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Diversification: A Value-Creating or Value-Destroying Strategy? Evidence From The Eurozone Countries

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Abstract

In this paper, we provide evidence on how diversification strategy impacts on excess value in a sample of Eurozone firms by using the data panel methodology. Specifically, we study the effect of the levels and types of the product diversification on the premium or discount that diversified firms trade at. Preliminary results are consistent with the value-destroying expectations and show that diversified companies trade at a discount in the Eurozone countries. However, a more accurate analysis reveals that the relation between diversification and excess value is non-linear; that is, diversification strategy first creates value and then, after a certain breakpoint, destroys it, giving rise to an optimal level of diversification, pointing out to both benefits and costs of this strategy. Moreover, our results show that related diversification is more value-creating than non-related diversification, and that non-related diversification is likely to turn into a value-destroying strategy at lower levels than related diversification.

Keywords: Eurozone, Excess Value, Product Diversification, Relatedness.
JEL Codes: G32; G34.

1 Introduction

To increase firm expansion and to create new options of value, some governments urge the development of product diversification strategies since this activity provides companies with the agility to make incursions into diverse markets where they will have a sustainable competitive advantage. Firms having operations in the Eurozone must take advantage of this environment since the world economy views it as a potential block of resources due to the agility in spreading operations in product segments across industries. Moreover, relatedness is essential to understanding the reasons and consequences of a diversification strategy because, as Sull (2010) suggests, companies have to do what they know will be successful rather than experimenting in new lines of business different from their core operations. Accordingly, in this paper we offer further elements to consider in a firm's decision to diversify

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in product segments from a consistent methodology perspective in the Eurozone context. These recent ideas highlight the important role played by the diversification strategy in firm evaluation literature, but there is still disagreement as to whether or not it helps firms to leverage resources and improve their performance, and whether or not the strategy creates a long-term competitive advantage (Markides and Williamson, 1994). A debate is currently taking place in management literature regarding the role played by corporate diversification as a value maximizing strategy for shareholders. The premise of this strategy is simple; a firm diversifies when the benefits exceed the costs, and remains focused when the opposite occurs (Campa and Kedia, 2002). This strategy plays an important role in economic activity. On the one hand, some theoretical arguments point to diversification as a value-increasing strategy for a firm. For instance, Fluck and Lynch (1999) argue that diversification permits the financing of marginally profitable projects that can not be financed as stand-alone units. Matsusaka (2001) reports that a firm electing to become involved in diversified activities is in line with organizational efficiencies. Conversely, there is evidence pointing out that diversified firms trade at a discount in relation to the portfolio of non-diversified firms, which has led researchers to believe that diversification destroys value (Lang and Stulz, 1994; Berger and Ofek, 1995; Rajan *et al.*, 2000; Whited, 2001; Lamont and Polk, 2001; Wan and Hoskisson, 2003). Furthermore, recent research into the effects of different levels of diversification on firm value has shown a curvilinear relation. This model posits that some diversification is better than none (Palich *et al.*, 2000), but that high levels might be value destroying.

The economic literature has also focused on the impact of different levels and types of diversification on firm value. To examine this impact, it is fundamental to distinguish between related and unrelated diversification. Firms that follow related diversification try to exploit economies of scope through the sharing of physical and human resources across similar lines of business segments. In contrast, unrelated diversification pursues the search for and achievement of economic advantages by being able to distribute capital and other financial resources more efficiently in an internal market (Helfat and Eisenhard, 2004). As a result, the evidence regarding which type of diversification is better is not unanimous, although diversification into related businesses is frequently argued to provide better value and thus should be preferred by the firm, at least in the first stage (Bettis, 1981; Markides and Williamson, 1994).

Previous findings are not conclusive, and open the door to further investigation of diversification strategies (Alessandri and Seth, 2014). In this setting, the goal of this paper is to learn how diversification activity impacts on firm valuation, and how this impact is moderated by relatedness in the Eurozone countries. Our interest in studying this setting stems from the fact that prior literature on diversification is mainly based on the United States (see, for instance, Nayyar, 1992; Rajan *et al.*, 2000; Bowen and Wiersema, 2008), and also on Asia (e.g. Chakrabarti *et al.*, 2007). Despite the vast research on the topic, we provide new evidence on diversification in the Eurozone, which, as far as we know, has not been previously documented. To achieve this goal, we estimate an excess value model by using the Generalized Method of Moments in our sample of companies.

Overall, this study contributes to the existing literature in five significant ways. First, we integrate into our value analysis the levels and types of product diversification strategy with their respective benefits and costs. Second, we offer confirmation of the impact of diversification strategy on a firm's value by regressing excess value over two different diversification measures (Total Entropy and Revenue-based Herfindahl Index) and a set of control variables that have traditionally been considered as value determinants (i.e., investment level, debt ratio, profitability, intangible assets and firm size). Third, we take into account the possible non-linear relation between the diversification strategy and the value of the firm. Our findings show that there is an optimal level of diversification; that is, a diversification strategy first creates value and then, after a certain breakpoint, destroys it. Fourth, to investigate how relatedness moderates the impact of diversification on a firm's value, we have interacted diversification with a dummy variable that captures the relatedness nature of the diversification. Regarding the type of diversification, our main results show that related diversification is more value-creating than non-related diversification is, and that non-related diversification is more likely to turn into a value-destroying strategy at lower levels than related diversification. Finally, compared with related studies on diversification, our dataset is interesting in itself and we use the Eurozone to offer evidence in an institutional setting outside the US and the UK where most of the previous research is based. Additionally, since the methodology used in the diversification literature has been previously questioned, we offer consistent results by using the panel data methodology over ten firm-years observations, as well as by running regressions on the two most consistent ways of measuring product diversification.

2 Theory, Hypotheses and Empirical Models

2.1 Corporate Diversification and Firm Value

There are many and somewhat contradictory theoretical arguments in the literature to explain the relation between diversification strategy and firm performance (Benito *et al.*, 2012), which suggests that diversification might have both value-enhancing and value-reducing effects. The key question is whether the act of corporate diversification destroys value or creates value.

In the past, industrial organization economics employed years of research that relied on the conjecture that diversification and performance are linearly and positively related (see, for instance, Gort, 1962). This assumption mainly derives from market power theory and internal market efficiency arguments (Scherer, 1980; Grant, 1998). In the beginning, diversification literature was based on the premise that diversified firms are able to make better use of market power advantages than non-diversified firms. This is due to the benefits that diversification conveys and the ability to increment market power easily (Scherer, 1980). Additionally, owing to internal market efficiencies, diversified firms can benefit from the advantage of easier access to external funding to finance growth, and they can transfer capital across businesses within their related segments of operation (Meyer *et al.*, 1992). As a result, diversification is a source of efficiency that is difficult to achieve by non-diversified firms (Scharfstein and Stein, 2000). Overall, these arguments indicate that diversification is positively associated with performance.

In fact, as proposed by Chandler (1977), gains from this strategy can come from managerial economies of scope, and favours the conditions for optimal firm expansion. Moreover, the increment of market power is determined by predatory pricing, future increased prices, and cross-subsidization, whereby companies use the benefits from one product to alleviate the suffering of damaged lines of production (Tirole, 1995). Some arguments posit that a positive effect of diversification is the reduction of the firm's risk by involving more businesses in its portfolio (Sobel, 1984; Grant, 1998). This risk reduction is also helpful for debt capacity and the cost of capital (Lewellen, 1971). For instance, Hann *et al.* (2013) find lower cost of capital for multisegment firms as compared to non-diversified firms.

Also, diversified firms enjoy better capital formation, because they can easily obtain external-type resources from internally generated assets in their business units. Then, the diversification itself creates internal capital markets that permit more efficient allocation of resources across businesses, and diversified firms gain considerable financial interests from the use of this internal market of resources (Rumelt, 1982). Moreover, in terms of the managerial use of resources, Weston (1970) and Williamson (1975) argue that managers have monitoring and information advantages over external capital markets. So, a diversified firm can exploit the advantages of both internal and external capital markets. Hence, they can generate efficiencies that are unavailable to the non-diversified firm. For instance, Campa and Kedia (2002) and Villalonga (2004) show that there is a small diversification premium after controlling for a firm's propensity to diversify. Theoretically, Maksimovic and Phillips (2002) show that diversification can be a value-creating strategy even if overall diversified firms have a lower value than non-diversified firms. More specifically, they show that conglomerates are more valued than small, specialized firms but when those firms are compared with their relatively large, specialized firms, a discount emerges. In short, all the above-mentioned arguments support diversification as a value-creating strategy.

Many arguments have led scholars to assume that diversification destroys value showing evidence that indicates that diversified firms trade at a discount relative to a portfolio of non-diversified firms (Berger and Ofek, 1995; Lamont, 1997; Shin and Stulz, 1998; Rajan *et al.*, 2000). A frequent and well-accepted argument is used in agency theory, which points out that managers can pursue their own interests at the expense of shareholders by means of the diversification strategy (Jensen, 1986). In this respect, diversification allows managers to reduce their personal risk (Amihud and Lev, 1981), as well as to increase their compensation, power, and prestige (Jensen and Murphy, 1990). Moreover, managers of divisions that have a future perspective of the firm are encouraged to persuade the top management of the firm to allocate resources in their direction (Meyer *et al.*, 1992). Jensen (1986) argues that managers of a diversified firm can be prone to investing free cash flow to support organizational inefficiencies; in other words, they are encouraged to allow the gains from profitable segments to compensate for the losses of non-profitable ones. Control and effort losses (increment of shirking) are common costs attributable to diversification; because the more complex the diversified operation becomes, the more difficult it is to manage the organization of all the resources, and consequently, the difference in philosophies between businesses appear more attenuated (Markides, 1992). The decision to incorporate efficient compensation for diversified firms' managers produces problems that are translated into costs for these firms in the form of incentives (Rotemberg and Saloner, 1994). As top management is further removed from segment managers, depending on the organizational scheme, asymmetries of information start to emerge, which to some extent result in additional operating costs in different segments (Harris *et al.*, 1982). Also, although diversification translates into lower financial risk, it can increase business risk given the different nature and characteristics of the businesses to be managed.

Transaction cost arguments have also received attention in the diversification literature (Williamson, 1975, 1985). Economies of scope can be exploited with the resources internally generated by managing the different business units in all the locations. However, at some point the costs of coordinating all the segments outweigh the benefits originated by sharing capabilities. Then transaction costs produce a downward momentum in the returns of the company. Using the transaction cost theory to explain the relation between diversification and firm value leads us to expect that management and administration costs rise as the firm becomes more «distant» from its core business segment because the more distant the operational markets, the more dissimilar the firm's functions (Hitt *et al.*, 1997). Additionally, diversified firms can create the operational structures, capabilities, and abilities in their operations to diminish the transaction costs by using the knowledge and experience they obtain from administrating product diversification (Hitt *et al.*, 1997, Benito *et al.*, 2012).

What is unquestionable is that managers of a diversified firm enjoy greater opportunities to undertake projects and have greater resources whenever diversification relaxes the constraints imposed by imperfect external capital markets. Also, during the course of overinvestment in low performing businesses, diversified firms create inefficient internal capital markets due to internal power efforts that generate influence costs (Stulz, 1990; Meyer *et al.*, 1992; Rajan *et al.*, 2000). Specifically, Berger and Ofek (1995) and Shin and Stulz (1998) provide empirical evidence showing that diversified firms invest inefficiently, and consequently, trade at a discount in relation to similarly constructed portfolios of non-diversified firms. In particular, Berger and Ofek (1995) explain value destruction by means of overinvestment and cross-subsidization of diversified firms. Shin and Stulz (1998) find that divisional resources do not appear to be directed to segments with the most favourable investment opportunities. These studies provide empirical evidence on the value-destroying effect of corporate diversification, and consequently, on the existence of a diversification discount.

Taking all of this into account, we propose an analysis of the effect of diversification on market valuation, by focusing on the premium or discount that diversified firms trade at. Consequently, we pose the following hypothesis as two alternatives:

Hypothesis 1a. Consistent with the diversification premium, diversified firms are more valuable than non-diversified firms are.

Hypothesis 1b. Consistent with the diversification discount, diversified firms are less valuable than non-diversified firms are.

To test this hypothesis, we propose the following basic model:

$$EV_{it} = \alpha_0 + \alpha_1 DIVER_{it} + \alpha_2 INV_{it} + \alpha_3 D_{it} + \alpha_4 IA_{it} + \alpha_5 CF_{it} + \alpha_6 SI_{it} + \varepsilon_{it} \quad (1)$$

where EV_{it}, $DIVER_{it}$, INV_{it}, D_{it}, IA_{it}, CF_{it}, and SI_{it} denote excess value, diversification, investment, debt, intangible assets, cash flow, and size, respectively[1]. The dependent variable (EV_{it}) is intended to capture the comparison between the market value of diversified firm, i , and the market value of a portfolio of focused firms operating in a similar industry. We follow Berger and Ofek (1995) in computing the excess value as the logarithm of the market to imputed value ratio, in which imputed value is calculated as follows[2]:

$$IV = \sum_{i=1}^{n} SS_i \times \left[IND_i \left(V / SS \right)_{med} \right]$$

where SS_i are the sales for segment, i, V is the actual firm value, and $IND_i(V/SS)_{med}$ is the multiple of the firm value sales for the median firm in the diversified firm, i's industry, and n is the total number of segments in the firm.

According to the construction of the dependent variable (EV_{it}), a positive coefficient of the diversification variable ($DIVER_{it}$) will support Hypothesis 1a. Similarly, Hypothesis 1b will hold under a negative coefficient of the diversification variable.

We propose two alternative measures of diversification ($DIVER_{it}$) that have been traditionally used in closely related research. The first one is a measure of Total Entropy[3], calculated following Gomez-Mejia *et al.* (2010) and Kistruck *et al.* (2013) as $TE = \sum_{i=1}^{N} S_i \ln(1/S_i)$. The second one is a modified version of Revenue-based Herfindahl Index[4], calculated as $RH = 1 - \sum_{i=1}^{N} (Si)^2 \Big/ \left[\sum_{i=1}^{N} (Si) \right]^2$.

The investment variable (INV_{it}) is computed as the net fixed assets plus the book depreciation expense over the replacement value of total assets (see details in Pindado *et al.*, 2011). The debt ratio (D_{it}) is defined as the market value of long-term debt to the market value of equity plus the market value of long-term debt plus the book value of short-term debt (see details in Pindado *et al.*, 2011). The intangible asset's variable (IA_{it}) is computed as the firm's intangible assets scaled by the replacement value of the firm's total assets. The cash flow variable (CF_{it}) is measured as earnings before interest and taxes plus the book depreciation expense plus provisions, scaled by the replacement value of total assets. Size (SI_{it}) is measured as the logarithm of the replacement value of total assets.

The basic model in (1) controls for other firm characteristics besides diversification that have been considered as determinants of excess value in the literature[5]. We now briefly explain the expected relation between these variables and excess value.

The investment level is supposed to be higher for the segments of diversified companies because diversification can create internal capital markets, which can increase investment

[1] The subscript i refers to the company and t refers to the time period. ε_{it} is the random disturbance.
[2] See Berger and Ofek (1995) for more details in the construction of this variable.
[3] S_i is the share of a firm's total sales in a 4 digit SIC industry, i and N is the number of 4-digit SIC industries in which the firm operates. Total Entropy equals zero for a single business firm and it rises with the extent of diversity (see Jacquemine and Berry, 1979; Palepu, 1985 for more details).
[4] The Revenue-based in the Herfindahl Index (RH), is calculated across n business segments as the sum of the squares of each segment i's sales, (S_i), as a proportion of total sales. Thus, the closer RH is to zero, the more the firm's sales are concentrated within a few of its segments (see Berger and Ofek, 1995 for more details).
[5] As usual in the diversification literature, we use the same set of variables as Campa and Kedia (2002) to control for other firms' characteristics that help us understand the performance of multi-segment corporations.

efficiency (Stein, 1997). This argument would be supported by a positive effect of investment on the excess value of diversified firms. On the contrary, agency costs can be a source of potential investment distortions in a diversified firm. In a diversified firm, top management enjoys greater opportunities to undertake projects, and more resources to do so if diversification relaxes constraints imposed by imperfect external capital markets such that overinvestment can arise (Stulz, 1990; Matsusaka and Nanda, 2002). This argument will hold if a negative effect of investment on excess value is found.

Prior research suggests that firm diversification can be financed through increased leverage (Kochhar and Hitt, 1998). Thus, we include the debt variable in the excess value model because one of the benefits that diversified firms enjoy is greater debt capacity due to the coinsurance effect (Duchin, 2010). Weston (1970) and Chandler (1977) suggest that diversified firms have the ability to leverage economies of scope because they provide more efficient operations and lines of business than non-diversified firms do. These arguments and prior empirical results lead us to expect a positive effect of leverage on the excess value of diversified firms.

Previous studies reveal a positive relation between intangible assets on various measures of firm value (Lev and Sougiannis, 1996; Chan *et al.*, 2001). This argument is consistent with the idea that the market positively assesses a firm's intangible assets. Therefore, a positive effect of the variable of intangible assets on excess value is expected.

Servaes (1996) uses a firm's profitability as a factor in explaining value-destruction in diversified firms. He argues that firms with low profitability are likely to trade at a discount compared to firms with higher levels of profitability. This result leads us to expect a positive effect of cash flow on a firm's excess value.

Additionally, a positive coefficient for size will support well-know arguments pointing to it as a value-creating factor via, for instance, scale economies and market power, or because big companies are more prone to diversification.

2.2 The Inverted *U*-Model of Diversification

The concept of an optimal level of diversification emerges from the existence of both costs and benefits in diversification. In fact, transaction cost theory on diversification suggests that firms must commit to bureaucratic costs to obtain economic attributions for an increase in product segments (or expand its internalization); then, an optimal level of diversification emerges to balance these activities (Jones and Hill, 1988).

Due to the existence of an optimal level of diversification, Markides (1992) argues that the more a firm diversifies, it moves away from its principal business, and the benefits of being diversified at the margin decreases. As a result, Markides infers that, beyond a certain point the marginal benefits from diversification are best explained as a decreasing function (Nachum, 2004). Supporting this argument, Grant *et al.* (1988) show that profitability increases with product diversity up to a certain point, and then it begins to decrease. Similarly, the «Intermediate Model» proposed by Palich *et al.* (2000) suggests that diversification has positive revenues, but the returns fall once the optimal level is reached. As the markets turn out to be more distant from the firm's core competency,

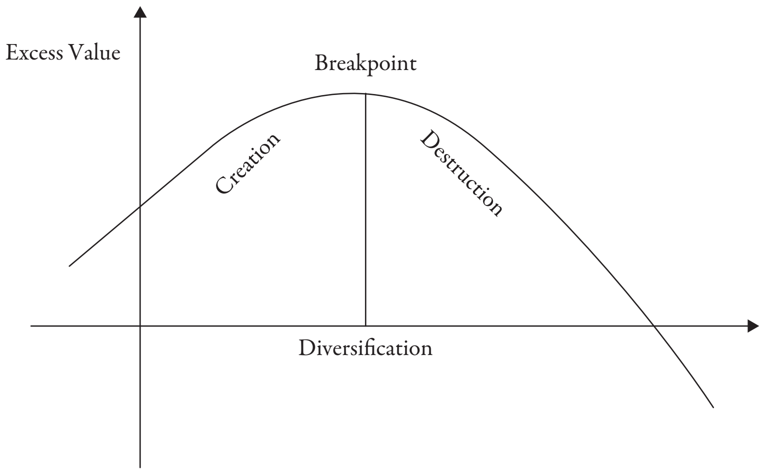

Figure 1: Relation between Diversification and Firm Valuation.

the firm slowly losses its ability to leverage, and, consequently, its competitive advantage. Therefore, the benefits of the coinsurance effect begin to reduce.

According to these arguments about the existence of an optimal level of diversification, our second hypothesis predicts an inverted *U*-model to describe the relation between diversification and firm valuation (see Figure 1):

Hypothesis 2. Diversification strategy first creates value and then, after a certain breakpoint, destroys value.

To test this hypothesis regarding the quadratic relation between the diversification level and excess value, we extend the basic model in (1) by adding the square of the diversification measure:

$$(2) \quad EV_{it} = \alpha_0 + \alpha_1 DIVER_{it} + \alpha_2 DIVER^2_{it} + \alpha_3 INV_{it} + \alpha_4 D_{it} + \alpha_5 IA_{it} + \alpha_6 CF_{it} + \alpha_7 SI_{it} + \varepsilon_{it}$$

2.3 The Effect of Relatedness on Firm Value

Panzar and Willing (1981) suggest that when the costs of producing separate outputs exceed the costs of joint production, firms can achieve economies of scope. In contrast, expansion into a new business, which is non-related with its core business, could be inefficient if the skills and resources used by the firm are useless to leverage their existing capabilities (Rumelt, 1974).

So, how might relatedness mitigate the value loss from diversification? Related diversifiers are one of several advantages accounting for economies of scope (Seth, 1990), because the more related the segment's business are, the more approachable the common resources to be exploited are. Nayyar (1992) argues that firms that diversify and are able to do it in a related industry activity enjoy greater success when their common resources are approachable and the firm uses the benefits that being related conveys. For instance, Markides and Williamson (1994) analyze labour across business units and obtain evidence of efficiency as an asset amortization in that the firm is able to use economies of scope across business segments that can bring into play the same asset. Moreover, Barney

(1997) emphasizes the potential gains of relatedness due to learning curves, easy process transmission via internal segments, and the facility to produce and distribute resources within the diversified firm. Additionally, relatedness reduces business risk in that businesses in the portfolio are of a similar nature and share common characteristics, which makes them easier to be managed. Lubatkin and O'Neill (1987) posit that related business acquisitions reduce systematic risk despite the market activity conditions.

Business segments characterize unrelated strategies when they diversify where no common resources (physical or knowledge) are combined and the advantages are solely financial (Rumelt, 1974). These financial economic gains arise when the firm's investments produce cost reductions through the improved allocation of financial resources by taking advantage of the internal capital markets and the restructuring of their firm-specific assets. In fact, even in the absence of operational synergies, diversified firms can enjoy other benefits, such as tax shields, because interest expenses are tax deductible (Amit and Livnat, 1988). Based upon a «resource-based» perspective, Ng (2007) proposes that unrelated diversification benefits from the «arbitrage opportunities» of incomplete markets as well as from the «expansion options» that enable the firm to compete for future first mover advantages in multiple product markets. On the other hand, unrelatedness might reduce value in many ways. It might be that managers have limited expertise and can not effectively manage diverse businesses, or that unrelated segments have conflicting operational styles or corporate cultures. These explanations indicate that unrelated diversity is negatively correlated with value.

Although there are some studies that find no relation between the diversification strategy and firm performance after controlling for relatedness (Hill, 1983; Montgomery, 1985; Grant *et al.*, 1988; Hill *et al.*, 1992), the evidence from a substantial body of empirical research finds that the related strategy is the most efficient because it mitigates the value loss from diversification (see, for instance, Rumelt, 1974, 1982; Bettis, 1981; Lubatkin and O'Neill, 1987; Seth, 1990; Nayyar, 1992; Markides and Williamson, 1994; Barney, 1997; Miller, 2006). In fact, synergies can potentially arise when a firm shares input factors of production across multiple products or lines of business, giving rise to the hypothesis that product related diversification generates greater economic value than a single-business focus and unrelated diversification (Rumelt, 1974, 1982; Bettis, 1981).

These arguments and findings lead us to study the role played by relatedness in the premium or discount that diversified firms trade at. In effect, if diversification is a value-creating strategy and, consequently, diversified firms trade at a premium, then the choice of relatedness will translate into a higher market valuation; that is, into a higher excess value. Note that this type of result supports Hypothesis 1a. In contrast, according to Hypothesis 1b, diversification will destroy value and diversified firms will trade at a discount. Within this context, relatedness would mitigate value destruction and the diversification discount would be lower. This all leads us to expect that the non-linearities in the relation between the level of diversification and value (stated by Hypothesis 2) show differences depending on the type of diversification (see Figure 2).

Relying on these expectations, we pose our last hypothesis about the moderating role of relatedness on the relation between diversification and excess value:

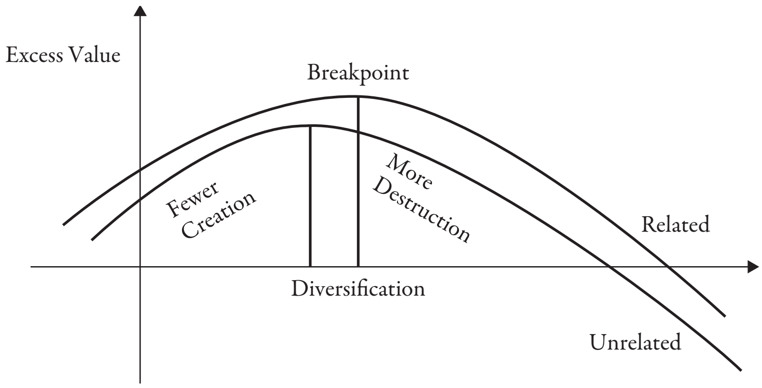

Figure 2: Relation between Diversification and Firm Valuation Depending on the Type of Diversification.

Hypothesis 3. Related diversification affects excess value more positively (or less negatively) than unrelated diversification does.

To test Hypothesis 3 and to capture the effect of relatedness on firm excess value, we extend the model in (2) by interacting diversification measures with a dummy variable that allows us to control for related and unrelated diversification. The resultant model is as follows:

$$EV_{it} = \alpha_0 + (\alpha_1 + \theta_1 UD_{it}) DIVER_{it} + (\alpha_2 + \theta_2 UD_{it}) DIVER^2_{it} + \\ + \alpha_3 INV_{it} + \alpha_4 D_{it} + \alpha_5 IA_{it} + \alpha_6 CF_{it} + \alpha_7 SI_{it} + \varepsilon_{it} \quad (3)$$

where UD_{it} is a dummy variable that takes the value of one for unrelated diversification, and zero for related diversification. Relatedness is defined on the basis that industries, *i* and *j,* are classified into the same two-digit SIC code (Wan and Hoskisson, 2003). This way, the coefficient of the diversification variable ($DIVER_{it}$) is α_1 under relatedness, because UD_{it} takes the value of zero, and it is $\alpha_1 + \theta_1$ under unrelatedness, because UD_{it} takes the value of one. Similarly, the coefficient of the square of the diversification variable ($DIVER^2_{it}$) is α_2 under relatedness, and it is $\alpha_2 + \theta_2$ under unrelatedness. In these cases, whenever the dummy variable takes the value of one, the statistical significance of the coefficient must be checked by performing a linear restriction test.

3 Data and Estimation Method

3.1 Data

To test the posed hypotheses, we use data from Eurozone countries[6]. Therefore, we have used the international database, Worldscope, as our source of information. Moreover, some additional data, such as the growth of capital goods prices, the rate of interest of short-term debt, and the rate of interest of long-term debt were extracted from the Main Economic Indicators published by the Organization for Economic Cooperation and Development (OECD).

[6] The Eurozone sample performed until 2003 comprises twelve countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal and Spain.

Table 1: Structure of the Sample by Countries

Country	Number of companies	Percentage of companies	Number of observations	Percentage of observations
Germany	185	30.38	1,538	30.74
France	166	27.26	1,325	26.48
Italy	54	8.87	467	9.33
Spain	44	7.22	359	7,17
Belgium	32	5.25	295	5.90
Finland	31	5.09	260	5.20
Ireland	26	4.27	228	4.56
Austria	27	4.43	222	4.44
Portugal	22	3.61	160	3.20
Greece	22	3.61	150	3.00
Total	609	100.00	5,004	100.00

Data of companies for which the information is available for at least six consecutive years between 1990 and 2003. After removing the first-year data only used to construct several variables, the resultant samples comprise 185 companies (1,538 observations) for Germany, 166 companies (1,325 observations) for France, 54 companies (467 observations) for Italy, 44 companies (359 observations) for Spain, 32 companies (295 observations) for Belgium, 31 companies (260 observations) for Finland, 26 companies (228 observations) for Ireland, 27 companies (222 observations) for Austria, 22 companies (160 observations) for Portugal, and 22 companies (150 observations) for Greece.

Our sample comprises data from all Eurozone firms reported on the Worldscope database. For the construction of the diversification indicators, we use firms with reported industry segment data. Like Berger and Ofek (1995) and Campa and Kedia (2002), we exclude firm-years when firms report segments in the financial sector (SIC 6000-6999), firm-years with a missing value of total assets, and firm-years in which the total sales are smaller than the sum of their segments by more than 1%. We also eliminate years in which the firm did not report four-digit SIC codes for all its segments[7].

For each country, we constructed an unbalanced panel of non-financial companies[8] whose information was available for at least six consecutive years from 1990 to 2003. This strong requirement is a necessary condition since we lost one-year data in the construction of some variables (the investment variable, for instance), we lost another year-data because of the estimation of the model in first differences, and four consecutive years' information is required in order to test for second-order serial correlation, as pointed out by Arellano and Bond (1991). We need to test for the second-order serial correlation because our estimation method, the Generalized Method of Moments (GMM) is based on this assumption.

Two of the twelve Eurozone countries were excluded from our analysis for different reasons. As occurs in La Porta *et al.* (2000), Luxembourg was removed because there are just a few firms listed in Luxembourg's stock exchange, and also The Netherlands because we do not have enough data for the construction of some variables in this country. Table 1 provides the structure of the samples by number of companies and number of observations per country. The resultant unbalanced panel comprises 609 companies and 5,004 observations. Using an unbalanced panel for a long period (13 years) is the best way to solve the survival bias caused because some firms might be delisted, and consequently, dropped from the database. Table 2 provides summary statistics (mean, standard deviation, minimum and maximum) of the variables used in the study. Moreover, in Table

[7] This restriction is necessary since we are trying to capture the relation between segment business units.
[8] We restrict our analysis to non-financial companies because financial companies have their own specificity.

Table 2: Summary Statistics

	Non-Diversified 1,691 Obs					Diversified 3,313 Obs					Total no. of firms 5,004 Obs				
	Mean	Median	SD	Min	Max	Mean	Median	SD	Min	Max	Mean	Median	SD	Min	Max
Excess Value$_{it}$	−0.00	0.00	0.68	−1.37	1.36	−0.09	−0.10	0.63	−1.36	1.36	−0.06	−0.07	0.65	−1.37	1.36
Total Entropy$_{it}$	0.00	0.00	0.00	0.00	0.00	0.88	0.90	0.40	0.00	1.60	0.58	0.58	0.53	0.00	1.60
Revenue Herfindahl$_{it}$	0.00	0.00	0.00	0.00	0.00	0.49	0.51	0.21	0.00	0.80	0.32	0.35	0.29	0.00	0.80
Investment$_{it}$	0.06	0.05	0.08	−0.79	0.57	0.06	0.05	0.06	−0.61	0.70	0.06	0.05	0.07	−0.79	0.70
Debt$_{it}$	0.07	0.04	0.08	0.00	0.57	0.10	0.07	0.10	0.00	0.53	0.09	0.06	0.09	0.00	0.57
Intangible Assets$_{it}$	0.04	0.01	0.07	0.00	0.49	0.07	0.03	0.09	0.00	0.59	0.00	0.02	0.08	0.00	0.59
Cash Flow$_{it}$	0.04	0.05	0.06	−0.70	0.29	0.04	0.04	0.05	−0.43	0.52	0.04	0.04	0.05	−0.70	0.52
Size$_{it}$	11.79	11.65	1.56	7.34	17.69	13.19	13.01	1.86	7.54	19.14	12.71	12.52	1.88	7.34	19.13

Table 3: Correlation Matrix

	Variables[a]	Correlations 1	2	3	4	5	6	7
1	Total Entropy$_{it}$	1	–	–	–	–	–	–
2	Revenue Herfindahl$_{it}$	0.990*	1	–	–	–	–	–
3	Investment$_{it}$	−0.001	−0.01	1	–	–	–	–
4	Debt$_{it}$	0.141*	0.14*	0.08*	1	–	–	–
5	Intangible Assets$_{it}$	0.162*	0.17*	−0.04*	0.19*	1	–	–
6	Cash Flow$_{it}$	0.010	0.01	0.12*	−0.16*	0.04*	1	–
7	Size$_{it}$	0.423*	0.41*	0.02	0.24*	0.22*	0.02	1

* Correlation is significant at the 0.01 level.

[a] Variables descriptive statistics are provided in Table 2.

2, we use the excess value measure and find preliminary results on value destruction in diversified firms, as compared to non-diversified. Finally, Table 3 shows the correlation matrix among the variables to be used into the estimations. Note that multicollinearity is not a major problem across the explanatory variables since the correlation values are moderate to low.

Data of companies for which the information is available for at least six consecutive years between 1990 and 2003. After removing the first-year data only used to construct several variables, the resultant samples comprise 185 companies (1,538 observations) for Germany, 166 companies (1,325 observations) for France, 54 companies (467 observations) for Italy, 44 companies (359 observations) for Spain, 32 companies (295 observations) for Belgium, 31 companies (260 observations) for Finland, 26 companies (228 observations) for Ireland, 27 companies (222 observations) for Austria, 22 companies (160 observations) for Portugal, and 22 companies (150 observations) for Greece.

3.2 Estimation Method

Our models have been estimated by using the panel data methodology (e.g., Hoechle *et al.*, 2012; Alessandri and Seth, 2014) on the diversified sample described in Table 2.

Two issues were considered in making this choice. First, unlike cross-sectional analysis, panel data allow us to control for individual heterogeneity. This point is crucial in our study because the decision of undertaking diversification strategies in a firm is very closely related to the specificity of each company. Therefore, to eliminate the risk of obtaining biased results, we controlled for heterogeneity by modelling it as an individual effect, η_i, which is then eliminated by taking first differences of the variables. Consequently, the error term in our models, ε_{it}, has been split into four components: *i*) the above-mentioned individual or firm-specific effect (η_i); *ii*) the time-specific effect by the corresponding time dummy variables (d_t), so that we can control for the effects of macroeconomic variables on the diversification decision; *iii*) country dummy variables (c_i) in that our models are estimated using data from several countries; *iv*) the random disturbance (v_{it}).

Second, as pointed out by Miller (2006), the endogeneity can also be a problem in the value-diversification strategy. The endogeneity problem also can be dealt with by using the panel data methodology. Particularly, the literature concerning the diversification discount examines whether such a discount is the result of endogenous choices by the firm, or the result of problems with data and measures (Custódio, 2014). Lang and Stulz (1994), for example, find that diversified firms trade at a discount even before diversifying. Focusing on firms that diversify through acquisitions, Graham *et al.* (2002) find that the diversification discount can be explained by the lower values of the acquired firms. Campa and Kedia (2002) suggest that the discount is considerably reduced with proper controls for the endogeneity of the diversification decision.

Consequently, to solve the endogeneity problem, our models have been estimated by using instruments. To be exact, we used all the right-hand-side variables in the models lagged from $t-1$ to $t-4$ as instruments for the equations in differences, and only one instrument for the equations in levels when deriving the system estimator used in our paper (Blundell and Bond, 1998).

Also, we checked for the potential mis-specification of the models. First, we use the Hansen J statistic of over-identifying restrictions to test the absence of a correlation between the instruments and the error term. Tables 4 and 5 show that the instruments used are valid. Second, we use the m_2 statistic, developed by Arellano and Bond (1991) to test for the lack of second-order serial correlation in the first-difference residual. Tables 4 and 5 show that second-order serial correlation is not a problem in our models (see m_2). Note that, although there is first-order serial correlation (see m_1), this is caused by the first-difference transformation of the model, and consequently, it does not represent a model specification problem. Third, Tables 4 and 5 show good results for the following three Wald tests: z_1 is a test of the joint significance of the reported coefficients; z_2 is a test of the joint significance of the time dummies; and z_3 is a test of the joint significance of the country dummies.

4 Results

Hypothesis 1a and 1b are formulated to check for the effect of the product diversification activity on firms' excess value. Columns I and II of Table 4 provide the results of the

GMM estimation of our basic excess value model in (1) for the Total Entropy measure (TE) and the Revenue-based Herfindahl Index (RH), respectively. The estimated coefficient of diversification is negative and significant using both measures, which supports Hypothesis 1b regarding the negative effect of a firm's level of diversification on market valuation.

The results concerning the control variables remain identical when using the two alternative measures of diversification. The positive coefficient of investment indicates that internal capital markets can increase investment efficiency in segments of diversified companies (Stein, 1997). The negative coefficient of the debt variable does not corroborate the coinsurance effect (Weston, 1970; Chandler, 1977), which suggests that diversified firms benefit from greater advantages associated with debt financing, and that this translates into a higher excess value. Supporting Denis *et al.* (2002), this result confirms that the costs of debt financing (mainly agency and financial distress costs) more than offset its potential benefits. In this vein, O'Brien *et al.* (2014) study the implications of capital structure on diversification performance and find a similar pattern. Also as expected, a firm's intangible assets and cash flow positively affect excess value, pointing to the positive assessment of the market on both characteristics. Moreover, prior empirical studies on firm value incorporate a size variable: because large companies can make use of different resources, size shows a positive coefficient that translates into higher excess value for diversified firms via economies of scope and market power.

Hypothesis 2 states that there is an optimal level of diversification in that this strategy has both positive and negative effects on firm value. Columns III and IV of Table 4 present the results of the estimation of the quadratic model in (2) for the TE and RH measures of diversification, respectively[9]. The coefficient of the diversification variable is positive and the coefficient of its square is negative when using both alternatives. Moreover, both coefficients are statistically significant, which indicates that the relation between diversification and excess value is quadratic rather than linear as proposed in Hypothesis 2.

The finding of a quadratic functional form for the relation between diversification and value implies that there is a breakpoint, which can be optimally derived by differentiating value in (2) with respect to diversification. Letting this partial derivative equal zero, the breakpoint is $DIV^* = -(\alpha_1/2\alpha_2)$. Because α_1 and α_2 present opposite signs, then DIV^* is a maximum; that is, an optimal level of diversification (see Figure 1). This finding strongly supports Hypothesis 2. Specifically, we find that the optimal level of diversification is 0.41 in the model with the Total Entropy measure, which implies that, all other things being equal, increases in a firm's diversification level create value until this optimum is reached, and then diversification turns into a value-destroying strategy. The optimal level of diversification found in the model with the Revenue-based Herfindahl Index is 0.26. This result supports the same trend in the relation. Note that the difference between these two optimal levels of diversification stems from the differences between the two measures of diversification used: Total Entropy and Revenue-based Herfindahl Index. As can be seen in Columns III

[9] Note that, despite obtaining a significant coefficient on the diversification measure for the linear specification, we try for a non-linear model in order to improve the Wald test on the right-hand-side variables and obtain better explanatory power.

Table 4: Estimation Results of the Excess Value Model

	I (Total Entropy)	II (Revenue-based Herfindahl Index)	III (Total Entropy)	IV (Revenue based Herfindahl Index)
Product Diversification$_{it}$	−0.20**	−0.32**	0.19**	0.50**
	(0.02)	(0.05)	(0.05)	(0.10)
Product Diversification Squared$_{it}$	–	–	−0.23**	−0.9760**
			(0.03)	(0.12)
Investment$_{it}$	0.76**	0.74**	0.76**	0.71**
	(0.04)	(0.04)	(0.03)	(0.02)
Debt$_{it}$	−2.56**	−2.58**	−2.42**	−2.44**
	(0.08)	(0.08)	(0.05)	(0.049)
Intangible Assets$_{it}$	0.41**	0.42**	0.30**	0.40**
	(0.11)	(0.11)	(0.07)	(0.07)
Cash Flow$_{it}$	0.94**	0.97**	1.05**	1.13**
	(0.09)	(0.09)	(0.06)	(0.06)
Size$_{it}$	0.13**	0.12**	0.13**	0.12**
	(0.01)	(0.01)	(0.06)	(0.06)
z_1	307.58 (6)	302.92 (6)	833.97 (7)	879.09 (7)
z_2	67.87 (12)	65.58 (12)	175.11 (12)	169.15 (12)
z_3	69.81 (9)	62.75 (9)	73.68 (9)	70.65 (9)
m_1	−10.48	−10.53	−10.44	−10.47
m_2	−0.34	−0.39	−0.37	−0.41
Hansen	338.73	331.12	379.93	375.51
	(324)	(324)	(376)	(376)

The regressions are performed by using the panel described in Table 1. The remainder of the variables is defined in Table 2. The rest of the information needed to read this table is: *i*) heteroskedasticity consistent asymptotic standard error in parentheses; *ii*) the †, * and ** indicate significance at the 10%, 5% and 1% level, respectively; *iii*) the z_1, z_2 and z_3 are Wald tests of the joint significance of the reported coefficients, of the time dummies, and of the country dummies, respectively, asymptotically distributed as χ^2 under the null of no significance, degrees of freedom in parentheses; *iv*) m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as $N(0,1)$ under the null of no serial correlation; and *v*) Hansen is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of no correlation between the instruments and the error term, degrees of freedom in parentheses.

and IV of Table 4, the estimated coefficients of the control variables remain identical in sign as in the basic model, thus, corroborating the above relations.

Hypothesis 3 states that related diversification is more valuable or less destructive than unrelated diversification practices. With this purpose in mind, we estimate the model in (3) in which diversification variables are interacted with a dummy variable that allows us to control for related and unrelated diversification. Columns I and II of Table 5 present the estimated results of this extended model for TE and RH measures of diversification, respectively. As shown in Column I, the coefficient of related diversification is positive ($\alpha_1 = 0.31$) and its square is negative ($\alpha_2 = -0.31$). These results corroborate our previous finding of the existence of a quadratic relation between diversification and value, and support that an optimal level of diversification exists. The optimally derived breakpoint is 0.50, suggesting that related diversification creates value up to this level, and is value-destroying beyond it.

We find the same pattern regarding non-related diversification, which confirms the non-linearity of the relation between diversification and value. The coefficient of non-related diversification is positive ($\alpha_1 + \theta_1 = 0.22$) and its square negative ($\alpha_2 + \theta_2 = -0.27$), and are statistically significant (see t_1 and t_2 in Table 5). The breakpoint derived from the relation between non-related diversification and value (0.41) is smaller than the one obtained for related diversification (0.50) (see Figure 2). Since the coefficients for the

Table 5: Estimation Results of the Extended Excess Value Model

	I (Total entropy)	II (Revenue based Herfindahl Index)
Product Diversification$_{it}$	0.31**	1.11**
	(0.04)	(0.06)
Product Diversification × Dummy Relatedness$_{it}$	−0.08**	−0.50**
	(0.01)	(0.04)
Product Diversification Squared$_{it}$	−0.31**	−1.84**
	(0.02)	(0.08)
Product Diversification × Dummy Relatedness Squared$_{it}$	0.04**	0.72**
	(0.01)	(0.05)
Investment$_{it}$	0.78**	0.76**
	(0.02)	(0.02)
Debt$_{it}$	−2.45**	−2.43**
	(0.03)	(0.02)
Intangible Assets$_{it}$	0.60**	0.60**
	(0.05)	(0.03)
Cash Flow$_{it}$	1.10**	1.16**
	(0.06)	(0.03)
Size$_{it}$	0.10**	0.09**
	(0.00)	(0.00)
t_1	6.98	11.92
t_2	−15.29	−19.98
z_1	2,521.58 (9)	5,731.27 (9)
z_2	1,124.09 (12)	1,633.34 (12)
z_3	271.64 (9)	462.70 (9)
m_1	−10.47	−10.47
m_2	−0.36	−0.44
Hansen	427.03	421.43
	(480)	(480)

The regressions are performed by using the panel described in Table 1. The remainder of the variables is defined in Table 2. The rest of the information needed to read this table is: *i*) heteroskedasticity consistent asymptotic standard error in parentheses; *ii*) the †, * and ** indicate significance at the 10%, 5% and 1% level, respectively; *iii*) t is the t-statistic for the linear restriction test under the null hypothesis of no significance; *iv*) the z_1, z_2 and z_3 are Wald tests of the joint significance of the reported coefficients, of the time dummies, and of the country dummies, respectively, asymptotically distributed as χ^2 under the null of no significance, degrees of freedom in parentheses; *v*) the m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as $N(0,1)$ under the null of no serial correlation; and *vi*) Hansen is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of no correlation between the instruments and the error term, degrees of freedom in parentheses.

unrelated strategy are lower than the ones obtained for the related diversification, our Hypothesis 3 is totally confirmed.

As can be seen in Column II of Table 5, the results obtained for the model with the Revenue-based Herfindahl measure of diversification confirm the above findings. All other variables in the model show significant coefficients, and the same sign as in previous estimations.

5 Discussion

This study provides new evidence of the relationship between the product diversification strategy and firm value, getting inside the level and types of diversification in order to understand the real benefits and costs that this strategy conveys. To be precise, our analysis is intended to complement the existing literature on the topic by focusing on the Eurozone, which is an institutional environment different from the US (on which most of the empirical studies are based). According to our study, the diversification strategy destroys value, a finding which is consistent with arguments pointing out that diversification: *i*) creates inefficient internal capital markets during the course of overinvestment in low performing businesses (Stulz, 1990); *ii*) generates influence costs (Rajan *et al.*, 2000); *iii*) encourages managers to invest free cash flows to support organizational inefficiencies (Jensen, 1986); *iv*) generates control and effort losses, coordination costs and other diseconomies related to organization, and discrepancy for ideas between businesses (Markides, 1992), among others. According to this finding and consistent with Lang and Stulz (1994), Berger and Ofek (1995), Shin and Stulz (1998), Lamont and Polk (2001) and Hoechle *et al.* (2012) diversified firms are less valuable than non-diversified firms, which leads diversified firms to trade at a discount.

Despite finding evidence that diversification is a value-destroying strategy, prior studies cast doubts on the existence of a linear relation between diversification and value (Markides, 1992; Palich *et al.*, 2000). Similar to Rumelt (1982), who found a pattern of declining profitability with the increase in diversity, we find a non-linear relation between diversification and firm valuation; firm value first increases and beyond a certain point then decreases with diversification. In short, our results are consistent with the existence of an optimal level of diversification and, consequently, with the inverted *U*-model that stems from the Intermediate Model proposed by Palich *et al.* (2000). Our evidence is also in accordance with diversification having both value-enhancing and value-reducing effects (Berger and Ofek, 1995; Liu and Hsu, 2011). The positive effect of diversification is a consequence of the efficient use of knowledge in managerial and technical resources that allows diversified firms to create core competences, since experience and expertise play an important role in firm valuation. As firms allocate the resources across segments, a cost reduction should appear due to the positive effect of more competitiveness and market power. However, when managers are not capable of understanding the correct proceedings of the above arguments and the business activities differ systematically from the principal unit, important costs would emerge, counterbalancing the benefits. For example, the use of inefficient internal capital markets, internal power efforts, the incorrect use of the resources by managers in their own benefit, discrepancy of ideas between business units or asymmetries of information must be translated into costs for multi-segment activity.

Once we have learned about the costs and benefits of the diversification strategy for Eurozone firms, we go a step further and investigate the effect of relatedness. Working upon the supported quadratic relation between diversification and value, we extend our analysis by controlling for related and un-related diversification. Our results totally confirm the above findings regarding the existence of an optimal level of diversification. More interestingly, we find that related diversification is more value-creating (or less value-destroying) than non-related diversification. We assume that the shift in positions among business segments provides more productivity since relatedness is more easily managed by the companies. This evidence is consistent with previous research pointing to the potential benefits of relatedness (Nayyar, 1992). In fact, since multi-market operations arise, managers should exploit their firms' related opportunities to reduce costs and increase value, as well as face the challenges associated with related expansion on product segments (Zahavi and Lavie, 2013). When we calculate the optimal levels of both types of diversification we find that non-related diversification turns into a value-destroying strategy at lower levels than related diversification. In other words, the value destruction associated with diversified firms can be counterbalanced with gains achieved by refocusing these firms (John and Ofek, 1995). According to our results, firms should perform what they have always done instead of trying to expertise in new business units in which they lack of knowledge. For example, some companies shift cash, knowledge, talent and managerial attention to the more efficient business units. If firms make decisions about these activities as corporations and not inside each business, they will be able to better avoid agency problems and increase in value.

In short, the differences in the levels and types of multi-segment activity outstandingly contribute to the explanation of the value-creating and value-destruction performance in the Eurozone diversified firms.

6 Conclusions

This study provides a test for the effect of the diversification strategy on a firm's value by taking into account the type and levels of diversification in firms in the Eurozone countries.

After controlling for traditional determinants of value, such as investment, debt, cash flow, intangible assets and size, a diversification strategy does impact the value of firms in Eurozone countries. Our study contributes to understanding the implications of the diversification discount by focusing on the premium or discount that diversified firms trade at. We show evidence of a curvilinear relation between diversification and excess value. Hence, there is an optimal level of diversification in that the diversification strategy first creates value and then, after a certain breakpoint, destroys it. Additionally, consistent with the potential benefits of relatedness, our evidence supports the idea that related diversification is more value-creating than non-related diversification, which suggests that non-related diversification turns into a value-destroying strategy at lower levels than related diversification does. Thus, relatedness moderates the discount value of diversified firms when accounting for the moderating effect of the type of diversification in its relation to excess value.

Operating in different business units can create and destroy value in the firm, depending on the level and similitude of the business operations. Accordingly, managers can take advantage of the diversification cycles by moving the resources from segments in which the optimum is reached to other emerging segments, until the decline begins. The Eurozone is a successful market due to the regionalism created among its members, and it is extremely important to exploit multi-market operations. Firm expansion through diversification is thus beneficial for companies in the Eurozone, especially if they recognize the optimal levels of this strategy in both related and unrelatedness.

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