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DID RELATIONAL CAPITAL MATTER DURING THE FINANCIAL CRISIS?

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This paper aims to contribute to the body of empirical studies that address the importance of investments in companies' relationships and the way in which they influence value creation in the global economic crisis. We employ linear panel analysis using the Hausman–Taylor model to analyse panel data for companies from the five largest European countries in the period 2004–2011. Different types of exogenous and endogenous links which a company could have in different stages of the crisis are investigated. The findings suggest that there is a statistically significant and positive link between relational capital and a firm's value. Moreover, we identify several differences in the significance of the inputs during different crisis periods. The study provides both theoretical and practical insights into investments in intangibles for framing strategy decisions with a particular focus on the role of relational capital. This could provide scholars and practitioners with a working basis for understanding connections and the implications of strategizing in the context of a company's networks.

JEL Classification: G32, G34

Keywords: relational capital, economic crisis, value creation, Hausman-Taylor specification

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1. Introduction

In a world of rapid change, company success depends greatly on the capability to generate value for shareholders. Intangibles can be regarded as fundamental determinants of firm value creation and a source of sustainable competitive advantage. The process of creating value will be enhanced by an extended knowledge base offered through linkages (or networks) with external sources such as suppliers, customers, competitors, universities and public agencies.

Existing empirical research has primarily focused on investigating the relations between intangibles and financial performance. This relationship has been confirmed to exist across different industries, national economies, firms and other environmental or organizational actors (Lin and Edvinsson, 2008). Initially, research efforts aimed at establishing empirical relationships between intangibles and company performance – and subsequently value creation – focused on specific types of intangibles, primarily those associated with advertising and research and development expenses (Eberhart, et al., 2004). Progressively, the relationship between intangibles and performance has begun to be examined under the prism of human (Pantzalis, et al., 2008) or organizational capital (Lev, et al., 2009).

At the same time, empirical evidence for the particular investigation of a link between one of the most crucial elements of intellectual capital – relational capital – and company performance is lacking. Strong and close relationships are considered one of the most promising areas within modern firm theory (Acedo, et al., 2006) and there is also great interest in the role of relationships in achieving success both at the institutional (Chang, 2003; Laursen and Salter, 2006) and personal level (Nahapiet and Ghoshal, 1998; Sambasivan, et al., 2012; Zheng, 2010). Moreover, according to Roos (2005), relational capital, which reflects all company networks and which is connected to all business processes, is a strategic competitive resource for company success, particularly for the value creation process, especially during periods of market turbulence. Although the lack of the prior research on the topic of financial crisis exists due to the fact that the crisis has occurred recently, we expect to receive confirmation of the competitive advantages for firms that have chosen the strategy of investing in different kinds of relationships during the crisis.

This research investigates the impact of investments in relational capital resources on the process of the transformation of relationships into company value in the context of the global economic crisis. The key research question is: Does relational capital become more relevant for the process of value creation during turbulence? To test the research question empirically, we use linear panel analysis to examine panel data for 909 large companies from five European countries: Great Britain, Germany, France, Italy, and Spain. These countries cover 71% of the

GDP in the European Union (EU). The time period for analysis is 2004–2011. This allows for exploration of different crisis stages and the capture of specificities in each of them in line with our research topic. We believe that our study is timely in taking into account the financial problems European countries have faced recently. Revealing the relations between relational capital and financial performance is expected to have useful implications for company management.

The paper is organized as follows. First, in Section 2, we outline the theoretical background for the relational capital concept and define the hypotheses of our study. Then, in Section 3, we introduce the research framework and methodology. Section 4 presents the empirical estimation and discussion the results obtained.

2. Relational Capital Concept: several considerations

This section provides the theoretical background for the study. Initially, the term relational capital (RC) is defined by reviewing a variety of theoretical propositions. Then, the role of relational capital in the value creation process is analysed. Based on the results of the analysis, we put forward the hypotheses tested in the study.

In the economics literature, the term ‘capital’ refers to a commodity itself used in the production of other goods and services. The adjective ‘relational’ suggests that there is a particular type of capital in some kinds of relationships between economical subjects who produce these goods or services. In spite of the special nature of this capital, we agree with Adler and Kwon (2002), who identify internal features of relational capital that are similar to other types of resources:

Relational capital can be considered an appropriable and convertible (into financial benefits) resource and also a kind of substitute, or a complement, for other resources.

Relationships need constant maintenance and renewal.

Some kinds of relationship are non-rivalrous and thus the use of capital by some does not lessen its availability to others; at the same time, its use is excludable, as it is possible to exclude parties from a given network of relationships.

There are many definitions and depictions of the relational capital concept in the literature, most of which belong to intellectual or social capital concepts. In relation to intellectual capital, Subramaniam and Youndt (2005) define RC as knowledge available through different inter-relationships and networks. Capello and Faggian (2005) specify the nature of these relationships as follows: market (with customers and suppliers), power (with authorities), and cooperation links (all non-market ties with competitors, universities and institutions). It must

be noted that all these relations should enable companies to carry out their activities with greater efficiency. The main idea underpinning all papers in the field is the analysis of RC as a potential source of a company's financial prosperity. For example, Kale, et al. (2000) show that the competitive advantages achieved by firms with a high level of organizational capital are mainly due to the fact that these resources cannot be completely codified and transferred to other organizations or imitated by them.

Social capital focuses on the internal features and structure of RC and is primarily connected with Granovetter's (1985) work on the ubiquity of social embeddedness in economic exchanges. Granovetter (1985) argues that this ubiquity of embeddedness accounts for much of the order (and disorder) that is found in both markets and in firms. In this sense, relational, or social, capital can also be considered the sum of the actual and potential resources embedded within, available through, and derived from the networking relationships developed by an individual or an organization (Lin, et al., 2001; Nahapiet and Ghoshal, 1998). Such kinds of resources do not directly belong to the company and cannot be controlled by it.

Relational capital includes both internal and external dimensions (Subramaniam and Youndt, 2005). Internal ties relate to internal actors, such as company employees (Zheng, 2010). These relationships are difficult to measure as their estimation requires internal information. Regarding relational capital, several scholars have highlighted the value derived from external relationships (Brooking, et al., 1998; Sveiby, 1997; Youndt, et al., 2004). The external dimension is connected with each link outside the particular organization: networks with customers, suppliers, government agencies, and other formal or informal institutions (Zheng, 2010).

In addition to the points mentioned above, relational capital consists of all the links a company has with its competitors and other institutions in the market and it also covers image, loyalty, satisfaction, commercial power, environmental activities, and so on. In other words, it reflects the knowledge that it is possible to obtain through such relations. Thus, a good description of relational capital is that it refers to the quality and sustainability of relationships with external stakeholders and also the potentiality of generating new partners in the future. These aspects are crucial to company success (Adler and Kwon, 2002).

Performance is increasingly being driven by sources of capital that are difficult for competitors to capture and replicate, such as relational capital (Acedo, et al., 2006). Castells (1998) argues that the kind of cooperation involved in relational capital promotes creativity and the constant generation of new ideas. That is, relational capital can indirectly provide a company with growth and can be considered a sustainable resource for a company's success. According to this, to create value, firms should generate new networks with customers, suppliers, alliances, and other partners. Swaminathan and Moorman (2009) consider that alliances (as strong

networks) have a positive influence on value creation.

In order to extend the practical implications of the relational capital concept, it is necessary to clarify the significance of the particular relations a company has and to examine investment in a firm's links. Taking into account all the considerations mentioned above, in this paper we focus on the following key hypothesis:

H: The significance of relational capital for a firm's outcomes grows during a period of crisis.

Supporting Capello and Faggian (2005), we propose that market and non-market links are essential in enhancing the transformation of RC into company value. In accordance with the assumption of the heterogeneous structure of relational capital, in this research we focus on the exploration of the influence of different relationships on company value. Adapting the framework for relational capital investigation provided by Cricelli, et al. (2013), in this study we reveal the significance of relational capital in the value creation process using four kinds of links: relationships with customers, partners, investors and institutions.

First of all, relationships with customers are a pivotal source of competitive advantage for companies as firms can obtain new ideas from their customers in relation to products, technologies, etc (Walter, et al., 2001). Moreover, great customer loyalty could help a company not only to survive but to create value during a crisis period.

Value creation through relationships does not only apply to customers and it is necessary to mention here relationships with partners. Generally, previous studies on the topic agree that there are potential benefits from cooperation with other companies. The most important concern transaction cost theory (the motive is the minimization of the sum of production and transaction costs and uncertainty caused by market failure) and resource-based theory (the easier acquisition of resources and building of competitive advantage). Inter-organizational relationships also help in the process of learning and gaining legitimacy (Barringer, 2000).

Relationships with investors are also a source for value creation in companies. In particular, a good company reputation with investors may lead to higher share prices on stock markets. However, it seems that in turbulent markets it is more valuable to observe relationships with foreign investors because a strong dependence on foreign investors increases uncertainty and consequently increases financial risks (Amadou, 2011).

One more type of relationship we take into account is ties with institutes. A developed network of this kind of relationship could also help to achieve improved results in company performance as it allows the use of extra sources of competitive advantage (Knack and Keefer, 1997).

Taking into consideration all the previous points, the following sub-hypotheses were

derived:

H_a: Relationships with customers have become more significant for company value in turbulent markets.

H_b: Relationships with partners have been correlated positively with value creation in the context of strong financial constraints.

H_c: Relationships with investors have had a negative impact on value creation during global economic crisis.

H_d: Relationships with institutions have positively influenced the value creation process during global crisis.

In the next section, we define the framework for the analysis of the role of RC in the value creation process.

3. Research Framework and Methodology

Measurement is a particularly crucial issue in studies on relational capital. As mentioned above, any study on the subject of relational capital is unlikely to be simple. Therefore, there is no critical mass of empirical papers concerning specifically the impact of relational capital on value creation. For each of the relationships described in the previous section, we have chosen direct and proxy indicators of relational capital that appear to be relevant to company value in previous studies (see Table 1):

Table 1 RC and value creation in previous studies

Type of relations	RC Proxies	Studies	Impact on value creation
Customers	brand power	Srivastava, 2001; Madden et al., 2006	Brand leads to higher perceived value that may be tapped through price or share premiums
Partners	participation in business associations (BA)	Collins and Hitt, 2006; Sambasivan et al., 2011, 2012	Participation in BA allows to gain extra benefits and leads to extra value
Investors	foreign capital employed	Hitt et al., 2006; Teixeira and Shu, 2012	Foreign capital employed leads to positive externalities and contributes to company growth
Institutions	location in agglomeration, collaboration with top European universities	Capello, 2002; Capello and Faggian, 2005	Agglomeration effect enhances company performance. The proximity to research centres positively correlated with company value

Generally, previous studies have observed a positive influence from all kinds of relationships on company performance, although it must be noted that there are also some contradictory papers that claim other kinds of relational capital impact, specifically during crisis periods. In relation to positive impacts, it is widely accepted that branding reflects the company's

relationships with its customers (Fernandez et al., 2000). This confers sustainability of a higher level of sales relative to a company's peers and therefore keeps more revenues coming in. Moreover, the stocks of firms with strong brands should offer some protection for investors because they are viewed as safer investments (Woodwell, 2013). Researchers agree that brand power is an intangible resource of considerable relevance **(**Hägg and Scheutz, 2006). Well-known brands are considered to constitute a source of competitive advantage as clients prove to be loyal to a company. Brands are popular among consumers because of their limited rationality: when experience (or time) is limited, brands that are positively perceived in customers' minds are preferred to unknown goods or services (Srivastava, 2001). As a whole, Aaker and Jacobson (2001) confirm that a brand is a market-based asset that is a driver of shareholder value. Moreover, they highlight the relationship between brand power and financial performance, particularly in relation to stock returns. One of the explanations for such a relationship is that stock market participants understand the relationship between changes in brand attitude and incorporate their knowledge into current stock prices. On the other hand, there are a few empirical studies that reveal a negative effect from a strong brand on a company's financial results. For example, Woodwell (2013) analysed the stock market performance of 50 Interbrand Top 100 global brands from 1 September to 31 December 2008 and found that high-scoring Interbrand firms performed slightly worse than the broader market, even controlling for factors such as firm size, considering varying performance industry by industry, and more.

Second, it is believed that participation in business associations can be considered a formal expression of firm cooperation that illustrates external economies of scale (Kingsbury and Hayter, 2006). In their literature review, Sambasivan, et al. (2012) explain the motives for networks such as the reduction of transaction costs, an easier means of obtaining resources, and the transfer of knowledge and technologies. The literature highlights the importance of partner commitment as all members should be interested in achieving win-win results. Nevertheless, some scholars consider that there is a dark side of close relations (Anderson and Jap, 2005). Hultén, et al. (2012) also believe that in terms of the global economic crisis and the resulting financial constraints, the negative effects for companies could be due to their strong dependence on partners or business associations.

Third, it is assumed that foreign capital employed as a proxy for relationships with foreign investors will also be of significance in this study. Some researchers highlight the importance of foreign capital employed for the economy's growth, both directly through an increase in productivity and exports, and indirectly through easier technological transfer (Teixeira and Shu, 2012). Ćorić and Pugh (2013) found that foreign direct investments in the pre-crisis period negatively influenced GDP growth volatility, thus contributing to the reduction of risks.

However, the true influence of foreign capital remains unclear, as there are many contradictory findings. In particular, Amadou (2011) claims that at the country level openness to foreign capital can harm the economy by increasing the risks of financial crises.

Finally, we consider relationships with institutions at both macro and micro levels. At the macro level, we investigate agglomeration effects. According to Audretsch and Doshe (2007), agglomerations have a positive impact on economic growth. Most researchers agree that spatial effects enhance economic performance (Brülhart and Mathys, 2008). Glaeser, et al. (1992) found that knowledge distribution within an agglomeration is easier than in cross-country distribution. In relation to the micro level, the particular importance of the firm–university relationship is assumed. Being located near research centres is considered to be a source of competitive advantage for firms, which can receive modern scientific and technological information at low marginal costs (Capello, 2002). Universities, according to Capello and Faggian (2005), Acs, et al. (1994), and Audretsch and Feldman (1996), are a source of innovation and growth through their role as traditional channels of urban knowledge production and thus proximity to research centres is positively correlated with firm performance.

The main outcome considered in this research is value creation that depends on efficient investment decisions. Market value added (MVA) is used as the outcome in the value creation process and is calculated as an estimation of the difference between annual market capitalization and invested capital. As an outcome of investor expectations regarding the company's future, MVA is a good measure of company investment attractiveness.

Defining the elements of the "RC-MVA" transformation process in practice, we faced several problems during the estimation process. One of the major problems concerns endogeneity. According to Wooldridge (2009), there are three causes of this and in this research we face at least two. The first source is omitted variables that could be correlated to the explanatory variables included. For example, foreign investors may be interested in the company due to its level of value, but at the same time the value depends on the amount of foreign capital invested. The second source relates to the presence of measurement errors when proxies are used within the model. As Roberts and Whited (2012) have pointed out, this occurs due to conceptual differences between proxies and their unobservable counterparts. Several techniques for solving the problem exist. The most popular of these is fixed and random effects (FE and RE) modelling. The FE estimator allows endogeneity for all independent parameters, whereas the RE estimator requires all variables to be strongly exogenous. However, drawing on Hausman and Taylor (1981), there is an additional option. Rather than a choice between all or nothing, namely an alternative estimator in which some of the regressors are correlated with the individual effects.

In our paper we use the alternative estimation, this being the Hausman–Taylor (HT) model. This specification allows the estimation of the effects of both time-variant and time-invariant parameters. As pointed out by Baltagi, et al. (2003), the HT estimator uses both the within and the between variation of the strictly exogenous variables as instruments. In particular, the individual means of strictly exogenous parameters are considered to be the instruments for the variables that are correlated to the individual effects. The main issue here is the definition of the strictly exogenous and endogenous independent variables.

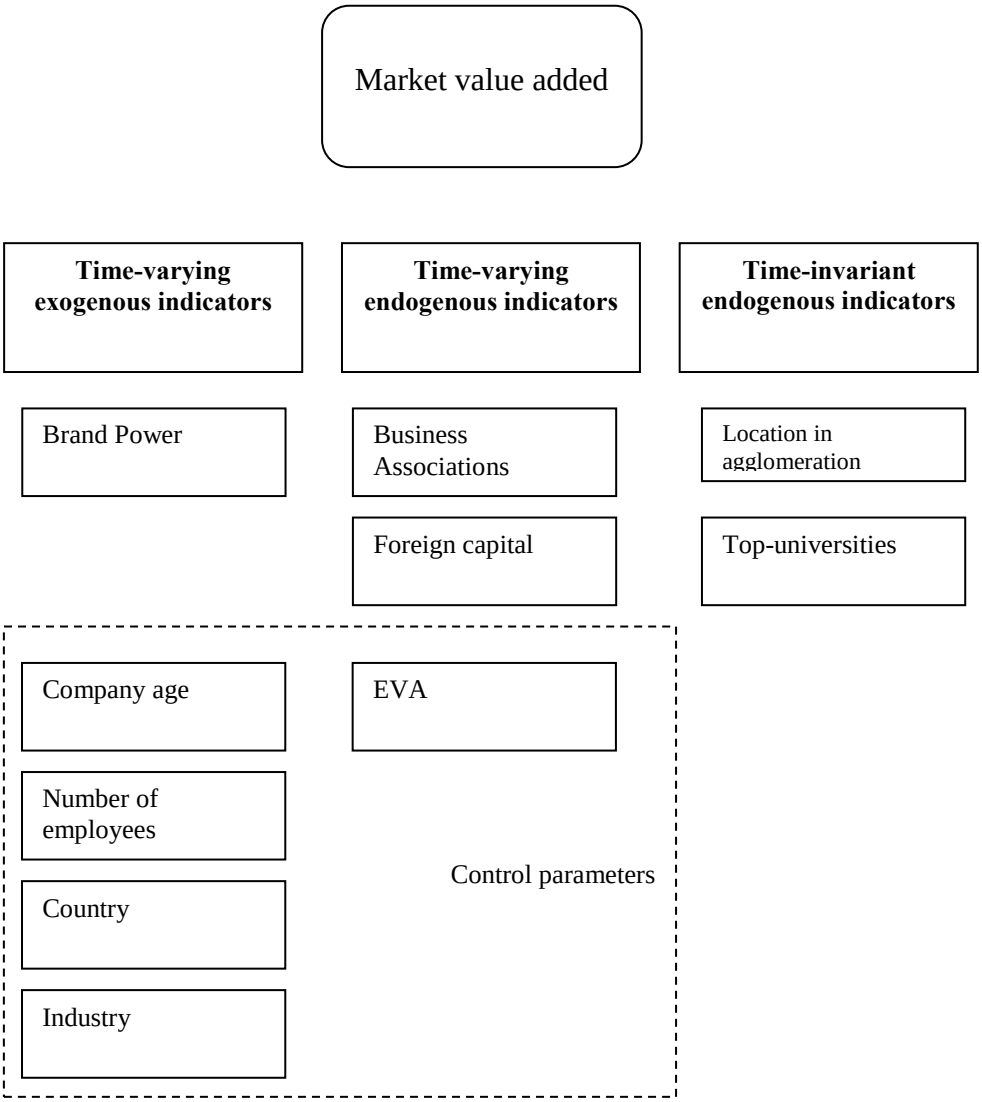
One of the main advantages of the HT specification is that it allows the estimation of the influence of time-varying and invariant indicators on the dependent variable simultaneously. This is quite valuable in our research as we have both kinds of variable. We believe that the participation in business associations and the foreign capital involved are the endogenous time-varying variables as they depend on particular decisions taken by top management and investors. The variables for location, i.e. agglomeration and having a top university nearby, are considered strongly exogenous as the decision on location does not depend on current management; these variables are the only features relating to physical space (Capello and Faggian, 2005). In addition, the indicator of brand power is also exogenous in the research logic.

Moreover, in order to undertake an accurate estimation, it must be recognized that relational capital is not the only resource that influences the value creation process. Therefore, control parameters that also influence the transformation process should be included in the framework. The economic value added (EVA) is incorporated as an indicator of firm competitive advantage. According to the literature, EVA is a measure of company performance connected with the mode of governance. That is, this metric of performance takes into account value drivers recognized by managers in order to run the company more effectively. Moreover, researchers agree that economic value added is evidence of the efficiency of the use of intangibles (Harrison and Wicks, 2013; Meek and Gray, 1988). Thus, we assume that it is an endogenous variable as it reflects the effectiveness of the use of a company's internal resources by its management.

Furthermore, due to the fact that a firm's size and age may influence relational capital, they are considered as control variables (Reed, et al., 2006; Youndt, et al., 2004). Finally, the value creation process may differ across different countries and industries. Because of this, it would be reasonable to include dummy variables for countries and industries. As basic variables, we took the United Kingdom among the countries and professional services among the industries. This choice was made based on the availability of a sufficient number of observations in each of these categories.

In accordance with our assumptions and the theoretical background, the research framework used in this paper is set out in Figure 1.

Figure 1 Research framework



To obtain an accurate picture of the success factors related to relational capital before, during, and after the crisis, the analysis of the same companies is divided into three time periods (panels), respectively. The determination of crisis periods is currently a popular topic of discussion in academia. For example, there is a tendency to define the time periods in relation to when the crisis began for each European country. It is rather more complicated to establish the beginning of the recovery period in these countries. In this paper, we define the period of prosperity, the crisis, and the subsequent recovery on the basis of European stock market behaviour. This means of analysis does not contradict the claims of authors that the stock market crashes when the crisis begins (Barro, 2002; Chiodo and Owyang, 2002).

The global economic crisis began in 2008 and led to the financial crisis in Europe.

Quotes on the stock markets fell sharply during 2008 and to a certain extent during 2009[3]. As presented in Figure 2, the movement of the Euro Area Stock Market (EURO STOXX 50) confirms this. The recovery period in this research relates to 2010–2011 as some modest improvements in economic activity took place in European countries in 2010[4].

Figure 2 The dynamic of the Euro Area Stock Market (EURO STOXX 50)

Source: Trading Economics[5]

To sum up, as the dynamics of market capitalizations are a crucial part of the market value-added calculation, for our analysis we chose the following panels:

- pre-crisis period: economic prosperity (2004–2007)
- global economic crisis (2008–2009)
- post-crisis period: recovery (2010–2011)

The database for this research consists of European companies. Europe is valuable for the investigation as it allows the same processes to be examined in different markets. The countries were selected on the basis of the five largest economies in the EU according to GDP (the countries chosen cover 71% of GDP in the EU in total), these being the United Kingdom, Germany, France, Italy and Spain:

Table 2 Country Distribution of the Sample

Country	Percentage of companies in the sample, %
United Kingdom	44
France	25

[3] http://www.eurofound.europa.eu/publications/htmlfiles/ef1207.htm
[4] http://www.eurofound.europa.eu/publications/htmlfiles/ef1207.htm
[5] http://www.tradingeconomics.com/euro-area/stock-market/

Germany	24
Spain	5
Italy	2

For the purposes of this research, 20 industries in the North American Industry Classification System (NAICS) were aggregated into seven industries. Table 3 presents the results of the aggregation process.

Table 3 Industry Distribution of the Sample

Industry name	Percentage of companies in the sample, %
Manufacturing	27
Professional Services	25
Finance & Insurance	12
Services	12
Construction & Real Estate	10
Trade & Related Services	9
Energy & Chemical	5

It should be noted that the sample structure corresponds to the country and industry structure of the European economy. The sample includes annual data from 2004 to 2011 for 909 European companies that are listed on the stock markets, or 7,272 observations. We consider only the category of large companies according to the Eurostat classification (more than 250 employees). The final database consists of different kinds of information from various sources. Table 4 presents the sources of information and calculation method for the variables:

Table 4 Indicators used in the Research

Components	Indicators	Information Source and Estimation Algorithm
Relational Capital	Brand Power	Take the following steps: 1. Search on company name on the website: www.rankingthebrands.com 2. Give a company 1 point if it has a rank or 0 point, otherwise. *Note: we look at any ranks company can have*
	Participation in business associations	Company Annual Report, section "Common information" + Company Website Search using the following words as "associations", "alliances", "strategic alliances". Those involved in business associations are given 1 point and otherwise 0 points
	Location in agglomeration	Search on company location on their website, see the status of the city location in Wikipedia If it is the capital of the state (or region) – 1 point, otherwise – 0 points
	University	Search on company location in their web-site, see the status of the university in the city in the web-site: http://www.webometrics.info/en/Ranking_Europe If it is one of the top-20 country's universities – 1 point, otherwise – 0 points
	Foreign capital employed	Company Annual Report, Section "Shareholder name", vertical vector "country" If company has foreign investors it gains 1 point and otherwise 0 points

Output	MVA	**Market Capitalization$_t$ - Equity$_{t-1}$ and Equity$_t$ for 2004** Market Capitalization: data from Bloomberg (according to the company ticker), total market value of all outstanding shares at period end date Equity: Shareholder funds, Company Annual Report, section "Balance Sheet"
Control Variables	Company Age	Company Annual Report, Section "Size & Group information"
	Number of Employees	Company Annual Report, section "Key financials & employees"
	EVA	**$EVA_t=IC_{t-1}*(ROIC_t-WACC_t)$,** $IC_{t-1}=D_t+E_t$: Book Value of Equity and Debts $ROIC_t=NOPAT_t/IC_{t-1}$: Return on invested capital $NOPAT_t=EBIT_t(1-T)$: Net operation profit after taxes $WACC_t=D_t/(D_t+E_t)*kd(1-T)+ E_t/(D_t+E_t)*ke$: Weighted average cost of capital D_t: Book value of debt E_t: Book value of equity kd=krf+ default spread of the company+default spread of the country: Cost of debt ke=krf+β*(km-krf): Cost of Equity krf: Risk free rate – return on the Treasury bonds of USA Government β: Bottom-up build beta (adjusted by Hamada's equation) km: Historical return on the market portfolio (market index) T: Effective tax rate

All data were subjected to panel data analytic techniques using the statistical package Stata 10. We focused specifically on the links between relational capital and firm outcome indicators. To test the hypotheses, econometric procedures are used. The next section presents the model specification and major empirical outcomes.

4. Empirical Results and Discussion.

This section is devoted to the empirical evidence of the impact of relational capital on company value. The descriptive statistics of MVA and certain control variables are presented in Table 5.

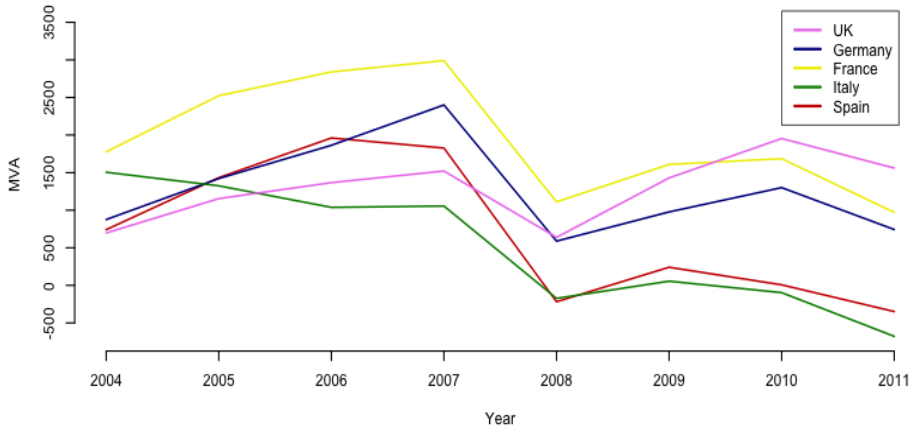
Table 5 Descriptive statistics of MVA, EVA and Control Variables

Factor	Observations	Minimum	Maximum	Mean	Median	Std.Dev.
MVA (mln EUR)	7272	-70988.09	126979.4	1559.73	60.35	7374.02
EVA (mln EUR)	7272	-52768.68	12076.02	-253.20	-4.87	2046.25
Age (years)	7272	0.00	204.00	48.00	30.00	42.00
Number of employees (number)	6854	251.00	536350.00	16662.75	2289.00	46345.00

For MVA, the sign of mean (and median) values are positive. That is, on average, the market value added of the companies in the sample was positive in the period 2004–2011. The gaps between minimum and maximum values are considerable and we assume that the level of

RC in the company could be a reason for this difference. Mean (and median) values of EVA, however, are negative: the companies in the database did not create value during the observed time period. In the sample we have both young and experienced companies according to their years of foundation. The actual firm size also varies, although all the companies included are categorized as large. Moreover, the movements of means for the MVA variable in different countries were examined. As Figure 3 illustrates, for all the chosen European countries, the mean values of the target variables changed in the same direction for the period 2004–2011:

Figure 3 Dynamic of Means (MVA), mln EUR



A correlation analysis based on pairwise Pearson coefficients was conducted and established that all relational capital inputs are positively and significantly correlated with the outcome (MVA). The correlation coefficients between explanatory variables are not high. Their absolute values vary from a low of 0.00 to a high of 0.57. Thus, it can be assumed that there are no problems of multicollinearity in the sample.

The next step in the research is hypothesis testing. Specifically, we employ linear panel analysis (HT estimator) on panel data concerning company relational capital. ANOVA analysis and t-tests were used in order to validate the results. The analytical estimation for hypothesis testing is as follows:

$$MVA = a + (b_1, b_2) * TVexogenous + (c_1, c_2) * TVendogenous + (c_3, c_4) ** TIexogenous + \varepsilon_{it},$$

where:

— Tvexogenous are time-varying exogenous variables;

— Tvendogenous are time-varying endogenous variables;

— Tiexogenous are time-invariant exogenous variables;

— ε_{it} is a vector of errors;

— t is a time period (for panel data)

We also examined the relevance of the HT specification with the help of two Hausman specification tests (the comparison of FE and RE estimators, followed by the comparison of FE and HT estimators). From the results gained through the tests conducted, the set of the chosen instruments is valid and cannot be rejected at the 5% level of significance. As a result, the HT model is found to be appropriate for the estimation.

The bootstrapping method, a common approach in empirical studies these days, was also implemented. Previous papers have generally found out that bootstrap tests are more reliable than asymptotic tests (see, for example, Davidson and MacKinnon, 2006). As empirically tested by Hedges (1992) and Hutchison, et al. (2000), bootstrap replications are performed in order to achieve a bootstrap p-value equalling 0.95. Table 6 presents the estimation results.

Table 6 Estimation Results

Independent variables	Time periods of the analysis (stages of the crisis)		
	2004-2007	2008-2009	2010-2011
Time varying exogenous			
Company age	64.54*** (3.21)	20.88 (1.29)	-29.22*** (-3.13)
Number of employees	0.01 (0.42)	-0.01 (-0.13)	0.02 (0.48)
Brand power	6572.52** (2.43)	3141.44*** (2.67)	4127.44 (1.47)
Time varying endogenous			
Business associations	1375.58 (0.96)	1382.19 (1.16)	-148.73 (-0.35)
Foreign capital	222.07 (0.81)	976.00** (2.21)	-83.62 (-0.37)
EVA	1.21* (1.65)	0.41 (0.49)	0.16* (1.68)
Time invariant exogenous			
Location in agglomeration	450.99 (0.81)	136.84 (0.32)	353.09 (0.90)
Top-universities	963.79* (1.95)	753.34** (2.11)	619.81 (1.49)
Country and Industry Dummy			
Germany	396.75 (0.62)	-13.63 (-0.02)	-387.34 (-0.72)
France	1381.00* (1.70)	227.97 (0.36)	-203.21 (-0.30)
Spain	-397.04 (-0.41)	-1308.90 (-1.31)	-1991.23* (-1.93)
Italy	3333.39 (1.42)	22.40 (0.01)	-2031.60** (-2.44)
Manufacturing	-495.36 (-0.78)	464.75 (0.95)	1721.16*** (3.54)
Construction & Real Estate	-866.23 (-1.37)	-754.20 (-1.43)	-264.33 (-0.62)

Services	320.94 (0.34)	-517.86 (-0.92)	-926.19* (-1.78)
Trade & Related Services	-242.35 (-0.32)	296.20 (0.42)	776.14 (0.90)
Energy & Chemical	7139.12** (2.51)	6408.58*** (2.57)	3755.03* (1.77)
Finance & Insurance	1774.22 (1.38)	459.12 (0.37)	-2391.19 (-1.19)
Constant	-3645.24*** (-3.13)	-2102.23** (-2.28)	1469.15** (2.26)
Sigma_u	21889.38	28371.04	27995.52
Sigma_e	2777.27	2918.00	2355.49
Rho (fraction of variance due to u_i)	0.98	0.99	0.99
Wald chi2 (18)	49.24***	37.35***	62.10***
P> Wald chi2 (18)	0.00	0.00	0.00
Number of observations (number of groups)	3174 (895)	1836 (942)	1844 (935)

All models are significant at 0.01. The number of companies observed varies between panels from 895 to 942. The findings suggest the statistically significant and positive impact of all relational capital inputs on company value, excluding agglomeration and participation in business associations (these coefficients are insignificant for all panels). Also, as expected, some differences in the levels of significance during different time periods were revealed.

A strong brand image is positive and significant in the panel for the crisis period and thus H_a is accepted. Moreover, branding is also significant for the value creation process during the years of prosperity. The coefficient for participation in business associations is insignificant for the particular periods. As a result, H_b is rejected. The indicator related to the use of foreign capital employed appears to be significant for the global economic crisis period and the sign is positive here. That is, H_c is rejected. For location, agglomeration is insignificant for all specified time periods. At the same time, the indicator of a top university nearby is significant for the years of prosperity and for the crisis. Moreover, the sign is positive for these periods. Despite this, H_d is rejected.

EVA is positively and significantly correlated with MVA at the 10% level for the years of prosperity (2004–2007) and for the recovery period (2010–2011). The sign is positive in all cases. Company age is significant for the prosperity years (positive influence) and for the recovery period (negative influence). For Italy and Spain the sign is significant and negative for the recovery period. In the panel for 2004–2007, the country variable for France is significant at the 10% level (positive influence). Among industries, the most interesting is the energy and

chemical industry: this is significant for all panels. The manufacturing industry appears to be statistically significant for the recovery period. The industry variable for services is significant at the 10% level for the years 2010–2011 (negative sign).

To sum up, some differences were detected for inputs during the period of economic prosperity, the global economic crisis, and the recovery period. It was found that compared with other panels, the panel for the crisis period had more significant inputs. This means that the key hypothesis is confirmed.

In conclusion, we have captured some relevant aspects of relational capital in terms of the value creation process within the context of the global economic crisis. This paper has highlighted the diverse and complicated nature of relational capital. The research has discussed different types of collaboration, such as links with customers, investors, partners and institutions, and categorized each of them according to the nature of their impact on company value and management opportunities.

As we expected, investment in customer relationships can be considered one of the major value creation drivers as it allows a stable cash flow to be maintained independently of the environment. The most interesting finding here is the lack of significance of brand power during the recovery period. This result is in contrast to the logic that brand power is an intangible resource with persistent relevance **(**Hägg and Scheutz, 2006).

Moreover, relations with institutes at the micro level could help companies overcome financial restrictions and divide risks during a crisis. This means that firm–university collaboration can be considered a driver of value creation. However, this result should be viewed as indicative descriptive evidence rather that implying a causal relationship. Like Abramovsky and Simpson (2011), we do not posit any causal relationship in terms of companies being driven to choose to locate close to universities in order to interact with them; universities themselves target collaboration with firms in their immediate area. At the same time, agglomeration, in contrast to other studies on the topic and our expectations, appears to be statistically insignificant. This may be due to the relatively small distances between European regional centres that make knowledge distribution quite simple. As a result, for companies in Europe, being located in major cities may not be a crucial point.

Surprisingly, the development of networks with partners via business associations did not matter for company value during all the periods analysed. This result is a somewhat different from the findings of other studies, but this may be due to the nature of the data. The main problem is that during the years 2004–2011, the variable "participation in association" on average changed only once – in the first year of the partnership. This constraint leads to some

statistical limitations, which is why future research is needed to investigate the influence of business associations on company value.

Contrary to our hypothesis, foreign capital is even more important for company value during the crisis period, providing evidence of the crucial role of foreign investors during a crisis for firms. Such kinds of collaboration make the process of technology and knowledge transfer easier and more effective. The results suggest that international penetration has a significant and positive impact on value creation.

The last findings concern the level of firm experience in the market. Company age influences company value during the prosperity and the recovery periods, but not the crisis itself. During the first period, the positive impact could be explained by the correlation between company experience and efficient governance. The exciting fact is the significant negative influence of company age on firm performance during the recovery period. It could mean that young companies are more successful in firm performance. Other words, young companies are more flexible and can adapt more easily to new circumstances in order to recover after a crisis (Ling, et al., 2007).

With reference to these findings, the paper identifies the crucial role of networks as a source of company success in terms of changing environment. Because the financial crisis considered here has only recently occurred, there has been insufficient exploration of the field. We believe that this study contributes to understanding of the need to invest in the development of external and internal relations and to consider these relations a major component in explaining the value creation process during the crisis period.

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