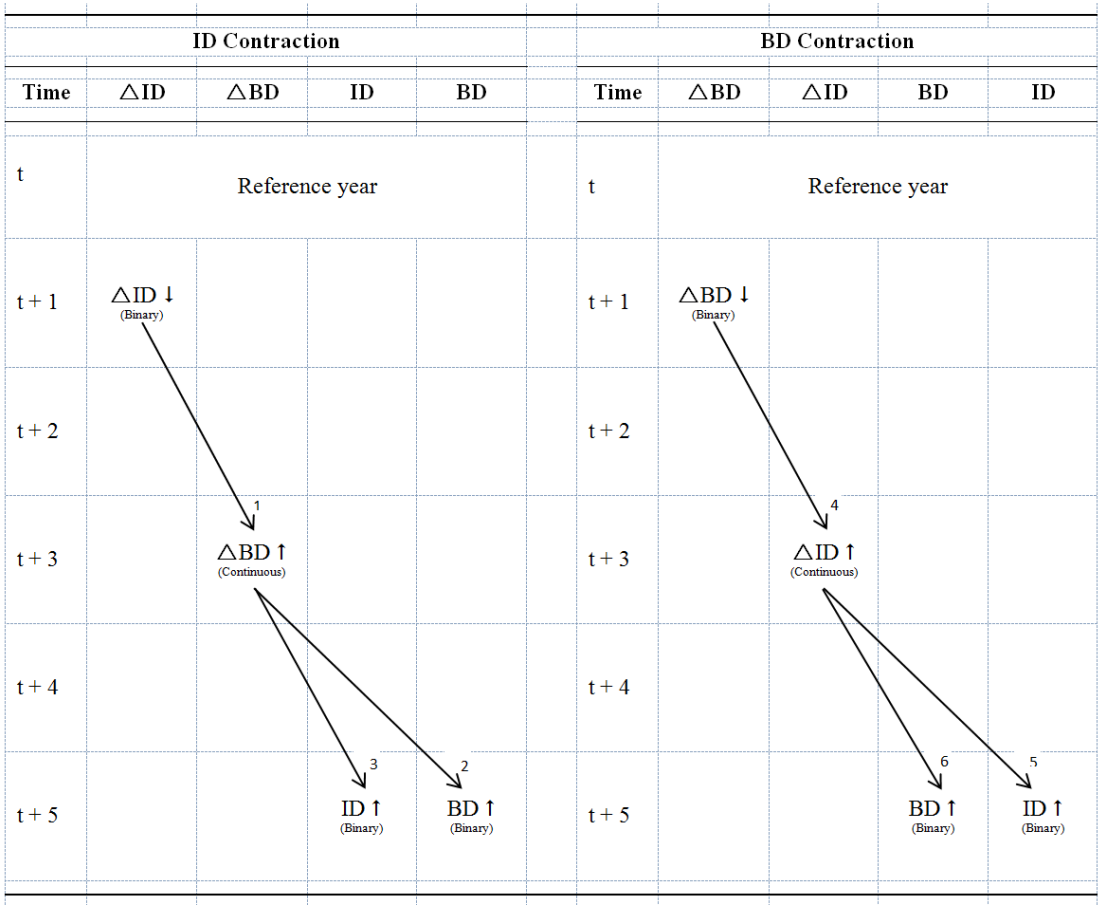

Table 1 – Descriptive statistics and correlation table

#	Variables	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12
1	Change in ID	0.021	0.152	-0.551	0.688	1											
2	Change in BD	-0.005	0.089	-0.498	0.412	0.060	1										
3	Firm Age	14.107	10.608	3	48	-0.008	-0.017	1									
4	Firm Size	4.834	2.333	-0.467	10.523	0.080	0.041	0.214	1								
5	Firm R&D	0.515	1.880	0.000	14.879	-0.037	0.003	-0.115	-0.053	1							
6	Firm Performance	-0.254	0.843	-5.991	2.207	0.028	0.011	0.152	0.354	-0.298	1						
7	Firm Risk	0.245	0.539	0.003	3.746	-0.046	-0.010	-0.144	-0.308	0.223	-0.518	1					
8	Firm Leverage	0.264	0.541	0.000	4.004	-0.028	-0.018	-0.020	-0.235	0.095	-0.507	0.389	1				
9	Firm Asset Intensity	0.560	0.420	0.103	2.431	-0.042	-0.002	0.143	-0.214	-0.054	-0.184	0.044	0.264	1			
10	Firm BD	0.096	0.242	0.000	1.076	0.021	0.147	0.412	0.214	-0.098	0.103	-0.107	-0.018	0.059	1		
11	Firm ID	0.432	0.494	0.000	1.769	0.262	0.020	0.213	0.361	-0.139	0.154	-0.169	-0.098	-0.098	0.179	1	
12	Industry Value Added	1.456	0.729	0.250	3.982	-0.034	0.001	-0.154	-0.065	0.109	-0.040	0.053	0.021	-0.061	-0.092	-0.179	1
13	Industry Productivity	832.508	1046.482	44.568	6418.153	0.001	-0.008	-0.009	0.013	0.065	0.004	0.002	0.013	-0.048	-0.014	-0.046	0.360

Table 2 – Regression analysis of the effect of contracting international presence

Variables	Model 1 DV= ΔBD $_{(t\ to\ t+3)}$	Model 2 DV= ΔBD $_{(t+5\ to\ t)}$>0	Model 3 DV= ΔID $_{(t+5\ to\ t)}$>0
Independent Variable			
ΔID $_{(t\ to\ t+1)}$<0	0.034		
	(0.016)		
	[0.031]		
ΔBD $_{(t\ to\ t+3)}$		0.638	
		(0.128)	
		[0.000]	
ΔBD $_{(t\ to\ t+3)}$			0.410
			(0.175)
			[0.019]
Firm Level Controls			
Firm Age	-0.000	0.012	0.010
	(0.003)	(0.004)	(0.005)
	[0.952]	[0.001]	[0.049]
Firm Size	0.006	0.023	0.054
	(0.005)	(0.011)	(0.028)
	[0.220]	[0.044]	[0.057]
Firm R&D	0.000	0.002	0.006
	(0.000)	(0.002)	(0.007)
	[0.797]	[0.039]	[0.398]
Firm Performance	0.000	0.031	0.081
	(0.001)	(0.014)	(0.036)
	[0.644]	[0.031]	[0.026]
Firm Risk	-0.001	0.012	-0.207
	(0.001)	(0.043)	(0.104)
	[0.039]	[0.777]	[0.047]
Firm Leverage	-0.002	-0.022	0.012
	(0.002)	(0.024)	(0.114)
	[0.415]	[0.368]	[0.913]
Firm Asset Intensity	0.044	0.047	0.161
	(0.022)	(0.044)	(0.060)
	[0.045]	[0.279]	[0.008]
Firm ID		-0.124	
		(0.042)	
		[0.003]	
Industry Level Controls			
Industry Value Added	-0.016	0.069	0.028
	(0.023)	(0.040)	(0.094)
	[0.491]	[0.087]	[0.764]
Industry Productivity	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)

	[0.897]	[0.006]	[0.090]
Constant	0.843	-0.340	0.056
	(4.124)	(0.170)	(0.320)
	[0.838]	[0.045]	[0.862]
Year Dummies	Included	Included	Included
Industry Dummies	Included	Included	Included
Observations	6,389	834	841
Number of Firms	1,584	425	429
Chi-squared	96.53	132.09	1214.60
	[0.000]	[0.000]	[0.000]
AR(1)	2.79	-2.48	-2.97
	[0.005]	[0.013]	[0.003]
AR(2)	1.48	-1.17	-0.22
	[0.139]	[0.241]	[0.828]
Hansen Test	194.43	352.89	237.99
	[0.948]	[0.195]	[0.488]

Robust standard errors in parentheses; P values in square brackets.

Table 3 – Regression analysis of the effect of contracting business areas

Variables	Model 4 DV= ΔID $_{(t \text{ to } t+3)}$	Model 5 DV= ΔID $_{(t+5 \text{ to } t)}$>0	Model 6 DV= ΔBD $_{(t+5 \text{ to } t)}$>0
Independent Variable			
ΔBD $_{(t \text{ to } t+1)}$<0	0.070		
	(0.032)		
	[0.028]		
ΔID $_{(t \text{ to } t+3)}$		0.853	
		(0.192)	
		[0.000]	
ΔID $_{(t \text{ to } t+3)}$			0.277
			(0.133)
			[0.038]
Firm Level Controls			
Firm Age	-0.001	0.019	0.007
	(0.000)	(0.022)	(0.006)
	[0.020]	[0.372]	[0.236]
Firm Size	0.012	-0.058	-0.001
	(0.006)	(0.029)	(0.018)
	[0.038]	[0.045]	[0.955]
Firm R&D	-0.000	0.365	-0.098
	(0.000)	(0.181)	(0.166)
	[0.662]	[0.044]	[0.555]
Firm Performance	0.003	0.007	0.062
	(0.002)	(0.019)	(0.026)
	[0.041]	[0.714]	[0.021]
Firm Risk	0.002	-0.019	0.113
	(0.001)	(0.014)	(0.066)
	[0.035]	[0.188]	[0.089]
Firm Leverage	0.009	-0.031	-0.045
	(0.004)	(0.015)	(0.038)
	[0.041]	[0.041]	[0.237]
Firm Asset Intensity	0.000	-0.004	0.037
	(0.011)	(0.007)	(0.022)
	[0.985]	[0.561]	[0.099]
Firm Business Diversification		-0.379	
		(0.191)	
		[0.047]	
Industry Level Controls			
Industry Value Added	-0.011	0.117	-0.071
	(0.030)	(0.122)	(0.082)
	[0.705]	[0.340]	[0.385]
Industry Productivity	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)

	[0.610]	[0.472]	[0.742]
Constant	-0.092	-2.675	0.218
	(0.044)	(2.008)	(0.239)
	[0.038]	[0.183]	[0.363]
Year Dummies	Included	Included	Included
Industry Dummies	Included	Included	Included
Observations	6,679	902	907
Number of Firms	1,570	416	424
Chi-squared	1571.23	166.99	181.07
	[0.000]	[0.000]	[0.000]
AR(1)	9.26	-1.99	-5.17
	[0.000]	[0.047]	[0.000]
AR(2)	-1.52	-1.53	-1.64
	[0.130]	[0.127]	[0.101]
Hansen Test	360.65	304.56	328.30
	[0.598]	[0.267]	[0.813]

Robust standard errors in parentheses; P values in square brackets.