Diversification: Value-creating or value-destroying strategy? Evidence from eurozone countries

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Abstract

This paper provides evidence on how the diversification strategy impacts on value in a sample of eurozone firms. Specifically, the paper studies the effect of the levels and types of diversification on the premium or discount that diversified firms trade at. To achieve this aim, we propose an excess value model that incorporates the level and type of diversification. The estimation of the model by using the Generalized Method of Moments provides interesting results. Preliminary results are consistent with the value-destroying expectations and show that diversified companies trade a discount in the eurozone countries. However, a more accurate analysis reveals that there is a non linear relationship between the diversification and excess value, giving rise to an optimal level of diversification. Moreover, our results support that related diversification is more value-creating than non-related diversification.

Keywords: Corporate diversification, relatedness, excess value
JEL classification: G32; G34

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1. Introduction

The diversification strategy is a considerable and interesting topic of study in the literature of firm valuation, but there is significant divergence on whether or not diversification creates long-run competitive advantage (Markides and Williamson, 1994). Nowadays, there is a debate in the strategic management literature about the role played by corporate diversification as a value maximization strategy for shareholders. A firm diversifies when the benefits of diversification overcome its costs, and it stays focused when the opposite occurs. On the one hand, some theoretical arguments point to diversification as a value-increasing strategy for the firm. For instance, Fluck and Lynch (1999) argue that diversification permits the financing of marginally profitable projects that cannot get financed as stand alone units. Matsusaka (2001) shows that the firm chooses to diversify when the gains from searching for a better organizational fit outweigh the costs of reduced specialization. On the other hand, the evidence obtained in the corporate finance literature, such as the point that multi-segment firms trade at a discount, in relation to a portfolio of single-segment firms, have led researches to believe that diversification destroys value (Lang and Stulz, 1994; Berger and Ofek, 1995; Rajan, Servaes, and Zingales, 2000; Whited, 2001; Lamont and Polk, 2001, 2002). As such findings are not conclusive, there is an open door to the investigation about the diversification strategy. Furthermore, recent research on the effects of different levels of diversification on firm value has driven to a curvilinear relation. The curvilinear model posits that some diversification is better than none (Palich, Cardinal and Miller, 2000).

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

In this setting, the aim of this paper is to learn how diversification activity impacts on firm valuation, and how this impact is moderated by relatedness in the Euro-zone countries. The interest in studying this setting stems from the fact that prior literature on diversification is mainly US based (see, for instance, Nayyar, 1992; Rajan, Servaes, and Zingales, 2000; Bowen and Wiersema, 2005; 2007). In this way, despite the vast research on the topic, we provide new evidence on diversification for the eurozone case which, as far as we know, has not been previously documented.. To achieve this aim, we estimate an excess value model by using the Generalized Method of Moments in a sample of eurozone companies. Our paper provides the following evidence. First, we offer evidence on the impact of the diversification strategy on the firm value by regressing excess value over two different measures of diversification (Total Entropy and Revenue-based in Herfindahl index) and a set of control variables that have been traditionally considered as value determinants (i.e. the investment level, debt ratio, dividends, profitability, intangible assets and firm size). Second, we take

into account the possible non-linear relationship between the diversification strategy and firm value. Our findings show that there is an optimal level of diversification; that is, diversification strategy first creates value and, after a certain breakpoint, then destroys value. Third, to investigate how the relatedness moderates the impact of diversification on firm 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 support that related diversification is more value-creating than non-related diversification, and that non-related diversification turns a value-destroying strategy at lower levels that related diversification.

The remainder of the paper is organised as follows. The second section presents the theoretical framework the hypothesis of our paper and the model to test them. Section 3 describes the data and estimation method used in our analysis. The results are discussed in Section 4 and the last section highlights our conclusions.

2. Theory, Hypotheses and Empirical Models

In this section, we first summarize the main arguments and contributions of previous research to the debate about the benefits and costs of diversification, which are the foundation of our hypotheses concerning the effect of diversification on firm value. We then specify the models that allow us to test the existence of the premium or discount hypotheses. Second, we discuss the arguments behind the diversification discount hypothesis to propose additional hypotheses about corporate diversification and the value discount.

2.1. Corporate Diversification and Firm Value

There are many, and somehow contradictory, theoretical arguments in the literature to explain the relationship between the diversification strategy and firm performance, suggesting that diversification may have both value enhancing and value reducing effects. The key question is whether the act of corporate diversification destroys value or, on the contrary, it creates value.

In the past, the industrial organization economics employed years of research relying 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 very early stage, the literature on diversification was based on the premise that diversified firms can employ market power advantages, which are largely inaccessible to their more focused counterparts (Scherer, 1980). Additionally, owing to internal market efficiencies, multi-segment firms can benefit from the advantage to access easily to external funds to finance growth, and can also transfer capital between businesses within its portfolio (Meyer, Milgrom and Roberts, 1992). As a result, diversification is a source of different efficiencies that are difficult to achieve by single business firms (Scharfstein and Stein, 2000). Overall, these arguments indicate that diversification is positively associated with performance.

To go further on the question as to why a firm diversifies, we should take into account the benefits that the diversification strategy conveys. In fact, gains from this strategy may come from managerial

economies of scale, as proposed by Chandler (1977). Moreover, the increment of the market power is determined by the predatory pricing, future higher prices, and sustained losses that can be founded through cross-subsidization whereby the firm taps additional revenues from one product to support another (Tirole, 1995). The conventional theory posits that one of the positive effects of diversification is the reduction of the firm's risk in the way to be involved in more businesses in its portfolio (Sobel, 1984; Grant, 1998). This risk reduction is also helpful for debt capacity and cost of capital (Lewellen, 1971), because it allows the firm to exploit the tax advantages available from increasing borrowing (Sheifler and Vishny, 1992). However, multi-segment firms enjoy much greater flexibility in capital formation, since they can access more easily to external sources as well as internally generated resources. Then, the diversification itself creates internal capital markets that permit a more competent allocation of resources across businesses, in that case multi-segments firms gain considerable financial interests from the use of this internal market and resources (Rumelt, 1982). Weston (1970) and Williamson (1975) argue that managers have in their hands monitoring and information advantages over external capital markets. Hence, multi-segment firms can generate efficiencies that are unavailable to the single-business firm. In short, all the above mentioned arguments support diversification as a value-creating strategy. For instance, the coinsurance effect gives multi-segment firms greater debt capacity than single-line business of similar size (Lewellen, 1971). One way in which increased debt capacity creates value is by increasing interest tax shields, thus multi-segment firms are predicted to have higher leverage and lower tax payments than their business would show if operated separately.

There are also many arguments that have led scholars to assume that diversification destroys value. For instance, the agency theory argues that managers can pursue their own interests at expense of shareholders by means of the diversification strategy (Jensen, 1986). In this way, diversification allows managers to reduce their personal risk (Amihud and Lev, 1981), as well as increase their compensation, power and prestige (Jensen and Murphy, 1990). Moreover, managers of divisions that have a future perspective in the firm are encouraged to persuade the top management of the firm to conduct resources in their direction (Meyer, Milgrom and Roberts, 1992). Jensen (1986) argues that managers of a multi-segment firm may be prone to invest any free cash flow to support organizational inefficiencies. Markides (1992) mentions other costs of diversification, such as control and effort losses (increment of shirking), coordination costs and other diseconomies related to organization, and discrepancy for ideas between businesses. The difficulty in designing optimal incentive compensation for managers of diversified firms also generates costs of multi-segment operations (Aron, 1988; Rotenberg and Saloner, 1994). Informational asymmetries between central management and divisional managers will also lead to higher costs of operating in multiple segments, as shown by Harris, Kriebel, and Raviv (1982). Finally, although diversification translates into lower financial risk, it may increase business risk given the different nature and characteristics of business to be managed.

What is unquestionable is that managers of the multi-segment firm enjoy greater opportunities to undertake projects and greater resources to do so whenever diversification relaxes the constraints imposed by

imperfect external capital markets. Also during the course of overinvestment in low performing-business, multi-segment firms create inefficient internal capital markets (Stulz, 1990); or due to internal power efforts that generate influence costs (Meyer, Milgrom and Roberts 1992; Rajan, Servaes, and Zingales, 2000). This might lead them to overinvest resources (Stulz, 1990; Matsusaka and Nanda, 2002).

The debate about diversification being a value-creating or a value-destroying strategy has given rise to a closely related line of research based on the existence of a premium or a discount of the diversification strategy. In this context, the evidence is also mixed. For instance, Campa and Kedia (2002) and Villalonga (2004) show that, controlling for a firm propensity to diversify, there is a diversification premium but small. Theoretically, Maksimovic and Phillips (2002) and Gomes and Livdan (2004) show that, diversification may be a value creating strategy even if, overall, multi-segment firms have a lower value than single-segment firms. Contrary to these arguments, there is also evidence that indicates that multi-segment firms trade at a discount relative to a portfolio of single-segment firms (Berger and Ofek, 1995; Lamont, 1997; Shin and Stulz, 1998; Scharfstein, 1997; Rajan, Servaes and Zingales, 2000). Specifically, Berger and Ofek (1995) and Shin and Stulz (1998) provide empirical evidence supporting that multi-segment firms invest inefficiently and, consequently, trade at a discount in relation to similar constructed portfolios of single-segment firms. Particularly, Berger and Ofek (1995) explain the value destruction by means of overinvestment and cross-subsidization of multi-segment firms. Shin and Stulz (1998) find that divisional resources do not appear to be directed to segments with the most favourable investment opportunities. From another perspective, Ferris and Sarin (1997) argue that investors prefer focused firms since it is more convenient for them to achieve the desired level of risk diversification with pure-play firms. Consequently, diversified firms would trade at a discount because of lower transparency and lower liquidity. These studies provide empirical evidence on the value destroying effect of corporate diversification and, consequently, on the existence of a diversification discount.

Taking all 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 two following alternative hypotheses:

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

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

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

$$EV_{it} = \alpha_0 + \alpha_1 DIVER_{it} + \alpha_2 INV_{it} + \alpha_3 DEBT_{it} + \alpha_4 INTANG_{it} + \alpha_5 CF_{it} + \qquad (1)$$
$$\alpha_6 SIZE_{it} + \varepsilon_{it}$$

where EV_{it}, $DIVER_{it}$, INV_{it}, $DEBT_{it}$, $INTANG_{it}$, CF_{it} and $SIZE_{it}$ denote excess value, diversification, investment, debt, dividends, intangible assets, cash flow and size, respectively[1]. The dependent variable

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[1] The subscript *i* refers to the company and *t* refers to the time period. ε_{it} is the random disturbance.

(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, where 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 firm value sales for the median single segment firm in the segment i's industry, and n is the total number of segments for the firm.

According to the construction of this variable, a positive coefficient of the diversification variable would support Hypothesis 1.a. Similarly, Hypothesis 1.b would 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 as $TE = \sum_{i=1}^{N} S_i \ln(1/S_i)$. The second one is a modified version of the Revenue-based Herfindahl index[4], calculated as $RH = 1 - \sum_{i=1}^{N} (Si)^2 / \left[\sum_{i=1}^{N} (Si) \right]^2$. The investment variable (INV_{it}) and the replacement value of total assets are calculated as in Miguel and Pindado (2001). The replacement value of total assets is computed, $K_{it} = RF_{it} + (TA_{it} - BF_{it})$ where RF_{it} is the replacement value of tangible fixed assets, TA_{it} is the book value of total assets, and BF_{it} is the book value of tangible fixed assets. The latter two have been obtained from the firm's balance sheet and the first one has been calculated according to the proposals by Perfect and Wiles (1994). The net fixed assets are represented as NF_{it}, and BD_{it} is the book depreciation expense corresponding to year t, then we can obtain the value of investment: $I_{it}=NF_{it}-NF_{it-1}+BD_{it}$. The debt ratio ($DEBT_{it}$) 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. The intangible assets variable ($INTANG_{it}$) is computed as the firm's intangible assets scaled by the replacement value of total assets. The cash flow variable (CF_{it}) is measured as earnings before interests and taxes plus the book depreciation expense plus provisions, scaled by the replacement value of total assets. Size ($SIZE_{it}$) is measured as the logarithm of the replacement value of total assets.

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[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 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, and Palepu, 1985 for more details).
[4] The Revenue-based 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).

The basic model in (1) controls for others firm characteristics besides diversification that have been considered as determinants of excess value in the literature[5]. Let us know briefly explain the expected relationships 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 may increase investment efficiency (Stein, 1997). This argument would be supported by a positive effect of investment on the excess value of diversifed firms. On the contrary, agency costs may be a source a potential investment distortions in diversified firms. Top management in a diversified firm enjoys greater opportunities to undertake projects, and also more resources to do so if diversification relaxes constrains imposed by imperfect external capital markets so that overinvestment may arise (Stulz, 1990; Matsusaka and Nanda, 2002). This argument would hold if a negative effect of investment on excess value is found.

Prior research suggests that firm diversification may be financed through increased leverage (Kochhar and Hitt, 1998). Thus, we include this in the excess value model because one of the benefits that multi-segment firms enjoy is the greater debt capacity as a result of the coinsurance effect. Weston (1970) and Chandler (1977) suggest that multi-segment firms have the ability to leverage economies of scale because they provide more efficient operations and more profitable lines of business than single-segment firms. 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 relationship between intangible assets on various measures of firm value. This argument is consistent with the notion that the market positively assesses a firm's intangible assets (Chan, Lakonishok, and Sougiannis, 2001; Lev and Sougiannis, 1996). 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 to explain the value-destruction in multi-segment firms. He argues that firms with low profitability are likely to trade at a discount as compared to firms with higher levels of profitability. This leads us to expect a positive effect of cash flow on a firm's excess value.

Finally, a positive coefficient for size would support well-know arguments pointing to size as a value-creating factor via, for instance, scale economies and market power.

2.1.1. The Inverted U Model of Diversification

Based upon the existence of both costs and benefits of diversification, the notion of an optimal level of diversification emerges. In fact, the transaction cost theory suggests that a firm's optimal level of diversification stems from balancing the economic gains from diversification against the bureaucratic costs of a multi-business firm (Jones and Hill, 1988).

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[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.

Consistent with the existence of an optimal level of diversification, Markides (1992) argues that as a firm becomes more diversified, it gets away from its principal business and the benefits of being a multi-segment firm at the margin decreases. As a result, Markides (1992) infers that beyond a certain point the marginal benefits from diversification are best explained as a decreasing function. According to this argument, Grant, Jammine and Thomas (1988) show that profitability increases with product diversity until certain point, and that it begins to decrease beyond such point. In the same vein, the "Intermediate Model" proposed by Palich, Cardinal and Miller (2000) suggest that diversification has positive revenues, but the returns fall beyond some point where the optimal is reached. As the markets turn out to be more distant to the firm's core competences, the firm bit by bit losses its ability to leverage and, consequently, its competitive advantage and 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 relationship between diversification and firm valuation:

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

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

$$EV_{it} = \alpha_0 + \alpha_1 DIVER_{it} + \alpha_2 DIVER^2_{it} + \alpha_3 INV_{it} + \alpha_4 DEBT_{it} + \qquad (2)$$
$$\alpha_5 INTANG_{it} + \alpha_6 CF_{it} + \alpha_7 SIZE_{it} + \varepsilon_{it}$$

2.1.2. The Effect of Relatedness on Firm Value

The resource-based theory offers widely accepted arguments about diversification being the result of a firm's excess capacity in valuable resources and capabilities that are transferable across industries but subject to markets imperfections. Thus, within this context, economies of scope arise, and a firm's diversification strategy becomes the most efficient form of organizing economy activity (Penrose, 1959; Panzar and Willing, 1981). In contrast, diversification can become suboptimal if the resources used by the firm are of little use into unrelated industries where the firm diversified (Rumelt, 1974).

In fact, Panzar and Willing (1981) suggest that when the costs of producing separate outputs exceed the costs of join production, firms can achieve economies of scope. These 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 and resource-related diversification generates greater economic value than single-business focus and unrelated diversified strategies (Rumelt, 1974, 1982; Bettis, 1981).

The evidence from a substantial body of empirical research does not conclusively find the related strategy superior to the unrelated one, and it remains an unexplained enigma. On one hand, there are numerous studies that find support for the superiority of related over unrelated diversification (Rumelt, 1974, 1982; Bettis, 1981; Markides and Williamson, 1994). On the other hand, there are many studies finding no significant relationship between diversification strategy and performance after controlling for relatedness

(Christensen and Montgomery, 1981; Hill, 1983; Montgomery, 1985; Grant, Jammine, and Thomas, 1988; Hill, Hitt, and Hoskisson, 1992).

On the one hand, unrelated strategies may present some exclusive advantages of their own mainly derived from financial synergies. In this vein, the portfolio theory proposes that industry specific risk can be reduced only via extra industry diversification (Kim, Hwang, and Burgers, 1989). It is worth highlighting that the lower risk that results from portfolio effects and reduced probabilities of bankruptcy (coinsurance) can also lead to increased debt capacity (Seth, 1990). In fact, even in the absence of operational synergies, diversified firms may enjoy other benefits such as tax shields given that interest expenses are tax deductible (Amit and Livnat, 1988). On the other hand, there are many ways in which unrelatedness might reduce value. It could be that managers have limited expertise and cannot effectively manage diverse businesses, or that unrelated segments have conflicting operational styles or corporate cultures. These explanations predict that unrelated diversity is negatively correlated with value.

Relatedness might mitigate the value loss from diversification. The related diversifiers are involved in multiple industries with businesses that allow them to approach common corporate resources (Lubatkin and O´Neill, 1987; Nayyar, 1992), which yields advantages to the firm, such as scope economies (Seth, 1990). For instance, Markides and Williamson (1994) analyze the labours across units and obtain evidence of enough efficiency as asset amortization in that the firm is able to use economies of scope across business segments that can bring into play the same asset. Relatedness can also benefit from some advantages efficiency due to learning curve, intra-firm product/process diffusion, and access to factors of production and distribution exclusive to and industry (Barney, 1997). Additionally, relatedness reduces business risk in that businesses in the portfolio are of similar nature and share common characteristics, which make them easier to be managed.

Also Berger and Ofek (1995) argue that industry diversification, on average, reduces value. However, Comment and Jarrell (1995) provide evidence documenting the gains achieved by the refocusing firms. That is, relatedness may contribute to mitigate the value loss from diversification, as extensive empirical evidence indicates (see, for instance, Lubatkin and O´Neill, 1987; Seth, 1990; Nayyar, 1992; Markides and Williamson, 1994; Barney, 1997).

These arguments and previous findings lead us to question the role played by relatedness in the premium or discount multi-segment firms trade at. In effect, if diversification is a value-creating strategy and, consequently, diversified firms trade at a premium, the choice of relatedness would translate into a higher market valuation; i.e., into a higher excess value. Note that this kind of result would be consistent with Hypothesis 1.a. In contrast, consistent with Hypothesis 1.b, diversification will destroy value and diversified firms will trade at a discount. Within this context, relatedness would mitigate this value destruction and the diversification discount would be lower.

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

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

To test Hypothesis 3 and 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 would be as follows:

$$EV_{it} = \alpha_0 + (\alpha_1 + \theta_1\ TDD_{it})\ DIVER_{it+} + (\alpha_2 + \theta_2\ TDD_{it})\ DIVER^2_{it} \qquad (3)$$

$$+\ \alpha_3\ INV_{it} + \alpha_4\ DEBT_{it} + \alpha_5\ INTANG_{it} + \alpha_6\ CF_{it} + \alpha_7 SIZE_{it} + \varepsilon_{i\,t}$$

where TDD_{it} is a dummy variable that takes the value of 1 for unrelated diversification, and 0 for related diversification. Relatedness is defined on the basis that industries i and j are classified into the same two-digit SIC code. This way, the coefficient of the diversification variable ($DIVER_{it}$) is α_1 under relatedness, since TDD_{it} takes value zero, and it is ($\alpha_1 + \theta_1$) under unrelatedness, since TDD_{it} takes value 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 value 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 hypotheses posed in the previous section, we use data from eurozone countries. We have thus used an 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, have been extracted from the Main Economic Indicators published by the Organization for Economic Cooperation and Development (OECD).

Our sample comprises data from all Euro-zone firms reported on Worldscope data base. For the construction of the diversification indicators we use firms with reported Industry Segment data . As Berger and Ofek (1995) and Campa and Kedia (2002), we exclude years when firms report segments in the financial sector (SIC 6000-6999), years with a missing value of total assets, and years where the total sales are smaller than the sum of its segments for more than one percent. We also eliminate years where the firm did not report four-digit SIC codes for all its segments.

For each country we constructed an unbalanced panel of non-financial companies[6] whose information was available for a 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 year information is required in order to test for second-order serial correlation, as

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[6] We restrict our analysis to non-financial companies because financial companies have their own specificity.

Arellano and Bond (1991) point out. 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[7] have been excluded from our analysis for different reasons. As occurs in La Porta, Lopez-de-Silanes, Sheifer, and Vishny (2000), Luxembourg has been removed from our sample because there are just a few firms listed in Luxembourg's stock exchange, and The Netherlands because we have no data enough to the construction of some variables in this country. The structure of the samples by number of companies and number of observations per country is provided in Table 1. 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 could be delisted and, consequently, be dropped from database. Finally, Table 2 provides summary statistics (mean, standard deviation, minimum and maximum) of the variables used in the study. In Table 2, we find destruction on valuation of the multi-segment over the single-segment firms using the excess value measure.

3.2 Estimation method

Our models have been estimated by using the panel data methodology on the multi-segment sample described in Table 2. Two issues have been considered to make 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 have controlled for such 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. First, the above mentioned individual or firm-specific effect, η_i. Second, d_t measures the time-specific effect by the corresponding time dummy variables, so that we can control for the effects of macroeconomic variables on the diversification decision. Third, since our models are estimated using data of several countries, we have also included country dummy variables (c_i). Finally, v_{it} is the random disturbance.

The second issue we can deal with by using the panel data methodology is the endogeneity problem. Particularly, the literature concerning the diversification discount examines whether such a discount is the result of endogenous choices of the firm. 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, Lemmon, and Wolf (2002) find that the diversification discount can be explained by the lower values of the firms that are acquired. Campa and Kedia (2002) suggest that the discount is considerably reduced with proper controls for the endogeneity of the diversification decision.

As a consequence, endogeneity may be a problem in our models that have to be controlled for. That is why our models have been estimated by using instruments. To be exact, we have used all the right-hand-

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[7] The eurozone currently comprises twelve countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, and Spain.

side variables in the models lagged from t-1to t-4 as instruments for the equations in differences, and t-1 for the equations in levels as Blundell and Bond (1998) suggest when derive the system estimator used in our paper.

Finally, we have checked for the potential misspecification of the models. First, we use the Hansen J statistic of over-identifying restrictions in order to test the absence of correlation between the instruments and the error term. Tables 3 and 4 shows that the instruments used are valid. Second, we use the m_2 statistic, developed by Arellano and Bond (1991), in order to test for lack of second-order serial correlation in the first-difference residual. Tables 3 and 4 show that there is no a problem of second-order serial correlation 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 specification problem of the models. Third, our results in Tables 3 and 4 provide 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

In this section we present the analysis results of the effect of diversification on market valuation by focusing on the premium or discount that diversified firms trade at. We first present the results of our basic model, which includes besides diversification a set of control variables that have been traditionally used diversification literature. We then comment on the evidence obtained from the estimation of the value model extended by incorporating the square of the diversification variable. This extended model allows us to test the existence of potential non-linearities in the relationship between diversification and firm excess value. Third, we test the implications of relatedness for the effect of diversification on firm excess value.

4.1 Diversification and excess value

The results of the GMM estimation of our basic excess value model in (1) are provided in Columns I and II of Table 3 for the total entropy measure (TE) and the Revenue-based Herfindahl index (RH), respectively. The estimated coefficient of diversification is negative using both measures, which supports Hypothesis 1.b about the negative effect of a firm's level of diversification on market valuation. That is, a firm's diversification strategy destroys value, which is consistent with arguments pointing out that diversification: i) creates inefficient internal capital markets during the course of overinvestment in low performing-business (Stulz, 1990); ii) generates influence costs (Rajan, Servaes, and Zingales, 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. That is, consistent with Lang and Stulz (1994), Berger and Ofek

(1995), Ferris and Sarin (1997), Shin and Stulz (1998) and Lamont and Polk (2001), multi-segment firms are less valuable than single-segment firms, which leads diversified firms to trade at a discount.

Let us now comment on the results obtained for the control variables, which remain identical when using the two alternative measures of diversification. The positive coefficient of investment indicates that internal capital markets may 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) that suggests that diversified firms benefit from greater advantages associated with debt financing and this translates into a higher excess value. However, this result confirms that the costs of debt financing (mainly agency and financial distress costs) more than offset its potential benefits. Also as expected, a firm's intangibles assets and cash flow positively affects excess value, pointing to the positive assessment of the market on both characteristics. Finally, size shows a positive coefficient, which supports that size translates into higher excess value of diversified firms via economies of scale and market power.

4.2. The inverted-U model

Despite finding evidence on diversification being a value-destroying strategy, there are previous evidence that casts doubts on the existence of a linear relationship between diversification and value. As we discussed in Section 2.1.1, according to Markides (1992) and the Intermediate Model proposed by Palich, Cardinal and Miller (2000), a quadratic specification better describes the functional form of this relation[8]. The results of the estimation of the quadratic model in (2) are presented in Columns III and IV of Table 3 for TE and RH measures of diversification, respectively. 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 relationship between diversification and excess value is quadratic rather than linear. Like in Rumelt (1982), who find a pattern of declining profitability with the increment of diversity, we find a nonlinear relationship between diversification and firm valuation. This result corroborates previous evidence provide by, for instance, Grant, Jammine and Thomas (1988), Markides (1992), and Williamson (1996).

The finding of a quadratic functional form for the relationship 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, this breakpoint is DIV* $=-(\alpha_1/2\alpha_2)$. Since α_1 and α_2 present opposite signs, then DIV* is a maximum; that is, an optimal level of diversification. This finding strongly supports Hypothesis 2. Specifically, we find that the optimal level of diversification is 0.4127 in the model with the Total Entropy measure, which implies that, other things equal, increases in firm's diversification level creates value until this optimum is reached, and then diversification turns into value-destroying strategy. The optimal level of diversification found in the model with the Revenue-based

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

Herfindahl index is 0.2583. This result supports the same trend in the relationship. 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 the Revenue-based Herfindahl index. The important point is that in both cases the tendency of value, first increasing and beyond a certain point decreasing with diversification, is supported. 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, Cardinal and Miller (2000). Our evidence is also in accordance with diversification having both value-enhancing and value-reducing effects (Berger and Ofek, 1995).

As can be seen in Columns III and IV of Table 3, the estimated coefficients of the control variables remain identical in sign as in the basic model, thus corroborating the above commented relations.

4.3. The effect of relatedness

Finally, we propose a third extension of the excess value model that is intended to control for the moderating role of relatedness in the relationship between diversification and excess value. With this purpose, we estimated the model in (3) in which diversification variables are interacted with a dummy variable that allows us to control for related and unrelated diversification. The estimated results of this extended model are presented in Columns V and VI of Table 3 for TE and RH measures of diversification, respectively. Let us comment on the results obtain for the TE measure first. As shown in Column V, the coefficient of related diversification is positive ($\alpha_1 = 0.3063$) and its square is negative ($\alpha_2 = -0.3093$). These results corroborate our previous finding about the existence of a quadratic relationship between diversification and value, and support that an optimal level of diversification exist. The optimally derived breakpoint is 0.4951, suggesting that related diversification creates value until reaching this level, being value-destroying beyond.

We find the same pattern regarding non-related diversification, which totally confirms the non-linearity of the relationship between diversity and value. Additionally, two interesting results are found. First, the coefficient of non-related diversification is positive ($\alpha_1 + \theta_1 = 0.2218$, which is statistically significant, see t_1 in Table 3) but smaller than the one obtained for related diversification. This result suggests that related diversification is more value-creating than non-related diversification supporting Hypothesis 3. This evidence is consistent with previous research pointing to the potential benefits of the relatedness (Reed and Luffman, 1986; Nayyar, 1992). Second, the breakpoint derived for the relationship between non-related diversification and value is 0.4139, which compared to the one obtained for related diversification (0.4951) suggests that non-related diversification turns a value-destroying strategy at lower levels that related diversification. In other words, the value destruction associated with multiple segment firms may be counterbalanced with gains that can be achieved by refocusing firms (Comment and Jarrell, 1995; John and Ofek, 1995).

As can be seen in Column VI of Table 3, the results obtained for the model with the RH measure of diversification totally confirm the above commented findings.

All the other variables in the model show significant coefficients, and the same sign as the obtained in previous estimations.

5. Conclusions

This paper provides a test for the effect of the diversification strategy on a firm's valuation taking into account the type and levels of diversification on the multi-segment firms in the eurozone countries. To achieve this aim, we first propose a basic model in which a firm's excess value is explained, besides diversification, by a set of control variables commonly used in previous diversification research. This model is then extended to test the curvilinear relationship between diversification and excess value. Finally, we incorporate the relatedness into the model to check the effect of this type of diversification on firm value as compared to that of unrelatedness.

Our results show that diversification strategy does impact on the value of firms in eurozone countries, after controlling for traditional determinants of value such as investment, debt, cash flow, intangible assets and size. Our study contributes to understanding the implications of the diversification discount by focusing on the premium or discount that diversified firms trade at. Preliminary results seem to indicate that the diversification strategy leads to a reduction of firm value and that multi-segment firms are less valuable than single-segment firms. Moreover, a more accurate analysis shows evidence of a curvilinear relation between diversification and excess value. Hence, there is an optimal level of diversification so that the diversification strategy first creates value and, after a certain breakpoint, then destroys value. Additionally, our evidence provides empirical support to the idea that related diversification is more value-creating than non-related diversification. This result is consistent with the potential benefits of relatedness, suggesting that non-related diversification turns a value-destroying strategy at lower levels that related diversification. Thus relatedness moderates the value discount of multi-segment firms, when accounting for the moderating effect of the type of diversification in its relationship with excess value.

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Table 1
Structure of the samples 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 five consecutive years between 1990 and 2003 were extracted. 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 the 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.

Table 2
Summary Statistics

	SINGLE-SEGMENT					MULTI-SEGMENT					TOTAL FIRMS				
	1691 OBS					3313 OBS					5004 OBS				
	MEAN	MEDIAN	SD	MIN	MAX	MEAN	MEDIAN	SD	MIN	MAX	MEAN	MEDIAN	SD	MIN	MAX
EV$_{it}$	-.0045	.0044	.6787	-1.366	1.360	-.0922	-.1003	.6257	-1.364	1.364	-.0625	-.0748	.6454	-1.366	1.364
TE$_{it}$	.0000	0	.0000	0	.0001	.8759	.8998	.3993	.0007	1.604	.5799	.5842	.5265	0	1.604
RH$_{it}$	0	0	0	0	0	.4877	.5147	.2088	.0001	.7997	.3229	.3483	.2865	0	.7997
INV$_{it}$	.0607	.0465	.0753	-.7920	.5658	.0598	.0511	.0610	-.612	.6983	.0601	.0498	.0661	-.7920	.6983
DEBT$_{it}$	.0707	.0407	.0821	0	.5728	.0985	.0691	.0962	0	.5301	.0891	.0605	.0926	0	.5728
INTANGK$_{it}$	.0385	.0089	.0673	0	.4888	.0703	.0343	.0890	0	.5863	.0596	.0234	.0833	0	.5863
CF$_{it}$	.0423	.0454	.0636	-.6992	.2877	.0411	.0439	.0495	-.4333	.5170	.0415	.0443	.0544	-.6992	.5169
SSIZE$_{it}$	11.79	11.65	1.558	7.343	17.68	13.19	13.013	1.859	7.536	19.14	12.71	12.52	1.881	7.343	19.13

EV_{it} denotes firm's excess value, TE_{it} is the Total Entropy index of diversification, RH_{it} is the Revenue based in the Herfindahl index of diversification, INV_{it} denotes investment, $DEBT_{it}$ stands for the debt ratio, $INTANGK_{it}$ denotes the intangible assets, CF_{it} is the cash flow and $SIZE_{it}$ is the firm's size.

Table 3. Estimation results of the Excess Value Model

	I (Total Entropy)	II (Revenue-based Herfindahl index)	III (Total Entropy)	IV (Revenue based Herfindahl index)	V (Total entropy)	VI (Revenue based Herfindahl index)
$(DIVER)_{it}$	-.2000795* (.0247826)	-.3204784 * (.0530682)	.1858286* (.051437)	.5041823* (.0969689)	.3062857* (.0352215)	1.111999* (.0626354)
$(DIVER\_REL)_{it}$					-.084482* (.0119616)	-.502159* (.0365146)
$(DIVER)^2_{it}$			-.225152* (.0305812)	-.9759828* (.1167726)	-.3093151* (.0203413)	-1.835383* (.0778547)
$(DIVER^2\_REL)_{it}$					.0413575* (.0090945)	.7188167* (.0534507)
$(INV)_{it}$	.7579084* (.0444404)	.740754* (.0437697)	.7629921* (.0259981)	.7089301* (.0248091)	.7839021* (.0178091)	.7605108* (.0174966)
$(DEBT)_{it}$	-2.559738* (.0831675)	-2.580363* (.0816293)	-2.42123* (.0489113)	-2.436384* (.0487315)	-2.449402* (.0302186)	-2.431034* (.02094923)
$(INTANG)_{it}$	.409674* (.1078028)	.424791* (.1103002)	.3015419* (.071656)	.3994832* (.0746934)	.5981801* (.0483013)	.6048003* (.0294958)
$(CF)_{it}$	.9390648* (.0901152)	.9674044 * (.0914482)	1.052104* (.0643947)	1.128438* (.0638681)	1.098167* (.0606664)	1.156534* (.0348204)
$(SIZE)_{it}$	.1269922* (.0099014)	.1243495 * (.0096384)	.1250863* (.0058099)	.1170203* (.0057149)	.096971* (.0028774)	.0870438* (.0021222)
t_1					6.982445	11.920558
t_2					-15.292135	-19.976439
z_1	307.58 (6)	302.92 (6)	833.97 (7)	879.09(7)	2521.58(9)	5731.27(9)
z_2	67.87 (12)	65.58 (12)	175.11 (12)	169.15(12)	1124.09(12)	1633.34(12)
z_3	69.81 (9)	62.75 (9)	73.68 (9)	70.65(9)	271.64(9)	462.70(9)
m_1	-10.48	-10.53	-10.44	-10.47	-10.47	-10.47
m_2	-0.34	-0.39	-0.37	-0.41	-0.36	-0.44
Hansen	338.73 (324)	331.12 (324)	379.93 (376)	375.51 (376)	427.03 (480)	421.43 (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) *,** and *** indicate significance at the 1%, 5% and 10% level, respectively; iii) t is the t-statistic for the linear restriction test under the null hypothesis of no significance; iv) 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) 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; 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.