POZNAŃ UNIVERSITY OF ECONOMICS REVIEW
Volume 12 Number 3 2012

Marlena DZIKOWSKA, Barbara JANKOWSKA
Poznań University of Economics

The global financial crisis of 2008–2009 and the Fortune Global 500 corporations. Looking for losers among the biggest – exploratory study

Abstract: The paper focuses on the influence of the financial crisis and economic downturn during 2008–2009 on the world's 500 biggest corporations. The authors present an overview of literature providing some insight into the impact the global financial crisis and economic downturn during 2008–2009 exerted on enterprises and their operations. The empirical data gathered from the Fortune Global 500 reports during 2007–2010 are used in cluster analysis and descriptive statistics. The empirical research conducted by the authors allows to indicate that among the analyzed population there exist significant differences in terms of their financial performance measured as return on revenues, return on assets and profit per employee. The discrepancies in this area grew during the crisis period. The reaction to the crisis among the analyzed population in the first year of the crisis (which was characterized by a high level of uncertainty among enterprises), was different than in the next year (when estimation of the risk associated with ongoing activities was easier). Among the companies that were most severely influenced by the crisis (their financial performance worsened the most) dominate those operating in Airlines, Diversified Financials and Motor Vehicles and Parts industries.
Keywords: financial crisis, economic downturn, corporations.
JEL codes: F23.

Introduction

The perspectives of research concerning financial and economic crisis during the years 2008–2009, which have so far dominated in the literature, are macroeconomic and mezzo-economic. However, there seems to exist a need for more in-depth research in the situation of broadly understood companies operating in the difficult conditions of financial crisis and economic downturn. The reasons for that are twofold. First of all, the microeconomic perspective in this field of research is of special importance because between both of the mentioned phenomena and broadly understood enterprises there exists a direct feedback. The analyzed financial crisis and economic downturn not only directly influenced enterprises but were also openly spread all over the globe through corporate operations and linkages. Secondly, companies in the dominating free-market reality are one of the main players who are responsible for overcoming of the economic downturn.

Therefore the authors aim at examination whether within the world's 500 biggest[1] corporations there was a group of organizations which suffered[2] the most because of the global financial crisis and economic downturn. Furthermore, the authors want to indicate what was the industrial background of those corporations and what was their country of origin.

The paper has been divided into six sections. Section 1 is devoted to a brief presentation of definitions and concepts of financial and economic crisis. Section 2 presents some snapshots of the results of the studies focused on the economic downturn and its consequences for companies. Up till now there have been only scarce data about it. Section 3 is focused on the methodology of the study. Section 4 is devoted to the assessment of the overall situation of the biggest global corporations in the period of the global financial and economic crisis. Section 5 presents the results of cluster analysis used to segment the biggest global corporations according to their performance and Section 6 closes the paper with final remarks.

1. Definitions and concepts of financial and economic crisis

According to the literature, the financial crisis is a disruption to financial markets in which adverse selection and moral hazard problems become much worse, so that financial markets are unable to efficiently channel funds to those who have the most productive investment opportunities [Mishkin 1996]. The economic crisis in the simplest terms is a sharp drop in economic activity (production, employment, investment). The financial crisis that broke through in 2008 led to the deepest and most synchronized global recession over the past 70 years [Gourinchas & Kose 2011]. The consequences of both the financial crisis and economic downturn appeared in the global economy during the years 2008–2009 in a scale and scope not seen since the late 30s of the twentieth century.

The recent financial crisis and its consequences have become a topic of studies for many researchers. It has been analyzed among others from the perspective

[1] The companies are ranked by total revenues for their respective fiscal years. An interesting study focused on one of the biggest market players in the world economy was provided by Czarny, Menkes and Toporowski [2009].

[2] By suffered the authors understood the worsening of financial performance.

of its causes [i.e.: Purnanandam 2009; Allen & Carletti 2010; Merrouche & Nier 2010; Ngowi 2010; Kowalski & Shachmurove 2011; Szyszka 2011], its influence on economies or industries [i.e.: Meyn & Kennan 2009; Brown, Lax & Petersen 2010; Przybylska-Kapuścińska 2011; Shachmurove 2011] or its implications [UNCTAD 2009a; Claessens *et al.* 2010; Kowalski & Shachmurove 2011; Kluza 2011].

There is still scarce data about the impact of the crisis on the main corporate players in the world economy – global corporations. In the year 2009 in the global market operated ca. 82,000 transnational corporations that possessed about 810,000 of foreign subsidiaries. At the same time it is estimated that the number of their employees in the year 2008 amounted to 77 million [UNCTAD 2010, p. 17]. According to the data provided in the Fortune Global 500 report [Fortune 2009], the 500 of the biggest world corporations in 2008 employed ca. 56.43 million people, which at that time constituted around 73.29% of the transnational corporations' workforce. Although it is almost impossible to gather data concerning all the world's transnational corporations, it is possible and at the same time it seems interesting to observe the reaction of the world's biggest corporations to the financial and economic crisis during years 2008–2009. The observation of the impact of the financial and economic crisis on those enterprises is even more interesting when taking into consideration that those 500 firms, which constituted only around 6.0% of the total number of the world's transnational corporations in 2009, were responsible for ca. 73% of the world transnational corporations' total employment.

It is easy noticeable that the impact of the crisis is related to different aspect of business strategy and activities undertaken by companies. The mentioned area of research is especially difficult to conduct due to very limited access to a broad scope of corporate data and high expenses of their gathering. These might be the reasons why the so far available research mostly concentrates on narrow areas of companies' operations.

2. The impact of the financial crisis and economic downturn during the years 2008–2009 on enterprises – empirical research results overview

One of the topics commonly linked in the empirical research with the financial crisis of the years 2008–2009 was corporate social responsibility (CSR). For example, Fernández and Souto [2009] investigated the results of the latest economic and financial crisis on CSR. CSR was recognized as a threat for companies' survival because of additional financial costs for the social initiatives. Karaibrahimoglu [2010] investigated CSR performance for the period 2007, pre-financial crisis, and 2008, a starting point of the crisis in the USA market, adopting the stakeholder approach.

The sample was based on Fortune 500 corporations. 100 companies from the ranking were randomly selected. In this case CSR performance was analyzed with the use of the content of annual non-financial reports. In total, twenty nine indicators were analyzed for estimating CSR performance and were classified into five stakeholders' areas, namely: employee, consumer, government, supplier and society. Results revealed that companies decreased CSR projects because of the financial crisis. The decrease in CSR projects was greater in the USA than in Europe and other countries.

Social responsibility issues in relation to the crisis were also empirically examined by other researchers. Njoroge [2009] examined how the current financial crisis affected multinational companies operating in Kenya and the effects of multinational companies in social projects and labor standards. Results showed that the economic downturn had no severe effect on labor standards, while there was an adverse effect on funding and implementing social projects. Şchiopoiu Burlea *et al.* [2010] investigated the influence of financial crisis and corruption on CSR in Romania. The research demonstrated that companies need to pay attention to their ethical sphere and to the institutional legitimacy of the managers' behavior. Arevalo and Aravind [2010] examined the impact of financial crisis on CSR taking into account companies that adopted the principles of United Nations Global Compact (UNGC). In total, the study was conducted among 271 USA members of UNGC and concluded that in some cases CSR was considered as a starting point for improving business operation. Companies that implemented a more proactive policy concerning UNGC were less severely affected by the crisis. Giannarakis and Theotokas [2011] conducted an empirical analysis, based on companies that implement Global Report Initiatives (GRI) reporting guidelines modifying the application level in a point score system. Totally, 112 companies were included in the GRI report list in 2007 (pre-financial crisis), 2008, 2009 and 2010. The results indicated increased CSR performance before and during the financial crisis except for the period 2009–2010, showing that the benefits that might arise from the implementation of CSR strategy and initiatives were more important than ever before for the companies' survival.

The financial and economic crisis is of great importance for growth strategies of companies. It has a visible impact on the intensity of mergers and acquisitions, as well as other investments. Burksaitiene [2010] examined this issue and it turned out that in 2008, the value of cross-border mergers and acquisitions (M&A) sales of the developed countries' companies fell by 39%, approximately their 2006 level. The number of such M&A deals fell by 13% as the financial and economic crisis made a dampening effect on cross-border M&A activity. Data for 2009 revealed a continuing downward trend: the number of high value M&A deals fell sharply. The explanation for this is avoidance of financing such transactions by banks and a sharp fall of stock prices on the developed countries' stock markets. One outcome of the crisis, as underlined by Burksaitiene, was the cancellation of large privatization projects. The subject of corporate acquisitions was also examined by Wan and Yiu [2009]. They found a general support that corporate acquisitions are positively related to corporate performance during an environmental jolt, but the same relationship before and after the jolt is negative in comparison. Their findings indicated that whereas many firms might be inclined to act conservatively in an environmental jolt, firms that pursue acquisitions during the jolt benefit from newly created opportunities. Additionally, some research evidenced that in the year 2009 85% of the transnational corporations decided to decrease the level of the previously planned investment due to the economic downturn [UNCTAD 2009b]. 79% of those corporation claimed that the direct cause of this situation was the financial crisis. In the year 2009 the researchers also noticed a decrease in the total research and development spending of the 1000 world biggest corporate investors in this area [Jaruzelski & Dehoff 2010].

Yakovlev, Simachevb and Danilov [2010] focused their research among others on the behavior of medium-size companies in Russia in the case of default on the corporate bond market. Under crisis conditions defaults on corporate bonds have become much more frequent. It turned out that there were 109 technical defaults during October 2008–March 2009. In the case of 21% of technical defaults registered during October 2008–March 2009 open talks occurred about restructuring to keep their creditors from suing for bankruptcy after a fully-fledged default. In 3% of the technical defaults registered during the same period there were attempts to restructure their liabilities in talks with the holders or to swap their debt for property (i.e. convert bonds into equities). Doing nothing or engaging in asset withdrawal before their bankruptcy in an attempt to swindle their creditors was taken in 76% of the technical defaults registered during October 2008–March 2009.

3. Methodology of the authors' study

In general from the microeconomic perspective, as highlighted by Claessens, Kose and Torrenes [2010], the financial crisis and economic downturn can cause a decrease in generated revenues, a loss of market share and a general deterioration of profitability. However, the extent of the negative impact of the financial and economic crisis is differentiated, depending on the market (in the sense of geography and industry) in which particular companies were operating. The empirical research suggests that the industries that were most severely influenced by the financial crisis and economic downturn were to a higher extent involved in international operations with a widely developed production network [OECD 2010, pp. 34]. Therefore, the financial and economic crisis undoubtedly induced changes in the demand of corporations' customers and actions taken by the multinationals. It is assumed that these actions can be observed by looking at their short-term economic performance.

The short-term economic performance can be expressed in terms of profitability, turnover, assets and employment.

This paper concentrates on empirical research concerning the influence of the global financial crisis and economic downturn during the years 2008–2009 upon corporations. The study focuses on the 500 world's biggest corporations included in the Fortune Global 500 reports during the years 2007–2010. Throughout those 4 years the ranking included 622 different corporations. For each year 10 variables concerning a particular company were collected, on the basis of which 3 additional variables were calculated. Altogether, in each year 6,500 variables were collected, which allowed to gather almost 26,000[3] variables in the database.

The span of time under investigation covers 4 years since achieving the mentioned before aim of the paper required a comparison between the pre-crisis and the crisis periods. The authors assumed that data concerning the years 2006 and 2007 (derived from reports from the years 2007–2008) picture the situation of the analyzed population during the pre-crisis years, while the data concerning the years 2008 and 2009 illustrate the crisis years.

In this paper the influence of the financial and economic crisis during the years 2008–2009 on the world's 500 biggest corporations was analyzed by taking 3 different perspectives. First, the overall situation was assessed with taking into considerations such factors as generated revenues, profits, assets, employment, changes in the CEO position, industry and country of origin of all the analyzed corporations during the years 2006–2009. In this part of the paper the authors used descriptive statistics as the main tool to summarize the data set gathered in the study. The main focus was put on year to year changes and their dynamics. The information gathered in this part of the study formed the basis for further quantitative analysis.

In the next part of the analysis the researchers focused on the perspective of industry and country of origin of the analyzed corporations. The authors used cluster analysis to identify industries and countries that were most severely[4] influenced by the crisis and those which were relatively better off. Cluster analysis classifies a sample of objects on the basis of a set of measured variables into a number of different groups so that similar subjects are placed in the same group [Everitt 1993]. Since cluster analysis has no mechanism for differentiating between relevant and irrelevant variables, the choice of variables included was underpinned by conceptual considerations. In the study the authors decided to use relative operational data concerning short-term economic performance – return on revenues, return on assets and profit per employee. The choice of variables for this analysis was purposeful. The applied set of variables allowed to take into consideration 4 different nominal operational factors for each company (revenues, profits, assets and employment), while highlighting the significance of profits as a background to the comparison

[3] In the year 2010 4 variables concerning General Motors were not available.

[4] Taking into consideration a particular set of criteria and the analyzed companies.

of financial performance. It was assumed that usage of the nominal factors of enterprises (simple revenues, profits, assets and employment) for this analysis would to a lesser extent allow to picture differences and similarities in the actual performance of the analyzed population. The conducted variance analysis showed that each of the applied variables differentiated the analyzed population in a statistically significant way. To generate the number of clusters the Ward's minimum variance technique was applied. The Ward method was chosen for the research since it aims at minimizing the loss of information, or the loss of homogeneity, that occurs by merging clusters. To answer the research questions the received results were supported with descriptive statistics.

4. The global financial and economic crisis and the Fortune Global 500 corporations – assessment of the overall situation

Table 1 presents data concerning revenues, profits, assets and employees of the 500 biggest global corporations for the years 2006–2009. According to the presented data in the year 2006 (assumed to be the pre-crisis year) the analyzed companies generated revenues of over USD 20.90 trillion, and in the year 2007 USD 21.40 trillion (the year to year growth amounted to 2.4%). In the same period the total generated profits amounted to, respectively, USD 1.53 trillion and USD 1.50 trillion, which allowed to gain the margin of profits at the level of 7.33% and 6.71%. In the year 2008 (regarded as the year when the crisis appeared) the analyzed enterprises booked a further increase of their revenues (increase by 7.69% comparing to the year 2007, and by 10.29% when comparing to the year 2006). However, at the same time there was a severe decrease in the level of generated profits (48.13% when compared to the year 2007, and 46.40% comparing to the year 2006). The return on revenue rate amounted to 3.26%, which constituted a decrease by 51.42% comparing to the year 2007. Additionally, there was a significant increase in the number of corporations that generated negative profits (the increase amounted to 316.00% comparing to the year 2007 and to 511.76% when comparing to the year 2006), while the average losses for corporations generating negative profits decreased only by 11% comparing to the previous year. At the same time the average gains for enterprises generating positive profits decreased by 10.49% comparing to the year 2007. The value of assets of the analyzed corporations in 2008 decreased by 5.22% comparing to the previous year, while the employment of those firms increased by 5.80%. Surprisingly, the increase in employment between the years 2007 and 2008 was higher than in the years 2006–2007 when it amounted to 2.60%. Nevertheless, as a result of the described above changes all the average relative factors (return on revenue, return on assets, profit per employee) deteriorated. The strength of negative changes was the highest for return on revenues (the decrease amounted to 51.42%), followed by profit per employee (–50.97%) and return on assets (–45.69%).

Table 1. The overall characteristic of the population – the years 2006–2009

	2006	2007	2008	2009
Total revenue (million USD)	20900340.7	23618475.1	25175468.5	23085071.2
Total profits (million USD)	1533039.1	1584071.4	821710.4	960457.9
Return on revenue	7.33%	6.71%	3.26%	4.16%
Total Assets (million USD)	85403841.6	105039372.0	99556218.0	104730119.8
Return on assets	1.79%	1.51%	0.82%	0.92%
Total employment	52074639	53429807	56529818	57733125
Profit per employee	29439.26	29647.71	14535.86	16636.17
Average revenue for all enterprises (million USD)	41800.68	42808.79	46102.63	41767.58
Average profits for all enterprises (million USD)	3058.48	2993.64	1336.09	1749.85
Number of enterprises generating negative profits	17	25	104	72
Average losses for enterprises generating negative profits (million USD)	–2610.62	–4905.56	–4344.86	–2923.60
Number of enterprises generating positive profits	483	475	396	423*
Average gains for enterprises generating positive profits (million USD	3265.88	3593.07	3216.10	2768.22
Average assets for all enterprises (million USD)	170807.68	210078.74	199112.44	209460.24
Average employment for all enterprises	104149	106860	113060	115466

* The 2010 report does not provide data concerning profits generated by General Motors.

Source: Own calculations based on data derived from Fortune Global 500 reports 2007–2010 [Fortune Magazine 2007, 2008, 2009, 2010].

In the year 2009 the total generated revenues decreased by 8.30% comparing to the previous year and amounted to USD 23.08 trillion (a value similar to the amount generated in the year 2007). However, the total profit booked by the analyzed corporations amounted to USD 0.96 trillion, which constituted an increase by 17.07% comparing to the previous year. Moreover, comparing to the year 2008, the number of enterprises that generated negative profits decreased and amounted to 72 enterprises (decrease by 30.77%). Additionally, the average losses for enterprises generating negative profits decreased in the mentioned period by 32.71%. However, the average gains for corporations generating positive profits decreased by 13.93%. In the year 2009, comparing to the previous year, the total assets' value of the analyzed corporations increased by 5.20%, up to USD 104.73 trillion (a value similar to the amount gathered in the year 2007) and the employment increased by 2.13%. As a result of those changes all the mentioned before average relative factors improved. The strength of positive changes was again the highest in the case of return on revenues (the increase amounted to 27.61%), then profit per employee (14.45%) and return on assets (12.19%).

In the case of revenues and profits generated by the analyzed corporations during the years 2006–2009 a strong negative influence of the financial crisis and economic downturn is visible. However, it induced a slightly different reaction among the analyzed population in the first year of the crisis (the year 2008) that was characterized by a high level of uncertainty among enterprises, than in the next year, when estimation of the risk associated with ongoing activities was easier. In the year 2008 an increase in generated revenues was accompanied by a strong decrease in profits and a significant increase in the number of enterprises generating losses. In the next year the value of the booked revenues decreased, but at the same time, profitability of the analyzed population improved, while the number of corporations generating losses decreased.

As a consequence of the financial crisis the investment activity of the corporations was limited.[5] Therefore, many investments were canceled or suspended, and in some cases de-investments were made. According to the results of research conducted by UNCTAD [2009b], in the year 2008 85% of the world's transnational corporations decided to limit their level of investment. 79% indicated the global financial crisis as a direct reason. However, despite the limitation of investment activities in a short period, the corporations anticipated increase in their operations in a medium period [UNCTAD 2009b]. These trends were reflected in the value of assets remaining under control of the world's biggest 500 corporations during the years 2008–2009.

In the case of information concerning changes of CEOs the analysis had to be conducted before aggregation of data. This meant that the data could be used only if the company was taken into consideration at least in two Fortune Global 500 reports during the years 2007–2010. Over the whole analyzed period in a particular enterprise not more than 3 changes of a CEO could be observed. In the first year in which the observation was possible (the year 2007) the analysis concerned 461

[5] This was caused by difficulties in receiving loans, lower level of earnings, global economic downturn and the related production overcapacity, as well as an increase in risk aversion.

enterprises.[6] There were 72 changes of CEOs in this population. In the next year (2008) the analyzed population consisted of 414 corporations,[7] of which 79 changed their CEOs when comparing to the previous year. In the year 2009 only 378 companies could be observed and there were 69 changes of CEOs among them. In the analyzed population there was only one company in which 3 changes of CEOs were observed – these changes concerned only 2 people, who replaced each other in the CEO position year by year. In 177 corporations included in the report during the years 2006–2009 CEOs were not changed at all. At least 2 changes of the CEOs took place in 18 firms, and 1 change happened in 181 companies. Altogether, in the analyzed period, 200 corporations at least once changed their CEOs. Since in each year of the analysis the population had a different size, it is important to notice that the changes concerned, respectively, 15.62%, 19.08% and 18.25% of the analyzed populations. During such a short period it is very difficult to assess which of those changes were the consequences of natural succession processes and which were caused by perturbation related to the financial and economic crisis. Nevertheless, in the year 2008 the % of the concerned population increased by almost 4%.

From the national perspective, during the crisis period the number of corporations included in the report decreased in the case of the USA (Appendix A). In the year 2007 the Fortune Global 500 report included 161 enterprises from the USA, a year later 152, and during the years 2009–2010 only 140. During the years 2009–2010 the number of corporations included in the reports coming from Finland, Mexico, South Korea, Spain and Sweden also decreased. In the cases of Australia, Germany and France in the year 2009 the number of enterprises included in the ranking increased, however, in 2010 it came back to the level from the year 2008.[8] A somehow reverse situation took place in the case of the British companies – in 2009 their number decreased from the level of 37 to 28, but in 2010 it grew back to 31 enterprises. The biggest improvement in the described area could be noticed in the case of Chinese and Japanese firms. The number of Chinese enterprises was increasing during the whole analyzed period – it 2007 there were 24 of them, and then respectively 29, 37 and 46. The number of the companies from the latter country grew in 2009 up to 68 from 64 in the previous year, and up to 71 in the year 2010. A relatively low nominal increase in the described manner could be also noticed in the cases of Austria, Brazil, India, Italy, Russia, Singapore and Taiwan.

When taking the perspective of industry, the number of companies decreased the most in the cases of corporations operating in Airlines, Banking, Motor vehi-

---

[6] These companies were included in the Fortune Global 500 report from the year 2007 and from the year 2008.

[7] This means that in the Fortune Global 500 report in the year 2009 86 companies that were included in the reports during the years 2007 and 2008 were not present.

[8] The situation may be related to currency exchange rate fluctuations and the way of calculation of revenues in the reports.

cles and Parts and Trading industries (see Appendix B). The numbers of corporations included in the reports and operating in Airlines, Motor vehicles and Parts and Trading industries during the years 2007–2008 amounted to, respectively, 7, 33 and 10. However, they decreased in 2009 and 2010, eventually achieving the level of, respectively, 4, 29 and 8. The number of corporations operating in the Banking industry included in the Fortune Global 500 report in the year 2007 amounted to 60. A year later it increased to 67, however in the year 2009 it went back to 62, and next year to 61 corporations. In the year 2010 the numbers of corporations operating in Specialty Retailers and Shipping industries also decreased.

In the cases of Building materials, Glass, Metals and Mining, Crude-oil production industries in the year 2009 the number of enterprises included in the ranking increased, however, in 2010 it came back closely to or even below the level from the year 2008. It is worth highlighting that those industries seem vulnerable to demand shocks related to economic downturn. A somehow reverse situation took place in the case of the companies operating in the Computer Services and Software; Computers, Office Equipment; Diversified Financials; Electronics, Electrical Equipment; General Merchandisers; Insurance: Life, Health (stock); Insurance: Property and Casualty (stock) industries – in 2009 their number decreased, but in 2010 it grew back to or above the level from the year 2008.

An increase in the number of corporations included in the reports could also be noticed in the case of the following industries: Energy; Engineering, Construction; Aerospace and Defense; Food Production; Health Care: Pharmacy and Other Services; Insurance: Life, Health (mutual); Insurance: Property and Casualty (mutual); Petroleum Refining; Tobacco; Wholesalers: Health Care.

The above presented data do not allow to reject the assumption that the strength of influence of the global financial crisis and economic downturn on the situation of the analyzed corporations was differentiated, among others, on the basis of industry and country of origin.

5. The global financial and economic crisis and the Fortune Global 500 corporations – assessment of the situation from the perspective of clusters

5.1. Cluster analysis – an attempt to segment the biggest global corporations according to their performance

As mentioned in Section 3, the cluster analysis was conducted according to the Ward's minimum variance technique. The analysis was conducted for the years 2006 and 2009. The Ward's method provided us with the dendrograms which present the number of clusters (Figure 1 and Figure 2). The authors tried to identify segments of companies similar in terms of their financial performance measured by the return on revenue, return on assets and profit per employee.

For both years the starting point of the analysis was a *pre*-computed *distance matrix* of all observations. Distance measures (inverse similarities) between objects[9] were adopted as the basis for determination of these matrixes. The researchers used a hierarchical clustering which created a hierarchy of clusters for the years 2006 and 2009. The applied algorithms for hierarchical clustering were agglomerative. Initially, the number of clusters equaled the number of corporations in the sample with each individual company forming one group. On their basis the smallest distance between particular units participating in the study was determined. Then the smallest values in the distance matrixes were chosen for, respectively, the year 2006 and 2009. In the next step, the Ward algorithm combined those two enterprises which were most similar to each other. Next, a distance for reduction of the set of units was determined. The previously created clusters were combined into newly created clusters. The described steps were repeated until all of the analyzed companies were combined in a 500-elemental clusters respectively for the year 2006 and 2009. At the end, after a series of successive mergers and a loss in homogeneity, all clusters were fused and all corporations belonged to one single cluster. On the basis of data for the year 2006 5 clusters were identified, and for the year 2009 8 clusters. However in the case of the year 2009 one cluster included only Fannie Mae – a US corporation operating in the Diversified Financials market.

The created hierarchy of clusters is presented as dendrograms in Figure 1 and Figure 2. The Figures represent horizontal tree structures with single corporations as leaves, the final single cluster as the trunk, and the intermediate clusters as branches. The dendrogram for both years allowed to determine the Euclidean distances between the analyzed units.

As described before, the dendrograms were created with the usage of Ward's method which combined corporations into clusters such that the variance concerning applied variables within a cluster was minimized. Each branch in the dendrogram represents a cluster, and the branches merge at nodes (linkages). The position of the linkage on the x-axis indicates at which distance level the mergers occurred. Distance is a measure of how far apart two clusters are.

The methodology applied so far did not prescribe any particular number of clusters. To determine the appropriate number of clusters the researchers examined the fusion curves during the clustering processes. The received fusion curves are pictured in Figure 3 and Figure 4. The fusion curve gradually increases as clusters are

[9] Distance is a measure of how far apart two objects are, while similarity measures how similar two objects are. For units that are alike, distance measures are small and similarity measures are large.

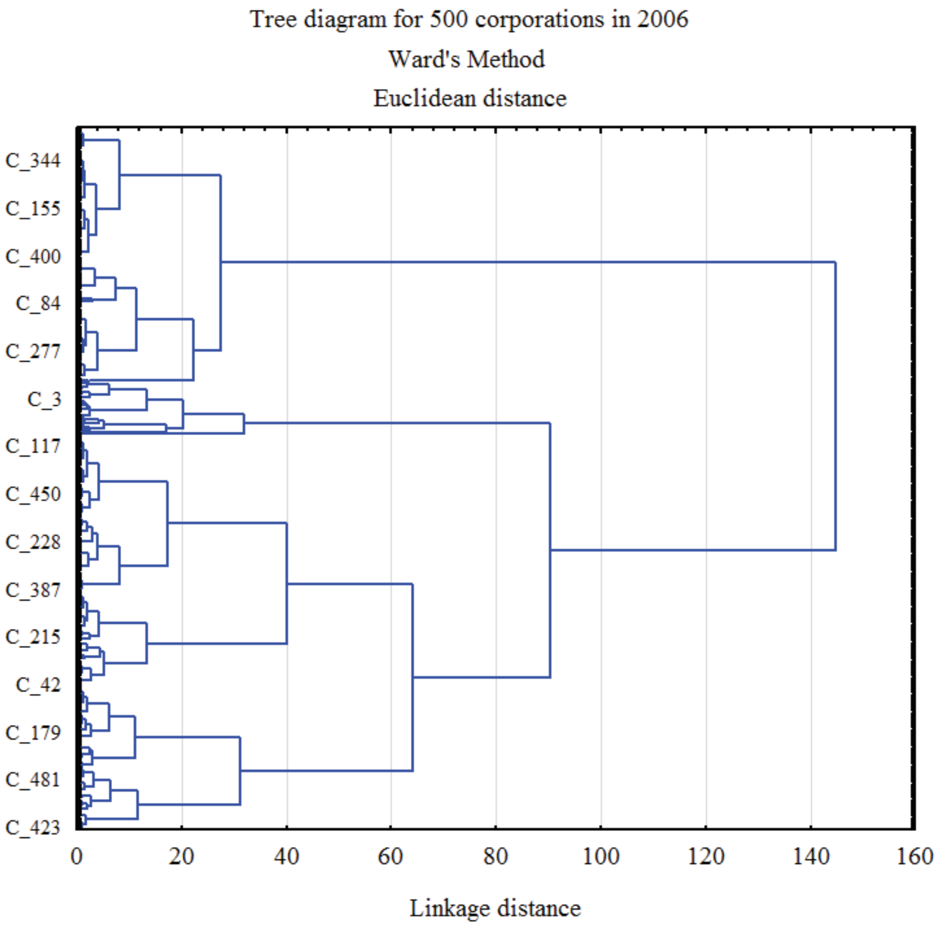

Figure 1. Hierarchical tree for the year 2006
Source: Own calculations based on data gathered from Fortune Global 500 reports 2007–2010 [Fortune 2007]

merged. An appropriate linkage distance to be applied is the one showed just before a sudden upward jump occurs in the curve, illustrating a relatively high loss in homogeneity. The distances that were observed between the analyzed corporations showed that the border value of those distances (the level at which the further merger of clusters should be withheld) for the year 2006 amounted to 34, while in the year 2009 to 20. Above these values the distance between units was significant. At those levels the cluster extraction process was withheld. Above the mentioned points additional increase of the information (as a result of further clustering process) was small.

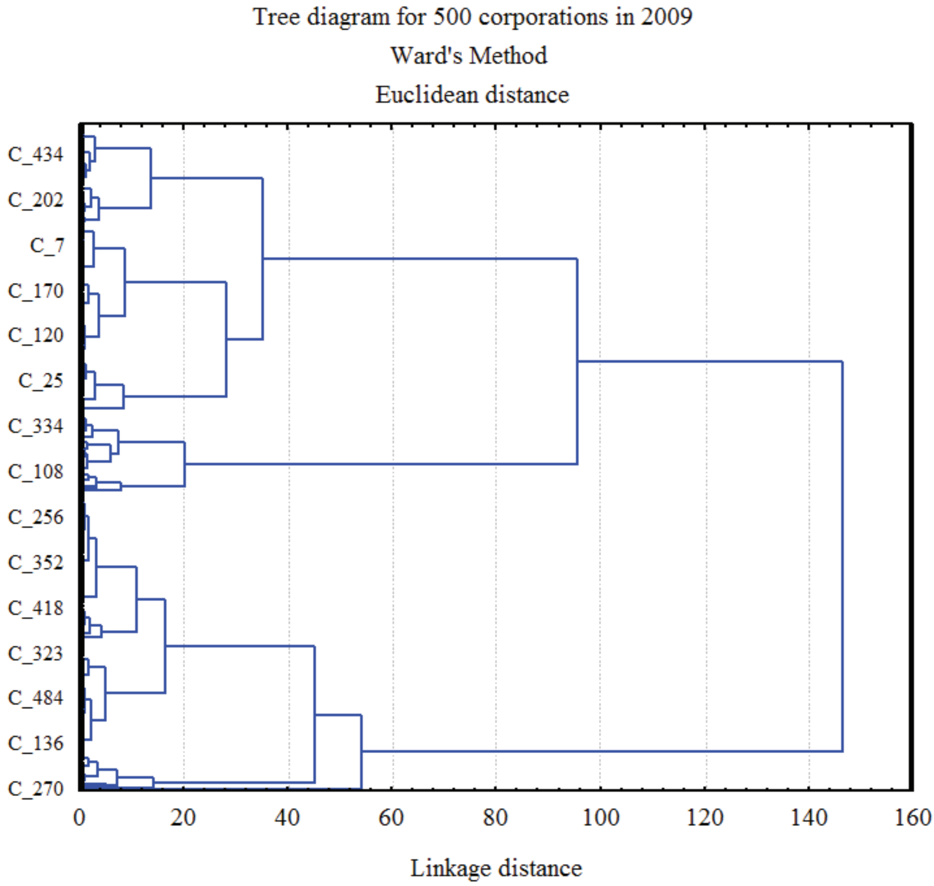

Figure 2. Hierarchical tree for the year 2009
Source: Own calculations based on data gathered from Fortune Global 500 reports 2009–2010 [Fortune 2009, 2010]

In order to check the differences between the variables in relation to the generated clusters the F test was applied. The F-values indicate whether the level of dispersion of a particular variable within one group is greater or smaller than in the underlying data sample.[10] It allowed to illustrate how strongly or weakly the particular variables differentiated particular clusters at the appropriate significance level p=0.05 (see Table 2 and Table 3). According to the analysis of variance presented in Table 2 and Table 3 there are statistically significant differences among the iden-

[10] If F > 1 (F < 1), then the group variance of variable is greater (smaller) than in the underlying entire data sample.

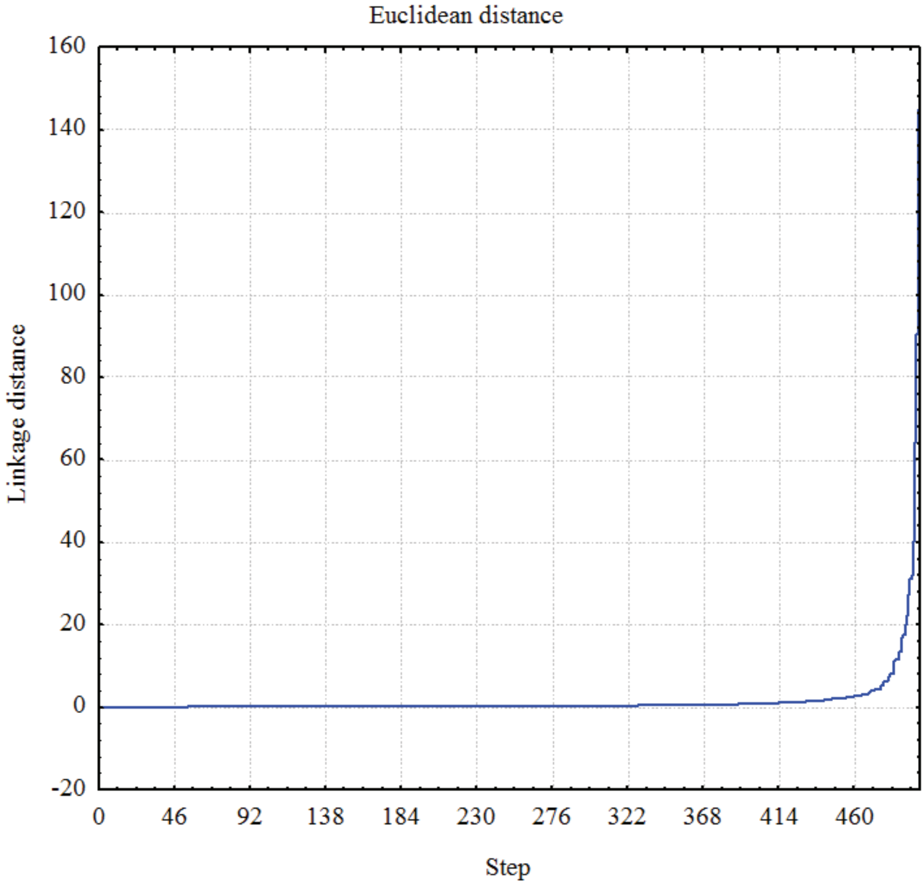

Figure 3. The linkage distance of the clustering process (fusion curve) – the year 2006
Source: Own calculations based on data gathered from Fortune Global 500 reports 2007 [Fortune 2007]

Table 2. Analysis of variance – the year 2006

Specification	Between Clusters	df	Within Clusters	df*	F Test	Significance level
Return on revenues	1.25E+00	4	3.11E-01	495	69.6851	0.00
Return on assets	7.77E-01	4	1.94E-01	495	74.8590	0.00
Profit per employee	2.81E+12	4	7.03E+11	495	224.3503	0.00

* The number 495 results from subtracting the number of clusters from the number of survey units for which complete data existed or 500–5 = 495.

Source: Own calculations based on data gathered from Fortune Global 500 reports 2007 [Fortune 2007].

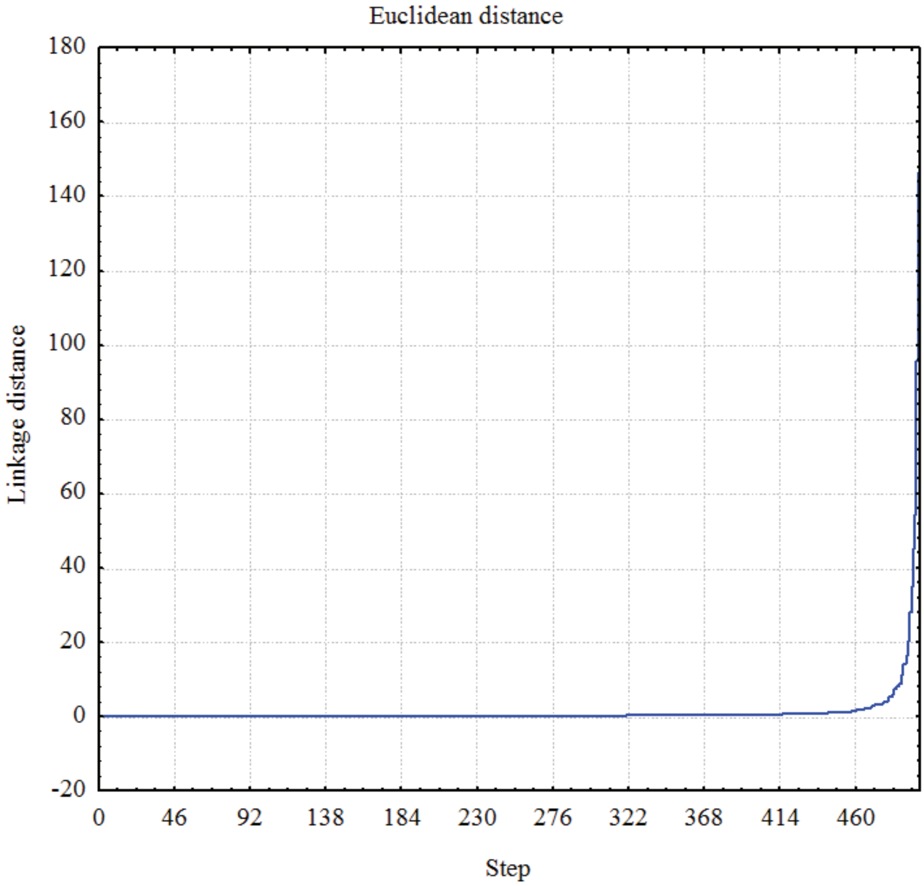

Figure 4. The linkage distance of the clustering process (fusion curve) – the year 2009
Source: Own calculations based on data gathered from Fortune Global 500 reports 2009–2010 [Fortune 2009, 2010]

Table 3. Analysis of variance – the year 2009

Specification	Between Clusters	df	Within Clusters	df*	F Test	Significance level
Return on revenues	8.34E+00	7	1.22E+00	491	477.8307	0.000
Return on assets	8.64E-01	7	1.15E-01	491	526.6350	0.000
Profit per employee	1.46E+14	7	1.67E+13	491	613.8565	0.000

* The number 491 results from subtracting the number of clusters from the number of survey units for which complete data existed or 499–8 = 491 / As noted, deficiencies of data related to General Motors.

Source: Own calculations based on data gathered from Fortune Global 500 reports 2009–2010 [Fortune 2009, 2010].

tified clusters. The three financial variables differentiate the 5 clusters identified for the year 2006 as well as 8 clusters identified for the year 2009.

The conducted analysis of variance showed that each of the applied variables differentiated the analyzed population in a statically significant way. The significance level and F-Values of all the variables used were high for both years under investigation. In both years profit per employee most strongly differentiated particular clusters (F-Value in the year 2006 amounted to 224.3503 while in 2009 to 613.8565). However, the F-Values for all the variables applied are much lower for the year 2006 than for the year 2009.

The cluster analysis helped the authors to identify the losers in the years 2006 and 2009. Our question was whether there was a group of organizations which suffered the most because of the global financial crisis and economic downturn. What were the industrial backgrounds of those companies and what were their countries of origin? To explore the issues the authors used descriptive statistics.

5.2. Inter-cluster analysis – identification of the losers' background

The data obtained in the previous stage of the analysis and presented in Section 5.1. were subjected to further treatment. The clusters received from the cluster analysis for the years 2006 and 2009 were evaluated on the basis of average values of the 3 relative operational data concerning financial performance – return on revenues, return on assets and profit per employee. Each of the clusters was given a qualitative evaluation. The evaluation was based on the comparison of average results between clusters created in the same year of analysis. In the case when at least 2 out of 3 variables that were taken into consideration were higher, the cluster received a better evaluation.

It is worth mentioning that the discrepancies between the average results of the identified clusters for the year 2006 were much smaller than in the case of the year 2009. Additionally, in the year 2009 a higher number of clusters was generated. These can suggest that in the time of the crisis the discrepancies among the world's biggest corporations grew. As a consequence, the applied scale of cluster evaluation had to be wider in the case of the year 2009 than in the case of the year 2006. For the clusters from the year 2006 a 5–degree scale was created. The average results of those clusters were evaluated as: *Very bad, Bad, Medium, Good and Very good.* For the clusters from the year 2009 an 8-degree scale was created. This scale included the scale applied for the year 2006, however, had 3 additional ratings. The average results of those clusters were evaluated as: *Outstandingly bad*, *Extremely bad, Very bad, Bad, Medium, Good, Very good* and *Extremely good.* The cluster evaluated as *Outstandingly bad* grouped only one US corporation operating in Diversified Financials market – Fannie Mae. The results of the evaluation process are presented in Table 4 and Table 5.

Table 4. Evaluation and average variable values for clusters generated for the year 2006

	Cluster 1	**Cluster 3**	**Cluster 5**	**Cluster 4**	**Cluster 2**
Evaluation	Very bad	Bad	Medium	Good	Very good
Return on revenues	1.69%	7.48%	10.76%	13.01%	16.87%
Return on assets	2.01%	3.72%	10.19%	1.19%	12.83%
Profit per employee	9541.6	44257.8	52662.8	99596.5	304608.7
Number of corporations in the cluster	181	113	103	66	37

Source: Own calculations based on data gathered from Fortune Global 500 report 2007 [Fortune 2007].

Table 5. Evaluation and average variable values for clusters generated for the year 2009

	Cluster 8	**Cluster 6**	**Cluster 7**	**Cluster 2**	**Cluster 1**	**Cluster 3**	**Cluster 4**	**Cluster 5**
Evaluation	Outstandingly bad	Extremely bad	Very bad	Bad	Medium	Good	Very good	Extremely good
Return on revenues	−247.61%	−9.51%	0.63%	3.51%	7.53%	12.27%	11.78%	25.03%
Return on assets	−8.28%	−5.72%	0.46%	3.01%	5.59%	0.77%	9.66%	16.30%
Profit per employee	−11994833.3	−208449.0	10788.5	30074.7	52904.4	64387.1	67523.9	125634.5
Number of corporations in the cluster	1	26	197	100	74	42	44	15

Source: Own calculations based on data gathered from Fortune Global 500 reports 2009–2010 [Fortune 2009, 2010].

The results of clusters from the years 2006 and 2009, even when limited to clusters that were given the same qualitative evaluations during the assessment process, were worse in the case of the year 2009. Corporations grouped in the cluster evaluated as vary bad for the year 2006, generated higher average results than corporations grouped in this cluster for the year 2009. This means that the negative influence of the financial crisis and economic downturn was visible among all clusters, with one exception (cluster 5).

At this point of the analysis clusters 8 and 6 from the year 2009 grouped corporations that were generating the lowest financial performance results among the analyzed population. Those groups did not have any counterparts in clusters generated in the year 2006 and they were indicated as most severely influenced by the crisis.

To point out the industries that had a high degree of presence in those clusters the authors compared the number of corporations operating in a particular industry in clusters 8 and 6 with the total number of such corporations included in the report in the year 2010. The 27 corporations grouped in those clusters were operating in 15 different industries. However, only 3 industries were represented by more than 1 corporation, and at the same time they grouped more than 20% of the total representation of the industry. Therefore, they were indicated as industries most severely influenced by the crisis. These were: Airlines (75% of presence in clusters 7 and 8), Diversified Financials (33% of presence in clusters 7 and 8) and Motor vehicles and Parts (21% of presence in clusters 7 and 8).

The same procedure was implemented in the case of countries of origin. The corporations grouped in clusters 7 and 8 came from 9 different countries. Only 1 country was represented by more than 1 corporation, and at the same time it grouped more than 10% of the total representation of the country. 11% of the total number of the USA corporations included in the Fortune Global 500 report in 2010 were grouped in clusters 7 and 8. Therefore, the USA was indicated as a country of origin of corporations the most severely influenced by the crisis.

While looking closer at the industries identified as the most severely influenced by the crisis the authors found out that the reasons for their situations had quite different roots. In the case of Airline industry on average the revenues generated by companies included in the Fortune Global 500 report and operating in this industry grew in the year 2008 by 11.11% and in the year 2009 by 4.20%. At the same time the total number of corporations included in the reports decreased in the year 2008 from 7 to 6, and in the year 2009 to 4.

A strong negative influence on the profitability of companies from this industry was exerted by a high level of oil prices, often wrong-way bets on the hedging of fuel purchases [http://www.ft.com/cms/s/0/acace9ba-0e6e-11de-b099-0000779fd2ac.html#ixzz1RAT7xUx5], adverse natural events (i.e. volcanic ash). However, experts note that the epicenter of the problem was the collapse in demand that resulted from the economic crisis - the financial crisis curbed passenger and cargo traffic [http://www.wharton.universia.net/index.cfm?fa=viewArticle&id=1733&language=english]. The situation was even worse than after the terrorist attacks of September 11, 2001. In the time of the economic downturn transferring additional costs to the final customers was difficult and sometimes impossible. Additionally a dramatic fall in demand could lead to a rise in unit costs that were not related to fuel, and which could not be cut proportionally [http://www.wharton.universia.net/index.cfm?fa=viewArticle&id=1733&language=english].

On average in 2008 and 2009 revenues of corporations (again included in the report) operating in the Diversified Financials industry increased, respectively, by 3.57% and decreased by 3.55%. The average profitability of the industry was decreasing during the whole analyzed period. In the year 2006 the average profit of a corporation operating in the industry and included in the report amounted to USD 6.11 billion, while in the year 2009 it amounted to USD 13.21 billion of losses. Bad results of the Diversified Financials industry are the consequences of the subprime products crisis and a direct result of the loses generated by Fannie Mae (over $ 58.7 billion in 2008 report and almost $72 billion in 2009 report) and Freddie Mac (over $ 21.5 billion in 2010 report).

In the case of Motor Vehicles and Parts industry, the low results were caused by long-term production overcapacity in the developed countries and the global economic downturn. Not without significance was the situation of General Motors (the company booked over USD 38.7 billion of losses in the year 2007 and USD 30.7 billion of losses in the 2008). The fact that during the year 2008 and/or 2009 the leading car manufacturers,[11] regardless of their country of origin, generated losses confirms a difficult situation and turbulences occurring in the industry during the crisis.

Conclusions

The presented research focused on the influence of the global financial crisis and economic downturn during the years 2008–2009 on the world's biggest corporations. The main research question of the study was whether within the world's 500 biggest corporation there was a group of organizations which suffered the most because of the global financial crisis and economic downturn. Furthermore, the authors wanted to indicate what was the industrial background of those corporations and what was their country of origin. To explore the issue the authors used cluster analysis and descriptive statistics.

The results of the cluster analysis presented in Section 5 allow the authors to formulate some conclusions. The negative influence of the financial crisis and economic downturn during the years 2008–2009 is visible among the world's 500 biggest corporations. In general it can be assumed that in the year 2009 the analyzed corporations took actions aiming at adaptation to the conditions of the crisis. The actions taken by the corporations improved their financial performance measured as return on revenues, return on assets and profits per employee. However, the mentioned reorganizations were not necessarily related with employment downsizing, as the total employment of the analyzed population during years 2008–2009 increased.

Significant differences existed in the analyzed population in terms of financial performance measured as return on revenues, return on assets and profit per employee. The discrepancies in this area grew during the crisis period. Among the companies that were most severely influenced by the crisis (their financial perfor-

[11] Among them were inter alia: General Motors, Toyota, Chrysler, Ford, Nissan, Peugeot, Fiat, Renault, Volvo, Mazda.

mance worsened the most) dominate companies operating in Airlines, Diversified Financials and Motor Vehicles and Parts industries. 40.74% of companies indicated as the most severely influenced by the crisis operated in those industries, the remaining 59.26% were dispersed in 12 different industries. At the same time, the country of origin of 55.56% of companies most negatively influenced by the crisis was the USA. The intuitively expected result was confirmed.

An interesting enrichment of the above presented study would provide information concerning changes in the operations of the analyzed companies in national and foreign markets. This would allow to take into consideration coordination of international and global actions of those corporations. However, in the first half of the year 2011 this information was not available. The results from the presented analysis could also form a foundation for further research to identify and test the hypotheses in the future.

Appendix A

Table A. Number of corporations included in the Fortune Global 500 reports 2007–2010 – country of origin

	2007	2008	2009	2010
Australia	8	8	9	8
Austria	1	2	2	3
Belgium	5	5	5	5
Belgium/Netherlands	1	0	0	0
Brazil	5	5	6	7
Canada	15	14	14	11
China	24	29	37	46
Denmark	2	2	2	2
Finland	3	2	2	1
France	38	39	40	39
Germany	37	37	39	37
Hungary	0	0	1	0
India	6	7	7	8
Ireland	2	2	1	1
Israel	0	0	1	0
Italy	10	10	10	10

cont. Table A

Japan	67	64	68	71
Luxemburg	0	1	1	1
Malaysia	1	1	1	1
Mexico	5	5	4	2
Netherlands	14	13	12	13
Norway	2	2	1	1
Poland	1	1	1	1
Portugal	0	1	2	0
Russia	4	5	8	6
Saudi Arabia	1	1	1	1
Singapore	1	1	2	2
South Korea	14	15	14	11
Spain	9	11	12	10
Sweden	6	6	6	5
Switzerland	13	13	13	13
Taiwan	6	6	6	8
Thailand	1	1	1	1
Turkey	1	1	1	1
UK	34	37	27	31
UK/Netherlands	1	0	1	1
USA	161	152	140	138
Venezuela	0	0	1	1

Source: Own calculations based on data derived from Fortune Global 500 reports 2007–2010 [Fortune 2007, 2008, 2009, 2010].

Appendix B

Table B. Number of corporations included in the Fortune Global 500 reports 2007–2010 – industry

	2007	2008	2009	2010
Aerospace and Defense	11	12	12	14

cont. Table B

Airlines	7	7	6	4
Apparel	2	1	2	2
Automotive Retailing, Services	2	2	–	–
Banks: Commercial and Savings	60	67	62	61
Beverages	4	5	5	5
Building materials, Glass	5	5	6	4
Chemicals	11	11	10	10
Computer Services and Software	3	5	4	5
Computers, Office Equipment	11	11	9	11
Diversified Financials	5	7	5	6
Electronics, Electrical Equip.	18	17	16	18
Energy	7	6	11	11
Engineering, Construction	11	14	18	17
Entertainment	4	4	5	5
Food and Drug Stores	22	22	22	22
Food Consumer Products	5	5	5	5
Food Production	3	3	4	5
Food Services	3	3	3	3
Forest and Paper Products	3	3	–	–
General Merchandisers	9	8	6	9
Health Care: Insurance and Managed Care	5	5	5	5
Health Care: Pharmacy and Other Services	4	3	3	5
Homebuilders	2	–	–	–
Household and Personal Products	4	4	4	4
Industrial and Farm Equipment	7	7	7	6
Insurance: Life, Health (mutual)	8	8	8	12
Insurance: Life, Health (stock)	20	19	14	19
Insurance: Property and Casualty (mutual)	2	3	3	5
Insurance: Property and Casualty (stock)	15	15	12	14
Mail, Package, Freight Delivery	10	7	6	6
Metals	14	13	20	16

cont. Table B

Mining, Crude-oil production	11	12	13	8
Miscellaneous	4	5	6	10
Motor vehicles and Parts	33	33	30	29
Network and Other Communications Equipment	5	5	5	5
Oil and Gas Equipment, Services	2	–	–	–
Petroleum Refining	39	39	49	40
Pharmaceuticals	12	12	12,0	12,0
Railroads	5	3	3	3
Securities	6	4	–	–
Semiconductors and Other Electronic Components	3	3	3	3
Shipping	3	4	4	2
Specialty Retailers	12	10	10	9
Telecommunications	21	22	21	22
Temporary Help	2	2	3	2
Tobacco	4	3	4	4
Trading	10	10	9	8
Utilities	21	19	19	19
Wholesalers: Electronics and Office Equipment	2	2	3	2
Wholesalers: Health Care	5	5	6	6
Wholesalers: Other	3	3	3	3
Pipelines	–	2	2	2
Internet Services and Retailing	–	–	2	2

Source: Own calculations based on data derived from Fortune Global 500 reports 2007–2010 [Fortune Magazine 2007, 2008, 2009, 2010].

References

Allen, F., Carletti, E., 2010, *The Global Financial Crisis: Causes and Consequences*, International Review of Finance, vol. 10, no. 1, pp. 1–26.

Arevalo, J.A., Aravind, D., 2010, *The Impact of the Crisis on Corporate Responsibility: the Case of UN Global Compact Participants in the USA*, Corporate Governance, vol. 10, no. 4, pp. 406–420.

Brown, J.R., Lax, L.C., Petersen, B.C., 2010, *Financial Market Crises and Natural Resource Production*, International Review of Finance, vol. 10, no. 1, pp. 93–124.
Burksaitiene, D., 2010, *Cross-Border Mergers and Acquisitions in Developed Countries: a Study in 2008–2009*, Economics and Management, 2010, vol. 15, pp. 32–38.
Claessens, S., Dell'Ariccia, G., Igan, D., Laeve, L., 2010, *Lessons and Policy Implications from the Global Financial Crisis*, IMF Working Paper, no. 44, International Monetary Fund, Washington.
Claessens, S., Kose, A., Terrones, M.E., 2010, *The Global Financial Crisis: How Similar? How Different? How Costly?*, Journal of Asian Economics, vol. 21, no. 3, pp. 247–264.
Czarny, E., Menkes, J., Toporowski, P., 2009, *Gazprom – threat to Europe?*, Poznań University of Economics Review, vol. 9, no. 1, pp. 44–66.
Everitt, B.S., 1993, *Cluster Analysis*, Edward Arnold, London.
Fernández, B., Souto, F., 2009, *Crisis and Corporate Social Responsibility: Threat or Opportunity?*, International Journal of Economic Sciences and Applied Research, vol. 2, no. 1, pp. 36–50.
Fortune Magazine, 2007, *The Fortune Global 500*, Fortune Magazine, Iss. July 23, 2007.
Fortune Magazine, 2008, *The Fortune Global 500*, Fortune Magazine, Iss. July 21, 2008.
Fortune Magazine, 2009, *The Fortune Global 500*, Fortune Magazine, Iss. July 20, 2009.
Fortune Magazine, 2010, *The Fortune Global 500*, Fortune Magazine, Iss. July 26, 2010.
Giannarakis, G., Theotokas, I., 2011, *The Effect of Financial Crisis in Corporate Social Responsibility Performance*, International Journal of Marketing Studies, vol. 3, no. 1, pp. 2–10.
Gourinchas, P. O., Kose, A.M., 2011, *Economic Linkages, Spillovers, and the Financial Crisis*, 2, IMF Economic Review, vol. 59, no. 1, pp. 1–5.
http://www.ft.com/cms/s/0/acace9ba-0e6e-11de-b099–0000779fd2ac.html#ixzz1RAT7xUx5.
http://www.wharton.universia.net/index.cfm?fa=viewArticle&id=1733&language=english [access: Jun 17, 200].
Jaruzelski, B., Dehoff, K., 2010, *The Global Innovation 1000. How the Top Innovators Keep Winning, "strategy+business"*, Iss. 61, Winter, Booz & Company [online] http://daghinrichs.com/wp-content/uploads/2010/10/Booz-1000-How-the-Top-Innovators-Keep-Winning.pdf [access: 09.01.2012].
Karaibrahimoglu, Y.Z., 2010, *Corporate Social Responsibility in Times of Financial Crisis*, African Journal of Business Management, vol. 4, no. 4, pp. 382–389.
Kluza, S., 2011, *The Financial Crisis of 2008–2009: the Financial Supervision Perspective*, Poznań University of Economics Review, vol. 11, no. 1, pp. 7–22.
Kowalski, T., Shachmurove, Y., 2011, *The Financial Crisis: What Lessons Can Be Learned?*, Poznań University of Economics Review, vol. 11, no. 1, p. 48–62.
Merrouche, O., Nier, E., 2010, *What Caused the Global Financial Crisis? —Evidence on the Drivers of Financial Imbalances 1999–2007*, IMF Working Paper, no. 265, International Monetary Fund, Washington.
Meyn, M., Kennan, J., 2009, *The Implications of the Global Financial Crisis for Developing Countries' Export Volumes and Values*, Overseas Development Institute Working Paper, no. 305, Overseas Development Institute, London.
Mishkin, F.S., 1996, *Anatomy of a Financial Crisis*, Journal of Evolutionary Economics, vol. 2, no. 2, pp.115–130.

Ngowi, N.P., 2010, *The Current Global Economic Crisis and its Impacts in Tanzania*, African Journal of Business Management, vol. 4, no, 8, pp. 1468–1474.
Njoroge, J., 2009, *Effects of the Global Financial Crisis on Corporate Social Responsibility in Multinational Companies in Kenya*, Covalence Intern Analyst Papers [online] www.covalence.ch/docs/Kenya-Crisis.pdf [access: 10.07.2011].
OECD, 2010, Measuring Globalization. OECD Economic Globalisation Indicators 2010, OECD, Paris.
Przybylska-Kapuścińska, W. (ed.), 2011, *Reakcje rynków na kryzys*, Wydawnictwo Ce-De-Wu, Warszawa.
Purnanandam, A., 2009, *Originate-to-Distribute Model and the Subprime Mortgage Crisis*, Working Paper, University of Michigan.
Şchiopoiu Burlea, A., Radu, C, Craciun, L., Ionascu, C., Lolescu, R., 2010, *The Relationship between Financial Crisis, Corruption and Corporate Social Responsibility in Romania*, Management & Marketing, vol. 8, no. 1, pp. 65–72.
Shachmurove, Y., 2011, *A Historical Overview of Financial Crises in the United States*, Poznań University of Economics Review, vol. 11, no. 1, pp. 28–46.
Szyszka, A., 2011, *Genesis of the 2008 Global Financial Crisis and Challenges to the Neoclassical Paradigm of Finance*, Poznań University of Economics Review, vol. 11, no. 1, pp. 64–72.
UNCTAD, 2009a, *The Global Economic Crisis: Systemic Failures and Multilateral Remedies*, UNCTAD, New York and Geneva.
UNCTAD, 2009b, *World Investment Prospects Survey 2009–2011*, UNCTAD, New York and Geneva.
UNCTAD, 2010, *World Investment Report 2009: Transnational Corporations, Agricultural Production and Development*, United Nations, New York and Geneva.
Wan, W.P., Yiu, D.W., 2009, *From Crisis To Opportunity: Environmental Jolt, Corporate Acquisitions, and Firm Performance*, Strategic Management Journal, vol. 30, no. 7, pp. 791–801.
Yakovlev, A., Simachev, Y., Danilov, Y., 2010, *The Russian Corporation: Patterns of Behaviour during the Crisis*, Post-Communist Economies, vol. 22, no. 2, pp. 129–140.