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THE EFFECT OF FINANCIAL/ECONOMIC CRISIS ON FIRM PERFORMANCE IN SLOVENIA – A MICRO LEVEL, DIFFERENCE-IN-DIFFERENCES APPROACH

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Abstract
The aim of the paper is to assess the effect of the financial/economic crisis on firm performance across different industry sectors in Slovenia. We employ unusually reach data set: in the analysis we include micro level accounting data on all Slovenian firms in the period from 2003 until 2010 (data for 2011 was not yet available). The analysis of the impact of financial/economic crisis on industry sectors in Slovenia is based on selected financial performance measures with the application of difference-in-differences approach. This is a quasi-experimental technique that measures the effect of a treatment at a given period in time. "Treatment" in our case is financial/economic crisis, which tend not to have a significant effect on some industries (i.e., control group) and have evident effect on other industries (i.e., treatment group). We find that the financial performance of firms was significantly poorer in treatment groups, confirming the negative effect of the financial/economic crisis. Besides control group (industry sector A - Agriculture, forestry and fishing) for which we assumed to be less affected by the financial/economic crisis or not be affected at all, the industry sector B (Mining and quarrying) and financial indicator EBITDA margin seem not to be affected much from the financial/economic crisis. But for most industry sectors and financial indicators the effect of the crisis was evident/statistically significant. According to the results of the analysis, the financial/economic crisis had the most evident effect on return on equity and employee value added, and on industry sectors Electricity, gas, steam and air conditioning supply (D), Water supply, sewerage, waste management and remediation activities (E), and – of course – Construction (F).
Keywords: financial/economic crisis, firm performance, micro level data, Slovenia.

1. Introduction

The global financial/economic (GFC) crisis started in end-2007 as financial (subprime mortgage) crisis in the United States. It has soon spread worldwide and caused economic crisis in most of the world economies. In Slovenia, for example, GDP fell for more than 8 % in 2009 and has not reached its pre-crisis GDP yet (in the last quarter of 2011 the real GDP is still 9 per cent below its peak value in 2007). However, not all economic activity has declined: construction and financial sector suffered the most, whereas retail has been growing steadily.

Even though macroeconomic consequences of business cycles are obvious, there is a lack of research in the literature regarding the microeconomic repercussions of crises. This paper tries to fill this gap and shed light on microeconomic effects of the GFC on firm performance in Slove-

nia. We employ unusually reach data set (i.e., micro level accounting data on all Slovenian firms in the period from 2003 until 2010) and a quasi-experimental technique (difference-in-differences approach).

We tried to address three research questions:

- What are the effects of the GFC on firm performance in Slovenia?
- Which industry sectors have been affected at most and which at least?
- Which financial indicators have been affected by the GFC?

To our view the paper has a significant scientific value. Namely, not much research has been done on the effect of the financial and/or economic crisis (especially not for the GFC) using micro level data. Second, studies which have shed light on micro-level effects have not used a complete population of firms in an economy. In our case we work with a complete dataset, covering financial statements of all active firms in Slovenia for a longer period of time. And third, difference-in-differences approach has been rarely used for such an analysis, even though it seems an obvious way to study these effects.

Our study shows that the financial performance of firms was significantly poorer in the treatment groups (firms engaged in industries evidently affected by the GFC), confirming the negative effect of the financial/economic crisis. Besides control group (industry sector A), for which we assumed that financial/economic crisis had no or small effect, the industry sector B (Mining and quarrying) and financial indicator EBITDA margin seem not to be affected much from the financial/economic crisis. But for other industry sectors and other financial indicators the effect of the crisis was evident/statistically significant. According to the results of the analysis, the financial/economic crisis had the most evident effect on return on equity and employee value added. As regards industry sectors, the effect was at most pronounced in sectors of Electricity, gas, steam and air conditioning supply (D), Water supply, sewerage, waste management and remediation activities (E), and – of course – Construction (F).

The paper is organized as follows. Next section points to the theoretical background of business cycles and summarizes some relevant empirical studies. In Section 3 we present methodology and data, and in Section 4 the results of the analysis are explained. The last section concludes.

2. Theoretical Background and Overview of Empirical Studies

Business (or economic) cycles are fluctuations in production or economic activity over several months or years (Shumpeter 1954). These fluctuations occur around a long-term growth trend, and typically involve shifts over time between periods of relatively rapid economic growth (an expansion or boom), and periods of relative stagnation or decline (a contraction or recession). According to Goldsmith (1969), crises normally result in sharp (and cyclical) deterioration of all or the majority of financial indicators, such as short-term interest rates, value of assets, housing and land, and insolvency and bankruptcy of firms and financial institutions.

Business cycles are relatively normal phenomena in economy. Leaven and Valencia (2005) counted 124 systemic crises worldwide in the period from 1970 to 2005. However, some business cycles are more and some less devastating to economy, and the majority of them are local, not global. It seems that until 2008 the major economic downturn on global level started in 1930s in the United States (later denoted as the Great depression), when the GDP declined in the United States for about 40 % compared to the long-term trend. The crisis had devastating results also in other parts of the world. After Great depression world economies have not faced such sharp downturns until the GFC, which again seriously hurt economies worldwide. Developed economies have never after second world war experienced such a huge economic slowdown as they did in 2008 (according to the IMF (2009 a, b), real GDP of developed economies has fallen for about 7.5 % in fourth quarter of 2008).

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Macroeconomic consequences of crises are obvious. In recent literature much research has been focused on the macroeconomic effects of crises, and how these effects spread to diffe-rent countries through contagion channels. However, there is a lack of information on the micro-economic repercussions of these crises (Fassler 2007). Therefore it would be interesting to understand, what are typical consequences of financial/economic crisis on micro level from the viewpoint of firms. What kinds of firms are affected by the crisis? Are there any differences in industry sectors? Are there any differences in the size of the firms or its – say – corporate gover-nance or ownership? Which financial indicators are under the major pressure? Unfortunately, not much research of the effect of external shocks on firm performance has been done on micro level, especially not for the GFC. This is not unexpected, as the GFC has not finished yet and not so much time has passed from its peak. Some evidence does exist, though, for past financial cri-ses and also for the GFC.

Even though not focusing on the GFC, we should not neglect two analyses which focused on the Asian financial crisis. Claessens, Djankov and Xu (2000) have studied corporate perfor-mance in the East-Asian financial crisis on a sample of more than 850 publicly listed firms in the four crisis countries (Indonesia, Malaysia, the Republic of Korea and Thailand) and two compara-tors (Hong Kong and Singapore). They compared the growth and financing patterns of East-Asian corporations in the years before the crisis with those in other countries and found little microeco-nomic evidence that corporate growth was weakening. However, they found some support for the argument that many firms had a weak financial structure that left them vulnerable to an econo-mic downturn. They claim that firm-specific weaknesses that existed already before the crisis were important factors in the deteriorating performance of the corporate sector.

Sufian and Habibullah (2010) have assessed the impact of financial crisis on bank per-formance taking into account Indonesian banks' profitability during the period 1990–2005. Their empirical findings indicate that income diversification and capitalization were positively related to bank profitability, while size and overhead costs exerted negative impacts. During the period under study, Indonesian banks seem to have been skimping on their resources, particularly dur-ing the pre-crisis and crisis periods. Namely, the impact of economic growth and banking sector concentration was during these two periods positive. They found that the Asian financial crisis exerted negative and significant impact on the profitability of Indonesian banks, while Indonesian banks have been relatively more profitable during the pre-crisis compared to the post-crisis and crisis periods.

Aldamen *et al.* (2011) have investigated whether better corporate governance impacts the performance of family versus non-family firms during the GFC. Their sample comprised more than 2,000 firms listed in the Australian Stock Exchange. Authors found that the value of family firms is more sensitive to book value than earnings changes, whereas better governance results in a higher earnings relationship with value during the GFC. They also found that better governan-ce, irrespective of whether the firm is family or non-family, is associated with better accounting and market performance during the GFC.

Bricongne *et al.* (2012) have tested how the GFC affected exports of French firms. Their analysis employed a unique dataset of French firms to match export data to firm-level credit con-straints and showed that most of the 2008–2009 trade collapse was due to the unprecedented demand shock and to product characteristics. While all firms have been affected by the crisis, the effect on large firms has been mainly at the intensive margin and has resulted in a smaller port-folio of products being offered to export destinations. As regards smaller exporters, they reduced the range of destinations served or stopped exporting altogether. Credit constraints have been an added aggravation for firms active in high financial dependence sectors. However, the share of credit constrained firms was small and their number has not increased hugely during the crisis, with the result that the overall impact of credit constraints on trade has been limited.

Chaston (2012) studied the effect of the recession on family firm performance for small U.K. family-owned hotels. They utilized a mail survey of small family-owned and nonfamily U.K. hotels to assess business performance, entrepreneurial orientation, and strategic flexibility.

Results indicated that family-owned hotels outperformed nonfamily businesses. Family-owned hotels which enjoyed sales growth during the recession were those which exhibited an entrepreneurial orientation and strategic flexibility. This conclusion was found to apply to both family-owned and nonfamily hotels. The results of the study imply that in order to survive in a recession small family firms should probably exhibit an entrepreneurial orientation and be strategically flexible.

Erkens, Hung and Matos (2012) have studied the corporate governance in financial institutions worldwide and its effect on firm performance during the GFC. Using a dataset of 296 financial firms from 30 countries that were at the center of the crisis, they found that firms with more independent boards and higher institutional ownership experienced worse stock returns during the crisis period. Further exploration suggested that this is because i) firms with higher institutional ownership took more risk prior to the crisis, which resulted in larger shareholder losses during the crisis period, and ii) firms with more independent boards raised more equity capital during the crisis, which led to a wealth transfer from existing shareholders to debtholders.

Little *et al.* (2011) have evaluated the effect of recession on retail firms' strategy and performance using DuPont method. They compared the financial performance of retail firms with fiscal years ending on or around December 31, 2008 and 2009 (the recession years) with retail firms with fiscal years ending on or around December 31, 2006 and 2007 (the non-recession years). The findings of their research suggest that retail firms pursuing a differentiation strategy are not more likely to achieve a higher return on net operating assets than those firms pursuing a cost leadership strategy in a recessionary period.

Lucky and Minai (2012) studied the effect of individual determinant, external factor and firm characteristics on small firm performance during economic downturn. Authors conducted a cross-sectional study using a questionnaire survey research design, and data were generated from 182 entrepreneurs or owner-managers of small firms in both manufacturing and service industries. Their findings indicate that the relationship between individual determinants, external factor and firm characteristics, and firm performance remain significant during the period of economic turbulence.

Pradhan (2011) examined firm performance during the GFC in India. It has been observed that the overall growth and stability of the global economy has become extremely important for the growth performance of Indian firms. Sales and profitability growth of some 450 Indian manufacturing and IT firms were significantly reversed with the condition of global market turning adverse since late 2008. Authors found that those Indian firms which were relatively young in age and more focused on global market have been better off in terms of sales and profit growth than other firms. Also large firms and those having higher advertising intensities have enjoyed higher profit growth in this period.

3. Methodology and Data

Methodology

In order to assess the effect of the GFC on the change in the firms' performance across different industry sectors we applied the difference-in-differences approach. The difference-in-differences approach is a quasi-experimental technique, which enables comparison of before-and-after changes in outcomes due to program or policy/situation change (in our case the financial/economic crisis) for a population that is affected by the situation change (i.e., treatment group) and a population that is not (i.e., control group).

To get better understanding, we present the difference-in-differences model in Figure 1. The impact of the situation change is according to difference-in-differences method simply estimated as the difference between two differences. The first difference is the change in the before-and-after outcomes for the treatment group (i.e., $Y_1 \mid D_i = 1) - (Y_0 \mid D_i = 1)$ – in this way we can control for factors that are constant over time in this group. The second difference is, on the other hand, the before-and-after change in outcomes for the control group, which was not affected by

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the situation change, however it was exposed to the same environmental conditions (i.e., $Y_1 \mid D_i = 0$) – ($Y_0 \mid D_i = 0$). It thus controls for the outside time-varying factors.

The average treatment effect is therefore simply the difference between the two:

$$DiD = [(Y_1 \mid D_i = 1) - (Y_0 \mid D_i = 1)] - [(Y_1 \mid D_i = 0) - (Y_0 \mid D_i = 0)].$$

It should be noted that in order for difference-in-differences estimates to be valid, the control group must accurately represent the outcome change that would have been experienced by the treatment group in the absence of treatment (Angrist and Pischke, 2009; Gertler *et al.*, 2011).

Figure 1: Causal effects in the difference-in-differences model
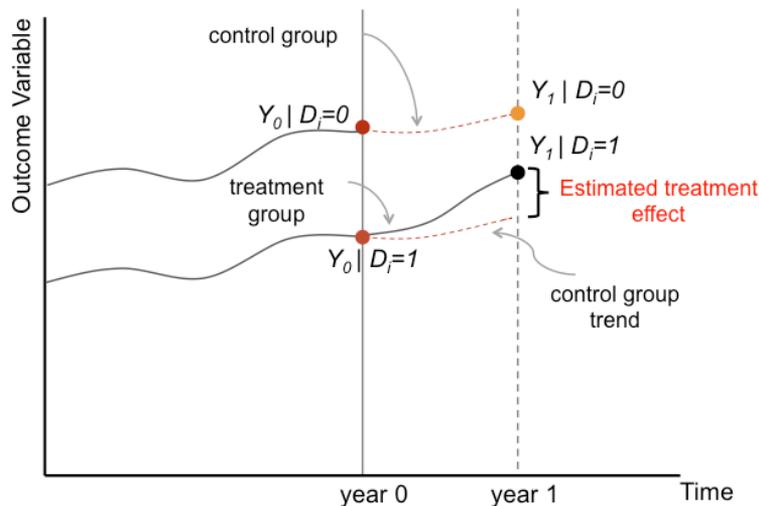
Source: Angrist and Pischke, 2010; Gertler *et al.*, 2011.

For each treatment group (i.e., industry sectors B to K) and for each measure of firms' performance we then estimated the average impact of the financial/economic crisis using the difference-in-differences model based on comparison of means. As a control group we chose industry sector A (see below details on industry sector classification, and selection of financial indicators and time framework): *DiD* = performance[(*Post-crisis (2009) | Treatment sector) – (Pre-crisis (2006) | Treatment sector)*] – performance[(*Post-crisis (2009) | Sector A) – (Pre-crisis (2006) | Sector A)*].

Data

We employ an unusually reach dataset of micro level data on all Slovenian firms in the period from 2003 until 2010 (data for 2011 were at the time of the analysis not yet available). The data set was constructed in a way that enabled us to classify firms into specific industry sectors.

For the analysis we used data from annual reports that must firms according to the law (i.e., the Companies Act – Official Gazette of the Republic of Slovenia, issue no. 42/2006, 60/2006-amended and 10/2008, ZGD-1) submit to the Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES) in order to ensure publicity of data and for national statistics purposes. These provisions refer to all legal forms defined in the ZGD-1 except silent partnerships, which are not considered legal entities, and those legal entities whose individual acts stipulate that they are required to keep books of account and prepare annual reports in

accordance with ZGD-1 (e.g., public commercial institutes and other legal forms which provide commercial public services). Annual reports are publicly available at the AJPES.

The data consist of detailed financial statements of the firms, which allows us to calculate the selected financial indicators. Besides financial data, the dataset includes information on the Slovenian Standard Classification of Activities (SKD), which enables grouping the firms according to their main activity.

Before applying the methodology, the data were processed in the following way:

- According to the methodological approach, the relevant years and controlling group for the analysis have been chosen.
- The outliers by year and industry sector were dropped from the analysis.
- Selected financial indicators have been calculated from raw accounting data.

We explain the data processing in more detail after the description of the SKD.

Standard Classification of Activities

Slovenian Standard Classification of Activities is the obligatory national standard used for recording, collecting, processing, analyzing, mediating and disseminating data connected with activity. It is used for defining the main activity and for classifying business subjects and their units for the needs of official and other administrative data collections (registers, records, databases, etc.) and for the needs of national and international statistics and analyses at various levels of comparison and decision-making.

SKD is in terms of contents and structure almost identical to the NACE Rev.1.1 (EU classification of activities). In three places the basic structure of the SKD differs from the NACE Rev.1. The first level of classification is presented by alphabetical codes representing industry sectors as follows: A (Agriculture, forestry and fishing), B (Mining and quarrying), C (Manufacturing), D (Electricity, gas, steam and air conditioning supply), E (Water supply, sewerage, waste management and remediation activities), F (Construction), G (Wholesale and retail trade, repair of motor vehicles and motorcycles), H (Transportation and storage), I (Accommodation and food service activities), J (Information and communication) and K (Financial and insurance activities). The SKD has been changed in 2008, so to be consistent between the subsequent years, we grouped industry sectors D and E, and J, L, M and N, respectively.

Selection of time framework

In accordance with the difference-in-differences approach, we firstly defined the before and after the crisis period and both treatment and control groups. As the pre-crisis period we defined year 2006; our decision was based on two facts: (i) the steady-state of the economy (for comparison, the year 2007 was characterized with rather high 6.9 % economic growth in Slovenia) and (ii) at that time there was no indication of the GFC that might influence firms' behavior. As the post-crisis year we chose year 2009. Although the GFC reached its peak in 2008, most of the Slovenian firms experienced it with a time lag in 2009 (in the year 2009 Slovenia recorded an almost 9 % drop of GDP (i.e., on macro level) which clearly proves the effect of economic slowdown with a lagged affect compared to the rest of the developed economies).

Selection of the control group

Following the methodology, we needed to select the control group, which has not been affected by the treatment. In our case the treatment is the GFC, which had – according to our expectations – the lowest effect on firms in industry sector A (Agriculture, forestry and fishing). Namely, operations of firms engaged mainly in agriculture, forestry and fishing sector are expected to be the least effected by business cycle or not to be affected at all. An important part of business activities in the sector is performed by farmers and cooperatives. One of the main

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business objectives of cooperatives is long-term stability in operations which is, among others, reflected in conducting conservative business practice.

With regard to our data (see time series of selected financial indicators by sectors – Figures A1 to A7 in the Appendix), this industry sector was at least affected by the GFC and recorded rather stable growth of firm performance. All other individual industry sectors (i.e., B to K) presented the treatment groups. Further, data on default rate (not presented in this analysis), defined as the incidence of insolvency events (bankruptcy, compulsory composition, liquidation), show that the occurrence of default events is relatively low in the sector A and has not changed substantially between years 2006 and 2009.

Treatment of outliers

The first look at data clearly showed that outliers might be an issue to consider in our analysis. Comparing several statistical parameters (mean, median and standard deviation) proved a large variability of financial indicators, even if data were grouped by year and industry sectors. Even though elimination of outliers can be controversial (see, e.g., Barnett and Lewis 1994, Osborne and Overbay 2004, and other research on this issue), we decided to drop outliers from further analysis. The reason behind this decision lies in the fact that for most of the financial indicators the eliminated observations had even theoretically unexpected and unacceptable values. These may be related to the fact that i) most of these indicators were financial ratios (not absolute values), and ii) accounting data may come also for the periods shorter than one year (for newly established and closed firms).

There are several approaches how to define (and eventually drop) outliers. We decided to follow a simple and clear approach by removing 10 % of observations at each tail of the distribution (for each performance measure and for each industry sector separately). In doing that we tried to avoid potential estimation biases due to the existence of outliers.

Selection of financial indicators

Financial indicators show basic performance characteristics of the firm in terms of their economic features and competitive advantages, allowing comparison between different firms. Firms from different industries have different operating characteristics, reflected in specific segments of their financial statements, and consequently also in the calculated financial indicators.

In theory there is a multitude of different indicators which can be calculated from firms' financial statements. The traditional approach to the selection of indicators for financial analysis involves defining different aspects of firm's operations and an arbitrary selection of a few indicators which shed significant light on these aspects. Different researchers categorize indicators into similar but not entirely identical groups, which are then used to analyze the individual segments of company operations.

To analyze the effect of financial crisis on firms' performance, we, amongst several possible financial indicators, selected those indicators that are commonly used to present the financial state of firms, covering profitability, liquidity, indebtedness, productivity and size. Five groups of financial indicators were chosen for the analysis:

1. Profitability:
   - Return on equity (ROE) = net profit or net loss / average equity
   - Operating margin = operating profit or loss / net sales revenue
   - EBITDA margin = operating cash flow (EBITDA) / net sales revenue
2. Indebtedness
   - Non-equity liabilities to total assets = Non-equity liabilities / total assets
3. Size
   - Net sales revenue (in EUR)
4. Liquidity
   - Current ratio = (current assets + non-current operating receivables) / current liabilities

5. Productivity
   - Employee value added (in EUR) = (gross operating income – costs of goods, material and services – other operating expenses) / (average number of employees)

Table 1 shows number of observations in the sample by the two selected years and industry sectors.

Table 1: Summary of the sample (number of observations)

Industry sector	2006	2009
A	261	197
B	48	52
C	5,045	4,977
D and E	124	268
F	2,926	4,105
G	8,099	8,521
H	1,879	1,581
I	1,222	1,507
J, L, M and N	7,121	9,372
K	445	484
Sum	29,176	33,073

Results

In this section we provide a short explanation of results. The results of the analysis are summarized in Tables A1 to A7 in Appendix. In comparison to the control group (industry sector A), we expect that the GFC would deteriorate financial performance of the firms in treatment group in year 2009 compared to year 2006. For most of the selected financial indicators (except the indebtedness), worse financial performance would mean their lower value.

The analysis shows that profitability has fallen due to the GFC in 2009 compared to 2006 in several industry sectors, especially if measured as the return to equity. As can be seen in Table A1, the *return to equity* declined in the control group in 2009 compared to 2006 – the difference is 1.3 percentage points. A decline in return in equity is observed also in most of the treatment sectors. By comparing the differences between control and treatment group we can see that at 1 % significance the *difference-in-differences* are negative for all treatment groups except I and K (difference is not statistically significant) and for treatment group I, L, M and N, where the *difference-in-differences* is negative and significant at 10 % significance level. We may conclude that the GFC has pushed the *return to equity* to lower levels in most of the industry sectors except *Accommodation and food service activities* and *Financial and insurance activities*.

Even though the *return to equity* has significantly fallen due to the GFC in most of the industry sectors, we cannot claim that for the *operating margin*. Table A2 shows that *difference-in-differences* in *operating margin* are significant (at 1 % level) only for industry sectors B, D and E, and F, by which the difference in sectors D and E is positive. This is somehow unexpected as it implies that in spite of the crisis and downturn of the *return to equity*, the *operating margin* has increased in this industry sector.

Furthermore, industry sectors D and E, and F have also experienced a significant fall in the value of next financial indicator, i.e., *EBIDTA margin* (see Table A3). For other industry sectors the *EBITDA margin* has not changed significantly in 2009 compared to 2006 and to the control group. To our view it is not clear how the GFC would affect the indebtedness of firms. On one hand, it could be expected that the indebtedness would fall, as firms would have hard time finding external sources of debt. But on the other hand, the equity capital could also fall due to the eventual losses caused by the GFC. Results show ambiguous results for industry sectors: if indebtedness has not changed much in the control group, it raised in some and fallen in other treatment industry sectors. However, the difference-in-differences, which would show the effect of the

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crisis, are mostly not statistically significant. In fact, only for the industry sector *Transportation and storage* and *Accommodation and food service activities* this difference is significant (at 5% level) and positive.

Similar results were obtained for the indicator *current ratio* (see Table A6). The results show that differences are significant for the same industry sectors as for indebtedness, but reverse in sense of the effect. Liquidity situation worsened for the same industry sectors (*Transportation and storage* and *Accommodation and food service activities*) due to the effect of the GFC. The *current ratio* has fallen for *Financial and insurance activities* as well.

Consistent in the sense of the direction of the change are also results for the *net sales revenue* (Table A5) and *employee value added* (Table A7): sales and productivity have fallen due to the GFC. The productivity (measured as *employee value added*) decreased in relative terms (i.e., compared to the change in control group) in all industry sectors, except in *Mining and quarrying*. On the other hand, the *difference-in-differences* in *net sales revenue* are statistically significant for five out of nine treatment groups, whereas for other treatment groups differences are negative, however not statistically significant.

Summarizing the results of *difference-in-differences* (see Table 2 below) we may conclude that the GFC has lead to worse financial performance of firms in the treatment groups. Besides control group (industry sector A), for which we assumed that the GFC had no or small effect, the industry sector B (*Mining and quarrying*) and financial indicator *EBITDA margin* seem not to be affected much from the financial/economic crisis. According to the results of the analysis, the financial/economic crisis had the most evident effect on *return on equity* and *employee value added*, and on industry sectors *Electricity, gas, steam and air conditioning supply* (D), *Water supply, sewerage, waste management and remediation activities* (E), and – of course – *Construction* (F).

Table 2: Summary of difference-in-differences analyses

Treatment sector	Return on equity	Operating margin	EBITDA margin	Non-equity Liabilities to total assets	Net sales revenue	Current ratio	Employee value added
B	–	–					
C	–				–		–
D and E	–		–		–		–
F	–	+	–		–		–
G	–	–					–
H	–			+		–	–
I				+		–	–
J, L, M and N	–						–
K					–	–	–

Legend: + and – denote significant (at least 10 %) positive and negative, respectively, difference-in-differences.
Source: Derived from Tables A1 to A7 from Appendix.

4. Conclusion

The paper tries to assess the effect of the GFC on firm performance in different industry sectors in Slovenia. The literature review indicates a lack of information and research on how an economic slowdown affects individual firm performance, even though the macroeconomic perspective is obvious. The paper adds to literature as it i) studies the effect of the GFC on individual firm performance, ii) employs micro level data on all active firms in Slovenia in the relevant years, and iii) employs an innovative methodology for this kind of analysis.

Our analysis shows that financial performance of firms was significantly poorer in most of the treatment groups, confirming the negative effect of the financial/economic crisis. Besides control group (industry sector A) for which we assumed that financial/economic crisis had no or

small effect, the industry sector B (Mining and quarrying) and financial indicator EBITDA margin seem not to be affected much from the financial/economic crisis. But for most industry sectors and financial indicators the effect of the crisis was evident/statistically significant. According to the results, the financial/economic crisis had the most evident effect on return on equity and employee value added, and on industry sectors Electricity, gas, steam and air conditioning supply (D), Water supply, sewerage, waste management and remediation activities (E), and – of course – Construction (F).

Having in mind some restrictions of our results, the future studies should include in their empirical model also control variables. Namely, in our study we have not checked if – for example – the effect of the GFC in a specific industry sector differs on some individual characteristics of the firms (e.g., size, ownership etc.). This could be done by employing regression difference-in-differences approach. And further, robustness of the analysis should be tested using different control groups, different combinations of years etc.

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Appendix

Figure A1: Time series of median of return on equity by industry sector in the period from 2003–2010
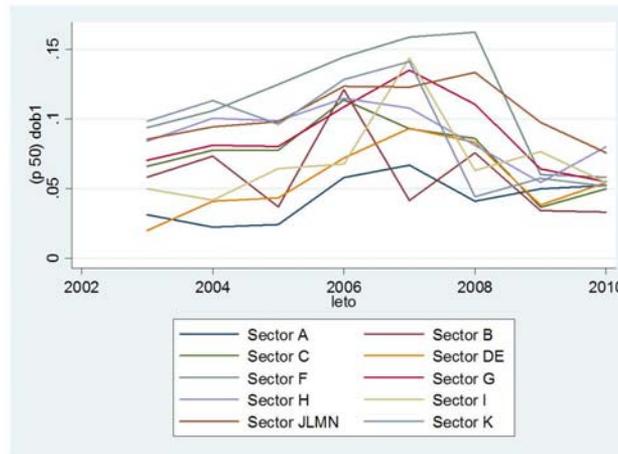
Source: Own calculations based on AJPES data.

Figure A2: Time series of median of operating margin by industry sector in the period from 2003–2010

Source: Own calculations based on AJPES data.

Figure A3: Time series of median of EBIDA margin by industry sector in the period from 2003–2010

Source: Own calculations based on AJPES data.

Figure A4: Time series of median of non-equity liabilities to total assets by industry sector in the period from 2003–2010

Source: Own calculations based on AJPES data.

Figure A5: Time series of median of net sales revenue by industry sector in the period from 2003–2010

Source: Own calculations based on AJPES data.

Figure A6: Time series of median of current ratio by industry sector in the period from 2003–2010

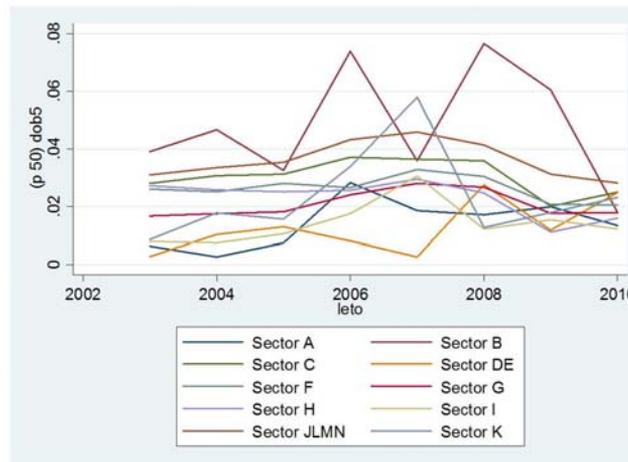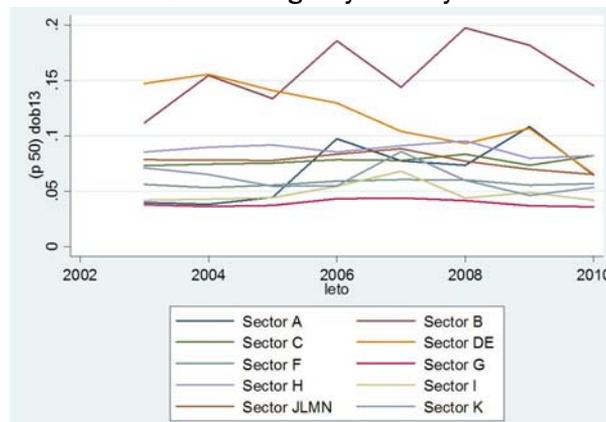*Source:* Own calculations based on AJPES data.

Figure A7: Time series of median of employee value added by industry sector
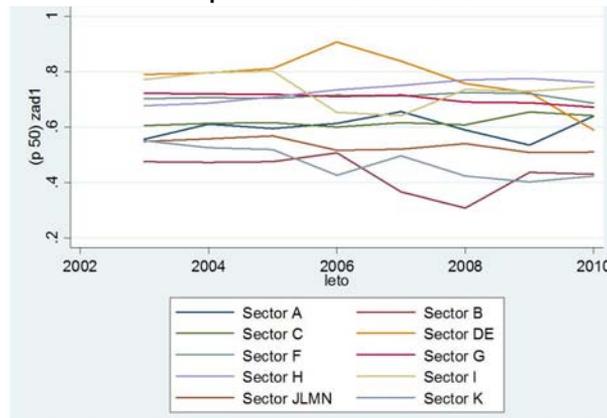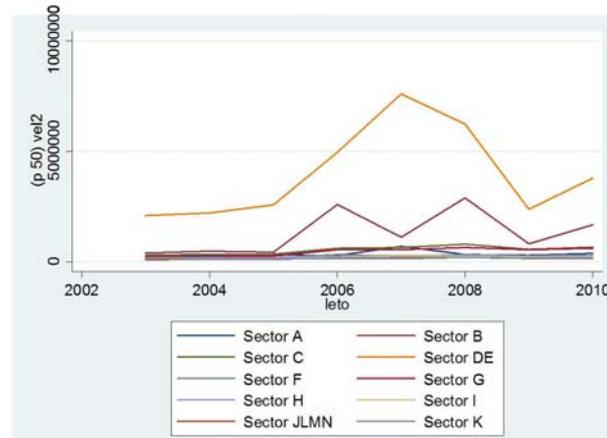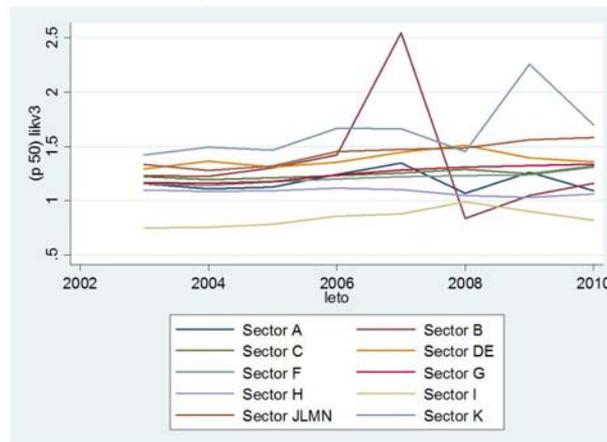in the period from 2003–2010
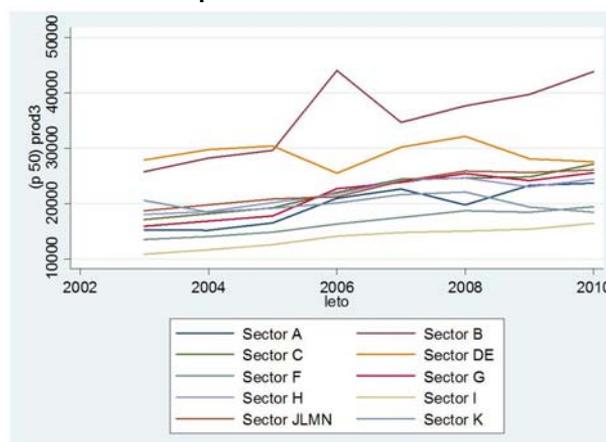
Source: Own calculations based on AJPES data.

General notes on the Tables A1 to A7:
[1] Data for the "before crisis" period refer to year 2006, data for the "after crisis" period refer to year 2009.
[2] Values in the above table present means and robust standard errors (in parentheses), both estimated by linear regression.
[3] Industry sectors are defined as explained in section *Data*.
[4] *Statistical significance:* *** p<0.01; ** p<0.05; * p<0.1

Table A1: Difference-in differences (DiD) estimate of the effect of financial/economic crisis
on the change in return on equity (comparison of means)

| Treatment sector | Before crisis | | After crisis | | DID |
	sector A	treatment sector	sector A	treatment sector	
B	0.079 (0.009)	0.177 (0.027)	0.066 (0.009)	0.054 (0.011)	– 0.109*** (0.032)
C	0.079 (0.009)	0.118 (0.002)	0.066 (0.009)	0.051 (0.002)	– 0.054*** (0.014)
D and E	0.079 (0.009)	0.061 (0.008)	0.066 (0.009)	0.109 (0.009)	0.061*** (0.018)
F	0.079 (0.009)	0.180 (0.004)	0.066 (0.009)	0.079 (0.004)	– 0.088*** (0.014)
G	0.079 (0.009)	0.134 (0.002)	0.066 (0.009)	0.083 (0.002)	– 0.037*** (0.013)
H	0.079 (0.009)	0.168 (0.005)	0.066 (0.009)	0.093 (0.006)	– 0.062*** (0.016)
I	0.079 (0.009)	0.137 (0.008)	0.066 (0.009)	0.136 (0.008)	0.012 (0.018)
J, L, M and N	0.079 (0.009)	0.157 (0.002)	0.066 (0.009)	0.120 (0.002)	– 0.023* (0.014)
K	0.079 (0.009)	0.108 (0.007)	0.066 (0.009)	0.122 (0.012)	0.027 (0.019)

Table A2: Difference-in differences (DiD) estimate of the effect of financial/economic crisis on the change in operating margin (comparison of means)

Treatment sector	Before crisis		After crisis		DiD
	sector A	treatment sector	sector A	treatment sector	
B	0.009 (0.004)	0.104 (0.019)	– 0.011 (0.008)	0.018 (0.011)	– 0.067*** (0.024)
C	0.009 (0.004)	0.034 (0.001)	– 0.011 (0.008)	0.005 (0.001)	– 0.009 (0.009)
D and E	0.009 (0.004)	0.006 (0.008)	– 0.011 (0.008)	0.022 (0.005)	0.036*** (0.013)
F	0.009 (0.004)	0.034 (0.001)	– 0.011 (0.008)	– 0.009 (0.002)	– 0.024*** (0.009)
G	0.009 (0.004)	0.020 (0.001)	– 0.011 (0.008)	0.003 (0.001)	0.003 (0.009)
H	0.009 (0.004)	0.029 (0.001)	– 0.011 (0.008)	– 0.004 (0.002)	– 0.014 (0.009)
I	0.009 (0.004)	0.002 (0.002)	– 0.011 (0.008)	– 0.019 (0.002)	– 0.002 (0.010)
J, L, M and N	0.009 (0.004)	0.049 (0.001)	– 0.011 (0.008)	0.028 (0.001)	– 0.001 (0.009)
K	0.009 (0.004)	– 0.142 (0.025)	– 0.011 (0.008)	– 0.220 (0.030)	– 0.058 (0.040)

Table A3: Difference-in differences (DiD) estimate of the effect of financial/economic crisis on the change in EBIDA margin (comparison of means)

Treatment sector	Before crisis		After crisis		DiD
	sector A	treatment sector	sector A	treatment sector	
B	0.074 (0.005)	0.187 (0.022)	0.066 (0.007)	0.154 (0.016)	– 0.025 (0.029)
C	0.074 (0.005)	0.082 (0.001)	0.066 (0.007)	0.066 (0.001)	– 0.008 (0.009)
D and E	0.074 (0.005)	0.161 (0.012)	0.066 (0.007)	0.119 (0.006)	– 0.034** (0.016)
F	0.074 (0.005)	0.064 (0.001)	0.066 (0.007)	0.029 (0.002)	– 0.027*** (0.009)
G	0.074 (0.005)	0.043 (0.001)	0.066 (0.007)	0.030 (0.001)	– 0.006 (0.009)
H	0.074 (0.005)	0.093 (0.002)	0.066 (0.007)	0.082 (0.002)	– 0.003 (0.009)
I	0.074 (0.005)	0.046 (0.002)	0.066 (0.007)	0.030 (0.008)	– 0.008 (0.010)
J, L, M and N	0.074 (0.005)	0.092 (0.001)	0.066 (0.007)	0.076 (0.001)	– 0.009 (0.009)
K	0.074 (0.005)	– 0.074 (0.024)	0.066 (0.007)	– 0.137 (0.027)	– 0.055 (0.037)

Table 4A: Difference-in differences (DiD) estimate of the effect of financial/economic crisis on the change in non-equity liabilities to total assets (comparison of means)

Treatment sector	Before crisis		After crisis		DiD
	sector A	treatment sector	sector A	treatment sector	
B	0.630 (0.015)	0.495 (0.036)	0.620 (0.018)	0.529 (0.036)	0.044 (0.056)
C	0.630 (0.015)	0.631 (0.003)	0.620 (0.018)	0.642 (0.003)	0.021 (0.024)
D and E	0.630 (0.015)	0.708 (0.023)	0.620 (0.018)	0.697 (0.014)	– 0.001 (0.036)
F	0.630 (0.015)	0.702 (0.004)	0.620 (0.018)	0.725 (0.003)	0.032 (0.024)
G	0.630 (0.015)	0.709 (0.002)	0.620 (0.018)	0.703 (0.002)	0.004 (0.024)
H	0.630 (0.015)	0.705 (0.005)	0.620 (0.018)	0.749 (0.005)	0.054** (0.024)
I	0.630 (0.015)	0.812 (0.009)	0.620 (0.018)	0.869 (0.009)	0.067** (0.027)
J, L, M and N	0.630 (0.015)	0.580 (0.003)	0.620 (0.018)	0.591 (0.003)	0.021 (0.024)
K	0.630 (0.015)	0.571 (0.014)	0.620 (0.018)	0.601 (0.014)	0.041 (0.031)

Table 5A: Difference-in differences (DiD) estimate of the effect of financial/economic crisis on the change in net sales revenue (comparison of means)

Treatment sector	Before crisis		After crisis		DiD
	sector A	treatment sector	sector A	treatment sector	
B	5.0×10^5 (4.6×10^4)	1.7×10^6 (3.2×10^5)	6.5×10^5 (7.1×10^4)	1.8×10^6 (3.0×10^5)	-7.3×10^4 (4.5×10^5)
C	5.0×10^5 (4.6×10^4)	8.9×10^5 (1.9×10^4)	6.5×10^5 (7.1×10^4)	7.9×10^5 (1.7×10^4)	-2.5×10^5*** (8.8×10^4)
D and E	5.0×10^5 (4.6×10^4)	6.8×10^6 (1.1×10^6)	6.5×10^5 (7.1×10^4)	3.3×10^6 (3.1×10^5)	-3.7×10^6*** (1.2×10^6)
F	5.0×10^5 (4.6×10^4)	3.4×10^5 (8.1×10^3)	6.5×10^5 (7.1×10^4)	3.1×10^5 (6.2×10^4)	-1.8×10^5** (8.5×10^4)
G	5.0×10^5 (4.6×10^4)	5.6×10^5 (8.2×10^3)	6.5×10^5 (7.1×10^4)	5.8×10^5 (8.2×10^3)	-1.3×10^5 (8.5×10^4)
H	5.0×10^5 (4.6×10^4)	5.1×10^5 (1.7×10^4)	6.5×10^5 (7.1×10^4)	5.3×10^5 (1.7×10^4)	-1.3×10^5 (8.8×10^4)
I	5.0×10^5 (4.6×10^4)	2.2×10^5 (6.2×10^3)	6.5×10^5 (7.1×10^4)	2.3×10^5 (5.6×10^4)	-1.4×10^5* (8.5×10^4)
J, L, M and N	5.0×10^5 (4.6×10^4)	2.2×10^5 (2.8×10^3)	6.5×10^5 (7.1×10^4)	2.3×10^5 (2.7×10^3)	-1.4×10^5* (8.5×10^4)
K	5.0×10^5 (4.6×10^4)	3.5×10^5 (2.7×10^4)	6.5×10^5 (7.1×10^4)	3.0×10^5 (1.9×10^4)	-2.0×10^5** (9.1×10^4)

Table 6A: Difference-in differences (DiD) estimate of the effect of financial/economic crisis on the change in current ratio (comparison of means)

Treatment sector	Before crisis		After crisis		DiD
	sector A	treatment sector	sector A	treatment sector	
B	1.309 (0.044)	1.676 (0.174)	1.504 (0.077)	1.545 (0.149)	– 0.327 (0.246)
C	1.309 (0.044)	1.395 (0.010)	1.504 (0.077)	1.454 (0.012)	– 0.136 (0.090)
D and E	1.309 (0.044)	1.434 (0.066)	1.504 (0.077)	1.470 (0.042)	– 0.159 (0.118)
F	1.309 (0.044)	1.292 (0.009)	1.504 (0.077)	1.342 (0.010)	– 0.146 (0.089)
G	1.309 (0.044)	1.340 (0.007)	1.504 (0.077)	1.430 (0.008)	– 0.105 (0.089)
H	1.309 (0.044)	1.228 (0.015)	1.504 (0.077)	1.154 (0.015)	– 0.269*** (0.091)
I	1.309 (0.044)	0.902 (0.018)	1.504 (0.077)	0.827 (0.016)	– 0.270*** (0.091)
J, L, M and N	1.309 (0.044)	1.665 (0.012)	1.504 (0.077)	1.793 (0.013)	– 0.067 (0.090)
K	1.309 (0.044)	2.120 (0.094)	1.504 (0.077)	2.032 (0.082)	– 0.283* (0.153)

Table 7A: Difference-in differences (DiD) estimate of the effect of financial/economic crisis on the change in employee value added (comparison of means)

Treatment sector	Before crisis		After crisis		DiD
	sector A	treatment sector	sector A	treatment sector	
B	1.8×10^4 (4.6×10^2)	3.8×10^4 (2.7×10^3)	2.2×10^4 (7.2×10^2)	3.6×10^4 (2.1×10^3)	$– 5.8 \times 10^3$ (3.5×10^3)
C	1.8×10^4 (4.6×10^2)	2.2×10^4 (1.3×10^2)	2.2×10^4 (7.2×10^2)	2.4×10^4 (1.4×10^2)	$– 2.2 \times 10^3$** (8.8×10^2)
D and E	1.8×10^4 (4.6×10^2)	4.3×10^4 (2.8×10^3)	2.2×10^4 (7.2×10^2)	1.9×10^4 (1.4×10^3)	$– 6.2 \times 10^3$* (3.2×10^3)
F	1.8×10^4 (4.6×10^2)	1.7×10^4 (1.4×10^2)	2.2×10^4 (7.2×10^2)	1.8×10^4 (1.4×10^2)	$– 3.0 \times 10^3$*** (8.8×10^2)
G	1.8×10^4 (4.6×10^2)	2.2×10^4 (1.4×10^2)	2.2×10^4 (7.2×10^2)	2.4×10^4 (1.4×10^2)	$– 1.8 \times 10^3$** (8.8×10^2)
H	1.8×10^4 (4.6×10^2)	2.3×10^4 (2.5×10^2)	2.2×10^4 (7.2×10^2)	2.4×10^4 (2.7×10^2)	$– 2.7 \times 10^3$*** (9.3×10^2)
I	1.8×10^4 (4.6×10^2)	1.4×10^4 (1.5×10^2)	2.2×10^4 (7.2×10^2)	1.6×10^4 (1.7×10^2)	$– 2.1 \times 10^3$** (8.8×10^2)
J, L, M and N	1.8×10^4 (4.6×10^2)	2.5×10^4 (1.5×10^2)	2.2×10^4 (7.2×10^2)	2.7×10^4 (1.5×10^2)	$– 1.5 \times 10^3$* (8.8×10^2)
K	1.8×10^4 (4.6×10^2)	2.5×10^4 (1.2×10^3)	2.2×10^4 (7.2×10^2)	2.6×10^4 (1.1×10^3)	$– 3.4 \times 10^3$* (1.9×10^3)