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Global Business and Economics Review

 This journal also publishes Open Access articles



Editor in Chief
Dr. Peter-Jan Engelen

ISSN online
1745-1329

ISSN print
1097-4954

8 issues per year
Subscription price

CiteScore
0.7 (2019)



A model for testing the relationship between company's size and performance: a cross country analysis

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Abstract: The purpose is to verify whether the company's size (in terms of production value) could be considered as a relevant factor in impacting company performance, taking into consideration the country variable. Italian and German companies have been compared. The country factor (considering its structural and economic characteristics that are different from the company's size) has a primary importance in determining the differences of performance between German and Italian companies. There is a weak relationship between the companies' performance and their size. Size factor is not one of the main factors that explain why the performance of the German companies is better than Italian ones. Global differences are mainly due to the structural and economic characteristics of each country and, in residual form, due to different size of the companies operating in those two countries. The research is characterised by several theoretical and practical implications, especially for top management and investors.

Keywords: Italian companies; German companies; company's size; company's performance; profitability; financial debt repayment.

Reference to this paper should be made as follows: Giacosa, E., Ferraris, A., Mazzoleni, A. and Vrontis, D. (2018) 'A model for testing the relationship between company's size and performance: a cross country analysis', *Global Business and Economics Review*, Vol. 20, Nos. 5/6, pp.524–543.

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This paper is a revised and expanded version of a paper entitled 'A model for verifying the correlation between the company's size and its performance in different countries' presented at Euromed Conference, Warsaw, Poland, 18–19 September 2016.

1 Introduction

In nowadays complex and hypercompetitive scenario where companies need to innovate continuously contrasting everyday old and new competitors (Santoro et al., 2016; Bresciani et al., 2016) a combination of economic, financial and growth aspects permits to understand the company's situation from different points of view (Vrontis et al., 2011; Ferraris et al., 2016a, 2016b). This can be analysed by the use of indicators aimed at assessing the company's performance (Arcari, 2004; Ferrero et al., 2006; Teodori, 2008).

The comparison between performance of the companies in different countries constituted a subject of numerous publications, despite the fact that international comparisons are not easy issue because of significant economic, social and cultural differences between the individual countries (Boffelli and Urga, 2015; Bozio et al., 2015; Bresciani and Ferraris, 2016). Moreover, the results obtained are not always convergent, as they depend on both the database and variables used to evaluate different sizes of the companies (Rivaud-Danset et al., 2001; Vrontis and Vronti, 2005).

The literature has been mostly focused on the opportunity to present a certain number of interdependent factors concerning the company's situation (Ferrero et al., 2006; Giacosa, 2015). Although a number of surveys is often aimed to deepen specific aspects (or relation between some variables), we decided to analyse the company as a system, which is influenced by a set of interdependent factors (Giacosa, 2011; Vrontis et al., 2016).

Our research is focused on the observation context mentioned above. The purpose is to verify if the company's size (in terms of production value) could be considered as a relevant factor in impacting their performance, taking into consideration the country variable. In particular, a correlation between the company's size and its performance has been investigated, comparing Italy and Germany companies.

The Italian and German companies have been compared because, for Istat, the German economic context constitutes a useful point of reference for Italy, as it is composed of small and medium-sized companies. Moreover, taking into account economies of European Union member countries, it is said that the German economy is one of the most advanced.

Framework of the present research (Giacosa and Mazzoleni, 2016) is defined by the model that has distinguished small and medium-sized enterprises into various typologies, on the basis of the following criteria: growth, profitability and their attitude to repayment of the financial debt, in the context of an informative matrix.

Additionally, it can be considered that the present research represents a development of Giacosa et al. (2016), which was aimed at the identification of appropriate methods of financing for small and medium-sized companies, through a comparison between Italian and German companies. In particular, it identified a set of indicators that indicate the appropriate financing methods for small and medium-sized companies, in terms of

growth, profitability, and capacity of financial debt's repayment. Our current research refers to the above indicators to reach a different purpose.

The context of our research is coherent with the current conditions in which the described companies operate, characterised by an intensive changeability as a result of the world financial crisis. Particularly, the research is related to the company require to understand its situation and improve profitability and ability to repay the financial debt, by adopting a set of indicators.

The research is composed of the following parts. The second paragraph represents the literature used for the purpose of the current research. In the third part, the research methods were introduced. The fourth paragraph contains the description of the results obtained and their discussion in the next section. And at the end the conclusions and implications of the survey are outlined, along with its limitations.

2 Literature

Researchers focused on a range of variables that permits a comparison between the company's situation, in several terms of observation, within a country or comparing several countries. With particular reference to the international comparisons, the comparison between the performances of the different countries was the subject of numerous publications. A significant part of the available literature is aimed to illustrate a set of interdependent indicators concerning the businesses situation (Ferrero et al., 2006; Giacosa, 2015).

Although the purpose of the survey is usually connected with the development of the specific aspects or relationships between some variables, exists a shared choice of understanding the reasoning from the global point of view, taking into account the company as a system, influenced by the series of interdependent indicators (Giacosa, 2011; Bresciani et al., 2015).

Considering the aim of the present research we have focused on the relationships between the company's performance, the country system and the company's size. Some of the research lines of studies divide literature in the following groups:

- a the first group of studies focuses on the relationships between the companies' business situation and trend of their growth
- b the second group of studies considers existing relationships between profitability, company's size and the country system.

With reference to the first group of studies, it exists many different ways of observing the condition of the company: it can be considered by taking into account the growth aspect (Giacosa, 2012a, 2012b; Goold, 1999) as well as referring to economic and financial context (Baginski and Hassel, 2004; Rossi, 2014; Vause, 2001).

In order to steer analysis of the literature towards the research objectives, we have chosen a set of observation aspects, regarding various aspects of the business situation, to arrive finally to the identification of those are more appropriate and the most interesting in the context of our research.

Instruments of financial analysis were very useful tool in evaluating the company's economic and financial situation, because its signaling ability (Bernstein and Wild, 1998; Ingram et al., 2002; Higgins, 2007), in spite of the limitations pointed out by the literature

(Brealey and Myers, 1988). Indeed, the use of financial analysis enables to define the company's situation in the sense of competences of productive, managerial and commercial nature (Marchi, 2010) in current and prospective terms (Bresciani, 2010; Bresciani and Ferraris, 2012), facilitating in this way the stakeholders in the assessment of the company's condition (Giacosa, 2012a, 2012b; Giacosa and Mazzoleni, 2012; Mazzoleni, 2012). For this reason, the use of financial analysis is important, as it permits to make use of synthetic elements (Baginski and Hassel, 2004; Giroux, 2003; Meigs et al., 2001; Mella and Navaroni, 2012), composed of various economic and financial indicators (Paolucci, 2013; Quagli, 2013; Sostero, 2014).

Considering the company's growth, another investigated aspect is represented by the factors that have an impact on it. A number of studies have analysed the relation between the company's growth and various elements such as environment and location of the companies and their ability of adapting to continuous changes in the country's environment in which the company operates (Bresciani et al., 2016), the company's size (Yasuda, 2005), its age (Robson and Bennet, 2000), the average rates of salaries (Almus and Nerlinger, 1999) and the financial structure of the company (Carpenter and Petersen, 2002; Giacosa, 2015).

By focusing our attention on the companies' financial structure (which permits, among other, to monitor the company's situation), a number of studies has linked the companies' financial structure with the company's growth trend (Delbreil et al., 2000; Harris and Raviv, 1990; Rivaud-Danset et al., 2001). These studies highlighted the role of the factors impacting the financial structure of the companies, which include among others: the activity sector (Long and Malitz, 1985), the characteristics of the market (market-based or banked-based) (Rajan and Zingales, 1995), the companies' size (Delbreil et al., 2000; Rajan and Zingales, 1995; Rivaud-Danset et al., 2001); the intensity of investments in research and development and advertising (Harris and Raviv, 1991; Long and Malitz, 1985), the proportion of the fixed assets over total capital invested.

In opinion of Giacosa (2015), the growth is an important factor in determining the financial structure of the company, as the financial resources are useful to support every subsequent strategy depending on the level of growth. Achieving the goals of growth can be influenced by the availability of financial sources, which represents an amplifier factor of the current and future growth possibility (Fazzari et al., 1988). Without a careful assessment of the growth impact on the financial sphere, the viability can result as compromise: in fact, the company would not be able to meet its financial commitments because of the absence or incomplete funds necessary to respect them (Herrera and Minetti, 2007; Honjo and Harada, 2006).

Bach (2014) suggests that the differences of the financial structure between firms of different countries are especially due to the structural characteristics of the countries regarding the different taxation, different degree of the financial markets development and different level of protection offered to creditors.

Among the choices in the context of the financial structure, we can find the degree of indebtedness. This needs to be analysed jointly with the company's ability to generate cash flows. Indeed, a certain level of debt is acceptable if the resources externally acquired generate a positive leverage effect (Ferrero et al., 2006). The results of the studies on the relationship between leverage and companies' size can differ sometimes. However, according to Smith and Watts (1992), there is an inverse relationship between the growth opportunities and debt ratios.

With reference to Remolona (1990), there is always an inverse relationship between the company's size and leverage, while Rajan and Zingales (1995) finds a positive correlation in all the countries analysed, except in Germany. Rivaud-Danset et al. (2001) suggests, instead, that the short-term debts are more relevant in the smaller companies, in comparison with the larger ones. Delbreil et al. (2000) found that the relationship between size of the company and leverage is not equal among the countries analysed in his study: in particular, the small German and Austrian companies are more indebted than the large-size companies and enterprises from other countries (Spain, France and Italy). A more recent study conducted by Bach (2014) showed that in almost all of the countries except Spain, Germany and France, the debt and company's size are correlated in the negative way.

With a particular reference to the existing relationship between the growth and the company's size (Kumar et al., 1999; Yasuda, 2005; Vlachvei and Notta, 2008), some suggestions are very interesting. Oliveira and Fortunato (2006) stated that newly established companies and the small ones have more substantial growth than the big and mature companies. These statements are in contrast with the theory of Gibrat (1931), according to which the company's growth and size constitute two independent factors. In addition, the small companies operating in the above mentioned sectors (with a high R&D rate) are growing more than the companies of big dimensions.

With reference to the second group studies, a number of studies has used a different methodologies and samples, to compare this aspect of observation. Rivaud-Danset et al. (2001) showed that the differences in profitability between companies from different countries are mainly influenced by the company's size factor, and a little by the country factor. On the contrary, the study of Victor and McGahan (2006) noted that the country factor has significant relevance in analysing the differences in the profitability of companies.

Schiefer and Hartmann (2009) attributed to the country factor only a residual role in the explanation of the difference between the profitability of different countries. In addition, Bach (2014) suggested that in different countries the relationship between the company's size and its profitability is different: in some of them there is an inverse relationship (Spain, Portugal, and Poland) while in other countries the relationship is positive (France, Germany, Belgium, Austria).

With reference to the relationship between profitability and leverage, the results of studies conducted by different authors are homogeneous. They claimed that, with increasing profitability, the debt of the company decreases (Rajan and Zingales, 1995; Rivaud-Danset et al., 2001; Shyam-Sunder and Myers, 1999), as the company produces by itself a series of financial resources useful to support the needs of management. Moreover, the inverse relationship between profitability and debt becomes stronger if we consider the trend of cash flow together with a short-term indebtedness (Remolona, 1990), and is more substantial for large companies (Rajan and Zingales, 1995).

According to the literature presented above, we can conclude that does not exists a model which would be able to assess the evolution in time of the state of health of the small and medium-sized companies in the period considered, in the context of combination the following criteria: growth, profitability, and the company's ability to repay financial debt. Moreover, the developed model could permit companies to adopt a various measures necessary to improve their situation, by defining the current state and following the path leading to virtuous position in terms of economic-financial situation and the companies' growth.

Concluding, the analysis of the current and future situation of the company and the understanding of the key business factors and their reasons constitute an aspect with high relevance, as these issues have a significant impact on the decision-making process carried out by the owners and/or management and in strengthening the company's performance and survival conditions in a long period of time (Higgins, 2007; Ingram et al., 2002).

3 Methodology

3.1 The sample

The purpose of the research is to verify if the company's size could be considered a relevant factor in impacting their performance. In particular, we compared Italian and German companies.

As for many other recent studies (e.g., Bresciani and Ferraris, 2016; Ferraris et al., 2016a, 2016b; Vrontis et al., 2016), the Amadeus-Bureau van Dijk database was the basis for our analysis, as it allowed to identify the Italian and German companies on which the survey was conducted. Subsequently, the companies have been matched to proper economic sector, adopting the NACE classification of the European Institute of Statistics (Eurostat).

Carrying out the survey requires an identification of two population of companies:

- a Italian companies
- b German companies.

According to the Italian companies, the population taken into consideration consists of 758,153 companies, while the sample of German companies counts 201,854 companies (presented in Amadeus database on the analysis reference day).

Creation of the samples demanded application of the following criteria:

- availability of the company's financial statements related to 2011, 2012 and 2013 (this three-year period was considered as minimum necessary to conduct the survey)
- preparation of the financial statements was not made in accordance with International Accounting Standards (IAS), in order to ensure the cohesion of the data analysed
- belonging to economic activities of NACE, considered as relevant (the companies belonging to its residual economic activities have been excluded)
- achievement of the production value in 2013 between 5 and 250 million Euro (in present analysis *production value* instead of *sales* was used to extend it about the working on order companies)
- presence of the detailed 'total debt' position in the financial statements (the companies which have not fulfilled this condition were excluded from the survey).

Manufacture sector consisting of 23 different activities has been further divided in the following categories: food, automotive, pharmaceutical, rubber-plastic, machinery, metal-mechanic, petrochemical, textile and other manufacturing.

The final sample is composed of 41,344 Italian companies and 12,219 German companies, operating in different sectors.

3.2 *The research design*

In order to achieve the aim of this research, the following research question has been formulated.

RQ Does exist a correlation between the company's size and its performance, comparing Italy and Germany?

The research methodology has been developed by the following steps:

- classification of the companies by production value cluster
- identification of some relevant indicators for the survey
- use of the above indicators for the evaluation of the economic and financial situation of Italian and German companies.

Each aspect has been analysed.

3.2.1 *Classification of the companies by production values cluster*

The company's size of Italian and German companies have been classified in relation to production value in five classes: 200 and 250 million Euro; 100 and 200 million Euro; 50 and 100 million Euro; 10 and 50 million Euro; 5 and 10 million Euro.

Once the companies have been placed in the correct production value cluster, for each cluster we calculated:

- the average amount of production value, Ebitda and financial debt recorded during the three year-period considered
- the average amount of production value, Ebitda and financial debt of a company belonging to that production value cluster.

3.2.2 *Identification of some relevant indicators for the survey*

For this purpose, our framework is represented by a model developed in a previous publication (Giacosa and Mazzoleni, 2016), which identified some relevant indicators for evaluating small and medium-sized companies performance.

The relevant indicators have been classified into the following categories – despite they have been considered in a system way (Coda, 1990; Ferrero et al., 2006; Teodori, 2008):

- a company's growth
- b company's profitability
- c company's ability of financial debt repayment.

The company's growth was measured using the *compound annual growth rate* (CAGR) indicator, which represents the annual average production value in three-year period (2011–2013). Indicator was calculated using the formula illustrated below.

$$CAGR = \sqrt{\frac{PV_m}{PV_n}}$$

where

PV_n, PV_m production value developed by a company respectively in years 'n' and 'm', with $m > n$.

CAGR indicator permits to neutralise the volatility of growth rates' effects, calculated on individual years, avoiding an arithmetic average which is less meaningful.

Choosing the most suitable indicators of profitability and ability to repay financial debt, we analysed a wide range of indicators and then we calculated their correlation with company's economic and financial situation (comparing the companies under normal operating conditions with bankrupt companies).

The criteria used to define relevant parameters necessary to value economic and financial situation of the company are as follows:

- high correlation between the company's situation and each indicator
- correlation between identified indicators.

It emerged that some indicators (EBITDA/PV and financial debts/EBITDA) reflect both: the significant correlation between the company's situation and the indicators themselves (respectively -0.3245 and -0.0874) as well as a lower correlation between two identified indicators (-0.0094). Finally, the following indicators have been used:

- referring to profitability: relation EBITDA to production value which reflects the capacity of generating cash flow by the company:

$$\text{Profitability in the year 'n'} = \text{Ebitda}(n) / \text{Production value}(n)$$

- referring to ability of financial debt's repayment: the relation between Financial Debt and EBITDA enables the estimation of time necessary to repay debts using the sources deriving from the core business activity:

$$\text{Ability to repay the financial debt in the year } n = \text{Financial Debts}(n) / \text{Ebitda}(n)$$

3.2.3 Use of the above indicators for the evaluation of the economic and financial situation of Italian and German companies

The first step was the calculation of the average values of the three above-mentioned indicators for each of the companies (the only exception was the growth, regarding to which the calculation of average values was unnecessary, because the CAGR indicator reflects by itself an average growth rate in three years considered).

$$CAGR = \sqrt{\frac{PV_{2013}}{PV_{2011}}} - 1$$

$$\text{Average Profitability} = \frac{EBITDA_{2011} + EBITDA_{2012} + EBITDA_{2013}}{PV_{2011} + PV_{2012} + PV_{2013}}$$

$$\text{Average Financial Debt Ratio} = \frac{\text{Financial Deb}_{2011} + \text{Financial Deb}_{2012} + \text{Financial Deb}_{2013}}{\text{EBITDA}_{2011} + \text{EBITDA}_{2012} + \text{EBITDA}_{2013}}$$

Secondly, next step was the calculation of the average value of the three indicators of all of the Italian and German companies, using the following formulas:

$$\text{CAGR} = \sqrt{\frac{PV_{c2013}}{PV_{c2011}}} - 1$$

$$\text{Average Profitability} = \frac{\text{EBITDA}_{c2011} + \text{EBITDA}_{c2012} + \text{EBITDA}_{c2013}}{PV_{c2011} + PV_{c2012} + PV_{c2013}}$$

$$\text{Average Financial Debt Ratio} = \frac{\text{Financial Deb}_{c2011} + \text{Financial Deb}_{c2012} + \text{Financial Deb}_{c2013}}{\text{EBITDA}_{c2011} + \text{EBITDA}_{c2012} + \text{EBITDA}_{c2013}}$$

where PV_{c2013} , PV_{c2012} , PV_{c2011} is the production value achieved by the companies from the cluster C in 2013, 2012 and 2011; EBITDA_{c2013} , EBITDA_{c2012} , EBITDA_{c2011} is the Ebitda realised by the companies from the cluster C in 2013, 2012 and 2011; $\text{Financial Deb}_{c2013}$, $\text{Financial Deb}_{c2012}$, $\text{Financial Deb}_{c2011}$ is the financial debts reached by the companies from the cluster c in 2013, 2012 and 2011; c identifies the country and means respectively Italy or Germany.

The same methodology was adopted to calculate the average values of the indicators for each group of the companies, identified on the basis of classification by production value, presented in point A.

Referring to RQ, a Pearson correlation between country, production value cluster and single indicators has been calculated. To avoid the impact of outlier on the calculated correlation, the calculation has involved only the values between the first and the fifth quartile. In particular, for each indicator the values included in inter-quartile range have been identified and then we have calculated the correlations between country, production value cluster and single indicator.

The country factor assumes value equal to 1 if each company runs its activity in Italy, and value equal to 0 if it operates in Germany, while the production value cluster assumes values 1, 2, 3, 4, 5 corresponding to clusters of 5–10 mln, 10–50 Mln, 50–100 Mln, 100–200 Mln e 200–250 Mln.

The Pearson correlation, in case in which the two samples are independent, is calculated as follows:

$$\rho = \frac{\text{Cov}(x, y)}{\sqrt{\text{var}(x)\text{Var}(y)}}$$

where

$\text{Cov}(x, y)$ illustrates the correlation between the variables x and y

$\text{var}(x)$ represents the variance of x

$\text{Var}(y)$ represents the variance of y

x, y reflects the variables by reference to which the correlation is calculated.

4 Findings

The sample on which the survey was carried out consists of 41,344 Italian companies and 12,219 German companies. Table 1 shows Italian and German companies according to the different production value clusters identified in the methodology.

Table 1 Comparison Italy/Germany articulation of the Italian and German companies for the production value cluster

<i>Production value cluster</i>	<i>Italy</i>		<i>Germany</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
5–10 million	19,050	46.08%	2,661	21.78%
10–50 million	18,588	44.96%	6,111	50.01%
50–100 million	2,414	5.84%	2,063	16.88%
100–200 million	1,081	2.61%	1,141	9.34%
200–250 million	211	0.51%	243	1.99%
Total	41,344	100%	12,219	100%

Source: Own elaboration

According to the table presented above, it emerged that:

- The average production value of 91% of the Italian companies analysed was between 5 and 50 million Euro in period 2011–2013; in particular 46.08% (19,050 companies) is placed in the production value cluster of 5–10 million euro and 44.96% (18,588 companies) in that between 10–50 million euro.
- The remaining 9% of the Italian companies analysed has developed in 2013 a production value between 50 and 250 million euro; in particular 5.84% (meaning 2,414 companies) is placed in the production value cluster between 50–100 million euro; 2.61% (meaning 1,081 companies) in that between 10–50 million euro and 0.51% in the cluster between 200–250 million euro.
- 72% of the German companies has realised in the period 2011–2013 a production value between 5 and 50 million Euro. In particular, 21.78% of them (2,661 companies) is located in the production value cluster between 5–10 million euro and 50.01% (6,111) in that between 10–50 million euro.
- 17% of the German companies analysed has recorded the production value between 50–100 million Euro.
- The remaining 11% of the German companies analysed have developed in 2013 a production value between 100–250 million Euro.

Table 2 shows Italian and German companies according to the different average values recorded by all the companies in three-year period 2011–2013.

Table 2 Comparison Italy/Germany: average values recorded by all the companies in three-year period 2011–2013 (values in millions of Euro)

<i>Production value cluster</i>	<i>Italy</i>			<i>Germany</i>		
	<i>Production value</i>	<i>EBITDA</i>	<i>Financial debts</i>	<i>Production value</i>	<i>EBITDA</i>	<i>Financial debts</i>
5–10 million	129,795	8,815	50,837	18,624	1,685	10,210
10–50 million	378,555	24,915	124,581	147,805	13,910	66,830
50–100 million	165,845	11,428	46,167	144,642	12,349	35,797
100–200 million	147,113	9,713	33,935	157,110	11,581	29,002
200–250 million	47,266	2,551	10,057	52,628	3,617	7,907
Total	868,574	57,422	265,577	520,809	43,142	149,746

Source: Own elaboration

In the period considered the Italian companies had a production value on average 868,574 million euro, while 12,019 german companies have produced 520,809 million euro.

Table 3 shows Italian and German companies according to the different average values recorded by each company in three-year period 2011–2013.

Table 3 Comparison Italy/Germany: average value for each company in the three-year period 2011–2013 (in thousands Euro)

<i>Production value cluster</i>	<i>Italy</i>			<i>Germany</i>		
	<i>Production value</i>	<i>EBITDA</i>	<i>Financial debts</i>	<i>Production value</i>	<i>EBITDA</i>	<i>Financial debts</i>
5–10 million	6,813	463	2,669	6,999	633	3,837
10–50 million	20,366	1,340	6,702	24,187	2,276	10,936
50–100 million	68,701	4,734	19,125	70,112	5,986	17,352
100–200 million	136,090	8,985	31,393	137,695	10,150	25,418
200–250 million	224,009	12,090	47,664	216,576	14,885	32,539
Total for each company	21,008	1,389	6,424	42,623	3,235	11,608

Source: Own elaboration

Observing the average values for each company, we can make the following conclusions:

- the Italian companies on average have developed a production value equal to 21,008, while the German companies have doubled this amount
- an average EBITDA realised by German companies is 2.33 times higher than in case of Italian companies
- German company on average is indebted about 1.8 times more than Italian one.

According to the observation of the average values for each company and for dimension of the production value it is observed that:

- production value of German companies on average is higher in every cluster except the last one, where production value of Italian companies is higher

- average EBITDA realised by the German companies is higher than by Italian ones in every production value cluster; the gap is becoming bigger with increasing the companies' dimension
- German company with dimension of 5–50 million has on average higher financial debts than Italian one; however, a German company with dimension above 50 million on average have recorded less financial debts than Italian ones.

Table 4 shows the comparison between Italian and German companies, in terms of profitability, financial debt ratio and growth (Baginski and Hassel, 2004; Grandinetti and Nassimbeni, 2007; Vause, 2001).

Table 4 Comparison Italy/Germany

<i>Categories of companies in the informative matrix</i>	<i>Profitability</i>		<i>Financial debt ratio</i>		<i>Growth</i>	
	<i>Italy</i>	<i>Germany</i>	<i>Italy</i>	<i>Germany</i>	<i>Italy</i>	<i>Germany</i>
5–10 million	6.67%	9.05%	5.77	6.06	5.12%	5.63%
10–50 million	6.58%	9.41%	5.00	4.80	–0,15%	1.61%
50–100 million	6.89%	8.54%	4.04	2.90	–0.31%	1.43%
100–200 million	6.60%	7.37%	3.49	2.50	–0,98%	1.26%
200–250 million	5.40%	6.87%	3.94	2.19	–5.86%	–2.02%
Total	6.61%	8.30%	4.63	3.47	–0.17%	0.52%

Source: Own elaboration

According to the Table 4, it emerged that:

- in terms of profitability 12,219 German companies in the three-year period considered, have recorded on average 1.3% higher profitability than the Italian ones
- German companies have a better ability to repay debts than the Italian companies of about 1.2 years
- regarding to the growth, in terms of average production value in the three-year period considered, German companies grow on average more than the Italian ones (0.52% for the German companies versus a negative growth of Italian ones equal to –0.17%).

In order to evaluate the correlation between companies' size and performance (Kumar et al., 1999; Yasuda, 2005; Vlachvei and Notta, 2008) between the two countries, the Pearson correlations between the production value cluster, country and the different dimensions of companies have been analysed (Table 5).

Table 5 Correlation between production value cluster, CAGR and country

<i>Country</i>	<i>Production value cluster</i>	<i>CAGR</i>	
1	–0.2868	0.2661	Country
	1	–0.0875	Production value cluster
		1	CAGR

Source: Own elaboration

It emerged that the correlation between CAGR and production value is negative (−0.0875), indicating that the growth decrease with increasing the companies' size. However, correlation mentioned before is weak, if compared to the correlation between CAGR and Country where the company operates.

In addition, if we do not take into consideration 25% of the lowest and 25% of the highest data of both countries, the Italian companies grow faster than the German ones. We can therefore say that changes in the production value in time are stronger for Italian companies than in case of German ones.

Table 6 represents correlations between production value cluster and profitability.

Table 6 Correlation between production value cluster and profitability

<i>Country</i>	<i>Production value cluster</i>	<i>EBITDA/production value</i>	
1	−0.2843	−0.2180	Country
	1	0.0698	Production value cluster
		1	EBITDA/production value

Source: Own elaboration

The correlation between the production value cluster and profitability (expressed by the ratio EBITDA/production value) is positive and is equal to 0.0894. However, comparing this result with correlation between indicator EBITDA/production value and the company's country, it seems to be weak (−0.0894 and −0.4131). It allows us to conclude, that differences between the two countries persist and are mainly due to the country's factor rather than company's size factor (Table 7).

Table 7 Correlation between the production value cluster and CAGR

<i>Country</i>	<i>Production value cluster</i>	<i>Fin. debt/Ebitda</i>	
1	−0.2747	−0.4308	Country
	1	−0.1331	Production value cluster
		1	Fin. debt/Ebitda

Source: Own elaboration

The correlation between production value cluster and financial debt/EBITDA ratio (Remolona, 1990; Rajan and Zingalez, 1995; Shyam-Sunder and Myers, 1999) is negative and equal to −0.1331, indicating reduction of financial debt/EBITDA ratio with the growth of production value and therefore an increase of the companies' ability to repay their debts. In this case, we can see how the ability to repay debts is correlated with both the country factor and company's size factor, although the intensity of the relationship is different.

5 Discussion

The conducted analysis reveals differences between Italy and Germany in terms of companies' size. 91% of Italian companies are classified as companies with production value between 5 and 50 million, while the German companies with the same production value constitute only 72% of the companies analysed. Furthermore, companies whose

production value is between 50 and 100 million Euro play a more important role in the German economy than in the case of Italian economy (17% versus about 6%). Finally, presence of the companies with production value above 200 million Euro is higher in Germany (11% versus 4%).

For a given production value, German companies have a better profitability than the Italian ones. It also notes that the difference in profitability between Italy and Germany is higher for companies, that has a production value between 5 and 50 million (measured in terms of production value), while it decreases for companies with production value between 50 and 250 million Euro.

With increasing the company's size, the ability to repay debt increases, as well. This statement is supported by the results emerging from the analysis of both Italian and German companies. In particular, the ability to repay debts of German companies having production value of less than 10 million Euro is lower in comparison to Italian companies of the same size (measured in terms of production value). The differences between the two countries become more consistent for companies with a production value of over 50 million.

Regarding to the growth it is observed that the companies with production value below 10 million are those growing higher, both in Italy and in Germany, with similar growth rates (5.12% for Italy and 5.63% in Germany). With increase of the company's size it is observed a slowdown in growth of production value both for Italy and Germany. There's a difference: while Italian companies with production value between 10 and 50 million Euro suffer a decline in production value, in Germany the change in production value remains positive. Companies with production value between 200 and 250 million, show a contraction in the production value both in Italy and in Germany. The two countries differ in the intensity of the contraction (-5.86%-2.02% in Italy and Germany).

Referring to RQ , and analysing correlations emerging from the survey conducted on the data between the first and third quartile, we can affirm that there is a weak relationship between the companies' performance (measured in terms of: profitability, growth and debt repayment capacity) and their size. This relationship shows that with increase of the company's size, it is observed decrease in the growth rate and an increase in the company's ability to repay debts. These results are in line with company life cycle: the companies in the early stage of their lives have significant growth rates (as in the case of the companies with low production value), which are more stable in their development and maturity phases.

The correlation between clusters of production value and profitability suggests that the profitability of companies increases with their size. The different conclusions that emerge from the two survey methods adopted suggest that small companies of the analysed sample are characterised by greater volatility of profitability values; in the same time, they are concentrated in the tails of the distribution of profitability values. The greater the size of a company, the greater are the company's resources available to meet its financial needs and invest in new activities that contribute to improve the profitability of the company (if they are successful investments).

The higher profitability of the companies with larger dimensions allows them to rely more on resources obtained from core business activity and therefore have lower need to resort to financial debt in order to meet their financial requirements.

For the German companies occurs the following observation: small companies are more indebted and large ones are less indebted than Italian companies. It would appear

that once a high level of production value of the German companies is established, they meet their financial needs and fund new investments using the resources generated internally more frequently than Italian companies do.

We can affirm that the relationship between the country system and the company's performance is relevant. In particular, the differences between Italy and Germany are mainly due to the economic structural features of individual countries and only partly due to different size of the companies operating in the two countries.

6 Conclusions, implications and limitations

The purpose of the research is to determine whether the differences between the performance of companies of Italy and Germany were not only due to their economic characteristics, but also to the size of each company (observed in relation to the production value of that company).

It emerged that, on average, each German company has a greater production value, is more profitable and has a superior ability to repay debts in comparison with Italian company. From the conducted analysis, it is possible to say that the German economy is different than Italian one, in terms of company's size (in terms of production value), although in both countries the majority of companies has a production value between 5 and 50 million Euro (72% versus 91%). This situation can be attributed to two following factors: firstly, in Germany the companies with production value of 5–10 million are moving towards a cluster of 10–50 mln, and those whose production value was between 10–50 million are moving into cluster characterised by production value of 5–100 million. Secondly, the economic situation of the two countries constitutes an important factor to consider. Italy has suffered the effects of the last crisis more heavily than Germany and the recovery process in Italy was slower than in case of Germany (Eurostat).

Observing several variables (country, production value cluster, and financial indicators), it emerged that the country factor (considering its structural and economic characteristics that are different from the company's size) has a primary importance in determining the differences of performance between German and Italian companies. On the contrary, there is a weak relationship between the companies' performance (measured in terms of profitability, growth and debt repayment capacity) and their size: it means that the size factor is not one of the main factors that explains why the performance of the German companies is better than Italian ones. It follows that the global differences between the two countries are mainly due to the structural and economic characteristics of each country and, in residual form, due to different size of the companies operating in those two countries.

The research is characterised by series of theoretical and practical implications. First, with reference to the theoretical implications, the research can represent a contribution to the scientific debate, because it permits the company to understand, which factors of both internal nature (profitability, growth and ability of debt repayment) and external nature (depending on the structural and economic characteristics of the country) have impact on the companies' performance. Therefore, the research is characterised by a certain multidisciplinary: it combines management considerations with changes of economic nature, looking for a liaison between them.

Second, with reference to the practical implications, the research can represent a contribution for the company and for investors:

- Regarding to the companies, the ownership and/or the management has the possibility to assess degree of influence of a series of variables on the ongoing company's performance. In this way, the decision-making process is more knowledgeable, because the various management's actions have impact on the performances that are object of the evaluation.
- Regarding to the investors, this research permits to establish what kind of relation exists among a series of variables, that represents a decisional element in reference to the investment choice in a company: the research findings permit to upgrade the quantitative information around which the investments choices took place.

The research is characterised by several limitations, which nonetheless do not affect significantly the conclusions and proposed observations:

- firstly, there are only three indicators used to assess the company's economic and financial condition (this choice is justified by important correlation between the indicators used and the company's condition)
- secondly the different database used to obtain financial statements of the German and Italian companies. In this way the number of Italian and German companies is disproportionate
- finally, the time horizon on which the survey is carried out did not permit to assess persistence of the differences in performance of the companies in pre-crisis, during the crisis and post crisis phase.

Future studies will embrace these aspects, with the purpose to improve the model's effectiveness.

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