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Impact of Floods on Local Political Representation¹

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Abstract:

Natural disasters have significant material and social impacts on the communities affected. It may also influence the result of the political process, especially at the local level. Therefore, the paper investigates the political consequences of the disastrous floods in the Czech Republic with the focus on the largest floods in 2002. Its main goal is to test the hypothesis that floods in the Czech Republic influenced the results of local elections, i.e. that floods caused changes in local representations of those municipalities, which were affected by floods just before the local elections. The hypothesis was formulated on the basis of the current distribution of responsibility in the Czech system of flood protection (responsibility is shared by citizens, local governments and the national government).

There have been used data concerning the elections at the local level held in November 2002 and data on flood damages. The data sample included not only those municipalities affected by floods, but also those which weren't affected. It enabled to verify the plausibility of the results.

The statistical analysis shows that there was no statistically significant influence of floods on re-election of candidates standing for their offices again. There was a moderate influence on the participation of the electorate in the elections.

Keywords: *local governments, floods, political process*

Introduction

Natural disasters (floods, droughts, hurricanes, wildfires and others) have affected mankind – individuals and communities – for ages. The consequences of such incidences are both material and social, so it is worthwhile to study their particular impacts on the society at the national, but also the local level.

During the past decades, in Central Europe, disastrous floods became the number one issue regarding various kinds of natural disasters. After many years of “flood peace”

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large floods suddenly hit the eastern part of the Czech Republic in 1997, continuing to Slovakia, Austria, Hungary (Danube river basin) and Poland (Odra river basin). Five years later in 2002, even larger flooding affected the western part of the Czech Republic, including Prague. From Bohemia the floods continued to Germany along the Elbe river basin. Further, in 2006, third floods partly reduplicated the situation from previous years in the east and west of the country. In the Czech Republic alone, in the past two decades, large floods have caused damages of about 6 billion Euros and 96 deaths. Thousands of people had to be evacuated and millions faced a difficult material situation [MoA 2008]. The recent focus on floods and flood prevention in public policies in the Central European perspective is the reason, why the paper investigates the (mainly political) impacts of such types of disasters.

Many articles and papers worldwide have been written to investigate the best practices for flood protection, flood recovery and mitigation [see Osei 2007; Gerber 2007; Garrett, Sobel 2003 among others]. Other types of papers deal with the reaction of the public and private sector to floods and they compare the effectiveness or the ease of readjusting under different schemes of flood management [Congleton 2006; Sobel, Leeson 2006; Shughart 2006]. In particular Hurricane Katrina brought increased scientific activity in this field. However, the question of the political responsibility for the damage to property and deaths is rarely raised.

The responsibility for damages caused by natural disasters is partly covered by several authors [Congleton 2006; Sobel, Leeson 2006 and Young 2006]. Further, Schneider [1992] focused on differences between bureaucratic procedures and intuitive emergent norms. She pointed out the limited ability of the public administration in the USA to react to a crisis situation and she indicated the political consequences of these findings. Cigler [2007] stressed the fact that natural hazards become a problem mainly due to interactions with human settlements and infrastructure. Thus, the problem of responsibility for flood damages does not just include the flood protection system itself, but also land-use regulations and the day-to-day behaviour of private users in river basins. The problem of political responsibility and natural disasters was also indirectly investigated by Nordhaus, Alesina and Schulze [1989], who studied the impact of external shocks to the political system.

The influence of natural disasters on political choice has been rarely studied directly. There are only several studies concerning such a topic [see Abney, Hill 1966; Davis, Seitz 1982; Gomez, Wilson 2008]. The most recent study [Gomez, Wilson 2008] concentrates on the aspect of responsibility from the point of view of voters, who were affected by floods. They found that citizens at higher levels of sophistication are less likely to find the federal government chiefly to blame, and more likely to fault actors at the state level, in the case of Hurricane Katrina. Authors summarize the attitude of voters without testing it on real elections. Therefore, they leave open the question whether the voters will really punish politicians for failure during Hurricane Katrina. Abney, Hill [1966] focused on the floods caused by Hurricane Betsy in September 1965 and its impact on the election of the mayor in New Orleans. Davis, Seitz [1982] covered a wide range of natural disasters including floods and investigated their influence on different aspects of community life. Political stability was

one of these aspects. Nevertheless, none of these articles proved that floods have a considerable impact on election results at the local level.

Following the effort of previous studies, the goal of this paper is to investigate whether voters at the local level are sensitive to external shocks (such as floods) and to test this hypothesis on empirical data. More specifically, the impact of the disastrous flood in 2002 on the results of municipal elections in the Czech Republic in the same year will be examined. Election results in two samples of municipalities (affected and unaffected) will be compared and data gathered on changes in local political representation will be analysed using regression analysis. The relationship between political behaviour and floods will thus be tested. Moreover, this research is set in the specific political environment of a post-socialist European country, so the result may complement existing knowledge in this field.

Finally it needs to be admitted that Achen, Bartels [2002] and Arceneaux, Stein [2006] have already tested a similar dependence as this paper. Achen, Bartels [2002] investigated the influence of droughts and floods during the 20th century on electoral outcomes at the national level in the USA. They concluded that voters are simply unable to look beyond the situation of their community (i.e. the distribution of the responsibility among actors on different levels or simply the inability of political representatives to deal with a certain problem at all). Thus they punish the political representatives in charge for droughts and flood damages. Further, Arceneaux, Stein [2006] found that voters are willing to punish the incumbent mayor for the flood, if they believe the mayor was responsible for the flood prevention. Thus, the ability of voters to recognize the responsibility of particular stakeholders is crucial for their ability to punish the incumbent politicians. The conclusions of these two studies will be discussed later in the context of the data analysis results of this paper.

The structure of the paper is as follows. First, the framework of the Czech system of flood protection is introduced focussing on the distribution of responsibilities among central government, local governments and the inhabitants. Then a robust hypothesis about the impact of floods on municipal elections is built and data selection and the model are defined. The interpretation of results follows with a comparison with previous research undertaken. Finally, the paper briefly discusses other relevant factors giving rise to variability in municipal election results.

The Czech flood protection system

In the Czech Republic the legal responsibility for both, flood protection and mitigation, is shared by the national government (state level), local governments (municipal/regional level) and by citizens (individual level). The individual responsibility for flood protection and flood damages is declared, although many national subsidy schemes exist to cover the necessary costs of households. The national government has a large responsibility regarding crisis management (during the disaster itself). Local governments also have the power to significantly influence the situation during floods (they are an integral part of the crisis management structures), but also before and after the floods in the “peace” period. Since

the main focus of the paper is on the political consequences of floods at the local level, a further description of the position of municipalities in the whole system will follow, as they are self-governed territorial units. The distribution of responsibilities differs significantly among countries – varying from the rather low involvement of local governments in Great Britain [Johnson, Priest 2008] to the large number of feasible interventions with which US municipalities are equipped [Rubin, Barbee 1985; Wise 2006; Loucks, Stedinger 2007]. In the Czech Republic, as will be seen further, there is a gap between the strong legal position and the weak real involvement of local governments in situations before, during and after the floods.

In the following text, two different situations are described: a) what a municipality can do during a flood threat, and b) what a municipality can do in a long-term period to lower the vulnerability of its territory to floods.

Municipalities during a flood threat

When a flood warning is issued, the flood protection system is activated following the bottom-up approach. The mayors of potentially endangered municipalities are given notice about heavy rains or a rise in water levels by the Czech Hydro-meteorological Institute, which runs the national monitoring net. This information can be complemented by data from river basin managers. In this situation, the mayor of a municipality is the key person in deciding what particular steps to take according to the extent of the risks.

At the municipal level, a mayor activates the flood committee, which serves as an advisory group of technical, water and rescue experts. According to the level of emergency, which is evaluated by the committee, a mayor can gradually announce 3 types of flood degree – watchfulness, alert and threat. Each degree announced is followed by standardized actions conducted by the flood committee according to the flood plan, e.g. the municipal monitoring of rivers and streams, the construction of mobile flood protection walls, the evacuation of people etc.

If the necessary flood prevention measures exceed the available possibilities of one municipality or if the situation in a municipality is no longer manageable, a mayor can call for help to the superior territorial unit – usually the regional office. In such a case, the effort of the municipality is supported by members of an Integrated Rescue System (police, firemen and, previously, the army as well). This system operates at the regional level. In this situation, it is probable that water does not threaten just a single municipality, so mayors often co-operate with each other. If the flood exceeds the territory of one region or the abilities of a regional office to manage it, the central level of public administration is involved, and the Parliament or the national government announces a “crisis situation”. From this moment, the centralized system of crisis management is activated under the command of the Minister of Interior. All decentralized flood committees are integrated into territorial crisis bodies. However, in reality municipal representatives remain the key persons to handle urgent local flood problems.

Regarding the operational preparedness of a single municipality to a flood event, the “flood memory” turned out to be an important factor after the third large flood in the Czech

Republic over the last 10 years. Whereas the first recent floods, in 1997, found many mayors and their flood committees unprepared to make needful decisions, the situation had improved significantly during the floods in 2002 and 2006 [Čamrová, Jílková 2006].

Municipalities in the long-term period

As can be seen from the description above, during “peace” time, a municipality can undertake training of its flood committee. It can improve the municipal warning system, educate inhabitants or buy additional equipment to manage floods (e.g. more mobile walls, water pumps). However, besides these rather passive measures, a municipality can significantly intervene in urban development processes. Through the urban and land use plans and through their influence on planning permission procedures, municipal representatives directly affect the vulnerability of the territory to floods. Let us dig deeper into this point.

Firstly, it is emphasized that a municipality should build a flood protection measure to achieve the direct protection of the property on its territory. The central or regional government can financially contribute to such investments. But a municipality can also ask owners of a protected property to financially contribute to the construction of a measure [Act No. 254/2001 Coll., § 86]. In practice, due to financial constraints, municipalities usually do not design their own technical or other flood protection measures. The main builders of dikes, polders, dams etc. are river basin managers (state enterprises), which are eligible to large government investment programs [MoA 2008].

Secondly, through the amendment of the municipal urban and land use plan, a municipality can adopt strategic changes in the development of its territory. After the floods in 2002, some municipalities decided to introduce strict conservation measures in floodplains prohibiting any other constructions or changing potential development zones into parklands. However, such measures are not widely supported by municipal representatives and they are unpopular among property owners as well – they significantly lower the value of private property in floodplains and they constitute development restrictions for a municipality. The decision on the level of conservation in floodplains is therefore a hot issue of local policy.

Thirdly, besides a change in strategic planning, a municipality can influence the day-to-day decision-making of a local planning office that issues planning permission to particular investors. Inhabitants are still rather reluctant to reflect floodplains as a “territory in risk”. The pressure to develop a floodplain is often very strong. If no conservation measure is adopted in a land-use plan a space opens up for lobbying on the part of developers. The legal declaration regarding floodplain development is rather weak – it says that constructions “should not” be allowed in floodplains [Act No. 254/2001 Coll.]. In some municipalities, officials adopted a pragmatic approach to this unclear statement – they do not prohibit new development, they just warn the property owners, reminding them of their individual responsibility for future flood damages.

From the above it should be clear to what extent local governments in the Czech Republic are responsible for flood damages – i.e. what is the link between the political responsibility of local representatives and floods. Municipal representatives should be able to handle emergency situations and to undertake the appropriate steps to rescue citizens and to protect their property (with the help of the relevant national or regional rescue or security bodies). Further, municipal representatives have tools to systematically lower property values in floodplains to prevent future damages. They should also build or strive for effective flood protection investments outside the floodplains. All these requirements are also supported by the Czech Strategy for Flood Protection [Resolution No. 382/2000]. However, the performance of local governments is not systematically monitored. There is only fragmented evidence coming from the qualitative research that local governments focus mainly on solving emergency situations, but practically ignore the long-term responsibility for flood damages despite having the appropriate power [Čamrová, Viktorová 2006].

Since the inhabitants of particular municipalities should be well informed about the performance of local governments regarding flood protection (both, during the floods and the long-term period), a quantitative investigation of changes in municipal representations due to elections shortly after the floods in 2002 can bring us a new perspective.

Data sample and methods

Data of three extensive flood catastrophes has been considered for the purposes of this paper. These floods took place in the Czech Republic in 1997, 2002 and 2006. In July 1997 the eastern part of the Czech Republic was affected by floods. Local elections took place in November 1998, so there was a period of 16 months between the course of the floods and the elections. In 2002 there were floods in August and the elections took place in November of the same year. During these floods, mainly the western and central parts of the Czech Republic were those that suffered most. The time delay between the elections and the floods was fairly minimal (only 3 months). In 2006 there were floods at the end of March and local elections took place in October (7 months difference). In the meantime, there were also national parliamentary elections. For all three local elections, the floods occurred in the second part of the local governments' term.

After careful consideration the floods and local elections in 2002 were selected to examine the impact of the floods on the election results. There are several reasons supporting this choice. Firstly, the municipal representatives in the Czech Republic bear a significant share of the responsibility to protect their municipalities against floods, as mentioned above. Therefore, the analysis has been focused on the impact of floods on local, not national elections. Furthermore, the national elections fell in different time periods, so they often bypassed the major floods.

Secondly, the floods in 2002 were chosen due to the shortest time period between the floods and the ensuing elections – i.e. voter myopia means the floods have a higher potential impact on the election results. It is anticipated that many voters are not normally

aware of the responsibility distribution for flood protection. Experiencing a natural disaster reminds them who is responsible for what. Contrarily, a longer period between the flood and the election causes a decrease in the importance of floods as a political factor.

Thirdly, an extensive data sample for local elections and the municipalities affected in 2002 was available to allow the necessary regression analysis. Essential data regarding the municipalities affected and the damage caused by the floods of 1997 is not available because the reporting system had not been fully developed yet. The floods of 2006 did not affect many municipalities and their extent was much smaller.

In total, there are 6,254 municipalities in the Czech Republic, of which 760 were affected by the floods in 2002. Within the data sample it has been decided to compare the situation in 558 affected municipalities belonging to three regions (Usti, Central and Southern Bohemian regions) with a control sample of all 1 113 municipalities of another two regions (Olomouc and Vysocina regions) which were not affected by the floods. The average size of a municipality in the total sample was 1 374 inhabitants, the median was 331 inhabitants. This shows the relative disintegration of the settlement structure in the Czech Republic. The whole sample does not include those municipalities where some part of the data was missing. It is the case of data for the local elections (15 municipalities) and missing data for flood damage in the Central Bohemia Region (11 municipalities).

The goal of the research was to reveal, if floods in 2002 had some impact on municipal elections in the municipalities affected (in comparison with unaffected ones). It is important to note that the actual system used for counting votes has a major impact on the relative proportion of mandates retained. A voter has as many votes as there are mandates. If the voter votes for one electoral party then all of the votes go to that party. Its value is thus higher than one. If the voter votes for individual candidates across the list of candidates, each vote is counted as just one vote. The local election system in the Czech Republic uses the d'Hondt system for counting mandates from votes. Thus, the single individual candidates do not have a high chance of acquiring a mandate. Therefore, a higher proportion of retained mandates will be fairly closely linked with a higher number of representatives who are standing again.

The hypothesis, if the elections have really been affected by the floods and if the behaviour of the electorate has changed, was based on testing various models using the following dependent variables:

Changes in local government representation (ELECT) as it enables us to see whether the politicians were successful in crisis management and thus continue in their political career after the flood and,

Changes in the participation of the electorate (PARTIC) as it enables us to see whether the voters were affected by the floods and were willing to participate in political life,

The independent variables below have been used. In order to test the hypotheses, regressions corresponding to the form specified below were estimated.

Both flooded and non-flooded municipalities were used together in the data sample for the purpose of the statistical analyses.

$$\text{ELECT} = f(\text{INHAB}, \text{AREA}, \text{CHGMUN}, \text{CHGPART}, \text{CHGCAN}, \text{PARTIC}, \text{POV}) \quad (1)$$

$$\text{PARTIC} = g(\text{INHAB}, \text{AREA}, \text{CHGMUN}, \text{CHGPART}, \text{CHGCAN}, \text{POV}) \quad (2)$$

The summary of the definitions of all variables employed in the analysis is described in table 1 with table 2 including additional information concerning the legal frameworks for the number of mandates in municipalities.

Table 1: Summary of definitions for all variables employed in the analysis

Abbreviation	Definition
ELECT	Changes in local representation. The relative number of representatives holding a mandate for the term of office of 1998 - 2002 and re-elected for 2002 - 2006 is stated in %. The proportion is cross-referenced with the number of representatives for 1998 – 2002.
PARTIC	Changes in the participation of the electorate. The difference in percentage points between the participation of the electorate in the 2002 local elections and the 1998 local elections is stated.
INHAB	Number of permanent inhabitants of a given municipality as of 31/12/2002.
AREA	Total area of the municipality in hectares.
CHGMUN	Changes in the size of the local representation between the election periods of 1998 – 2002 and 2002 – 2006. The change is stated in % with regard to the number of representatives in the period of 1998 – 2002. Local representatives can make a decision of how many representatives will be elected in the next elections (within the framework given by law). This formal change may affect the political representatives' chance of re-election, especially in the case of smaller municipalities. The limits in Table 2 must be complied with.
CHGPART	Changes in the number of election parties standing in local elections. An election party might be a political party, or just a group of people without organizational background or without formal legal identity. This reflects the difference between the number of election parties standing in 2002 and 1998. This variable was used as a % with regard to the number of election parties standing in 1998. This variable was included as it does show the competition among political parties. An increase in the value diminishes the chance for re-election.
CHGCAN	Changes in the number of candidates standing in local elections (for all the election parties in total). This is the difference between the number of the election parties standing in 2002 and 1998. This variable was used as a percentage with regard to the number of candidates standing in 1998. This variable was included as it does show the competition among political parties. An increase in the value diminishes the chance for re-election.
POV	This is a dummy variable showing if the given municipality was affected by floods (in this case the municipality is given a value of 1) or not (0 value).

Table 2: Legal frameworks for number of mandates

Number of inhabitants in the municipality	up to 500	500 - 3,000	3,000 - 10,000	10,000 - 50,000	50,000 - 150,000	150,000 and more
Total number of mandates	5 - 15	7-15	11-25	15-35	25-45	35-55

Source: Act No. 128/2000 Coll., on municipalities, § 68

For the purpose of the regression analysis, the municipalities have been divided into three groups: 1) of up to 500 inhabitants, 2) 501 to 2,000 inhabitants and 3) larger municipalities, in order to assess differences in analysis results according to the size of a municipality. There have been done the total number of 8 regression analyses. Each dependent variable – see: formula (1) and (2) – was analyzed according to the four groups of size. The results are displayed according to these groups in the following chapter. The data file did not allow us to establish how big a part of the municipality was affected by the floods, so the size of a municipality was the only feasible option to cluster the data sample.

The number of municipalities used in the analysis (1) is 854. Those are municipalities, in which case were collected the data concerning the proportion of mandates retained with regard to the number of mandates of those, who stood for re-election.

The number of municipalities used in the analysis (2) is higher. It is 1667. Those are municipalities, in which case were collected the data concerning the proportion of mandates retained with regard to the total number of mandates. The method of collecting of the date for the purpose of the analysis (2) is less demanding and enabled to collect bigger data sample.

In order to test dependency, the method of forward regression has been used in order to exclude those independent variables that show mutual interdependency and are statistically insignificant. This method enables to test one dependent variable with more independent variables at the same moment.

Results

In order to support the results and their verification obtained from the regression analysis, the proportion of retained mandates in the municipalities was recalculated. The table 3 shows the average proportion of retained seats in the 2002 elections in % of the original mandates of 1998. It shows that candidates for the local election managed to retain their mandates fairly equally regardless of the fact whether the elections took place in a flooded or non-flooded municipality. Regarding the whole data sample, the catastrophic floods therefore had a small, if not zero, impact on the results of the municipalities monitored.

Table 3: Average proportion of retained seats in the 2002 elections (in % of the original mandates of 1998)

Non-flooded municipalities	Number of inhabitants				
	Up to 500	501 – 2,000	2,001 - 5,000	More than 5,000	Total
Proportion of mandates retained with regard to the total number of mandates (%)	57.66	52.20	50.07	54.84	55.11
N	746	292	45	30	1,113
Proportion of mandates retained with regard to the number of mandates of those, who stood for re-election (%)	84.73	73.29	75.82	73.49	79.47
N	201	84	10	5	300
Flooded municipalities					
Proportion of mandates retained with regard to the total number of mandates (%)	55.84	51.51	56.69	55.84	54.47
Proportion of mandates retained with regard to the number of mandates of those, who stood for re-election (%)	81.08	73.85	73.92	69.66	75.87
N	300	173	44	37	554

Source: Czech Statistical Office; <http://www.volby.cz/>

On average 45 % of the representatives with regard to the total number of mandates were replaced. In many cases this was due to the fact that former representatives did not stand again. On average, in non-flooded municipalities, 20.5 % of the candidates did not retain their mandates. In flooded municipalities it was 24.1 % of the candidates.

For further verification of this result it has been tested if the mayors in office during the floods in 2002 managed to retain their seats. As already mentioned, mayors are often more associated with the successes and failures of the municipality than an ordinary local representative. Since no chronological data is available to show the mayors in office in the individual municipalities in the Czech Republic, it was impossible to collate information about all of the monitored municipalities due to time constraints (extensive field research would have been needed). This partial hypothesis was verified only generally for 109 flooded municipalities. Out of this sample, 97 mayors stood again and of these 90 (i.e. 92.78 %) managed to retain their mandates. This data shows the exclusive position of mayors and their popularity with the electorate and also supports the previous conclusion about the minimal impact of floods in 2002 on election results.

To be convinced about the relevance of the results of this paper, several calculations including different variables were done with a focus on particular types of municipalities (according to size). These calculations are not described in detail here. Variables determining the level of damage in the area of the municipality, or the number of inhabitants in the municipality, were included in the independent variables for municipalities affected by the

floods. Results support the conclusion mentioned above – the regression estimates did not show, for any of the situations tested, that the floods had any impact on the re-election of local representatives. In all cases, the variable POV was shown to be statistically insignificant (for the details see table 4). Thus, the insignificance proves that it isn't possible to make conclusion concerning the influence.

It was revealed that the success of the representatives in local elections (e.g. the likelihood of re-election) was affected by other factors such as the level of political competition, and changes in the size of the local representation. Especially in larger municipalities the participation of the electorate grows statistically (see table 5), but at the same time the likelihood of being re-elected gets lower. On the local political market the offer of candidates determines the demand. The result is a relatively high level of retained mandates by re-elected representatives. The political capital is defined in particular in the form of social contacts, not in the form of political power or in the form of election parties. In larger municipalities politics is seen more as a profession (rather than a public service), which results in social capital deterioration. There is a decreasing trend of retained seats. Contrarily in smaller municipalities, the proportion of retained seats is much higher due to informal contacts (see table 3).

Table 4 shows the results of regression analysis for retained mandates (variable ELECT). There are many explaining estimates but the impact of the variable POV (floods) is statistically insignificant.

Table 5 shows the results of regression analysis for the participation (variable PARTIC) of the electorate in the elections. In contrast to the results of the regression analysis of the ELECT variable, in the case of the variable PARTIC, the regression analysis estimates show an influence of floods in the participation of voters.

The variable, representing the level of competition in the form of the number of candidates (CHGCAN), showed a statistical impact on the ability of the existing representatives to retain their mandates, along with the level of inhabitants' participation in the elections. Quite logically it is shown that growing competition can decrease the chance of re-election and it can increase the participation of the electorate in the elections. A similar conclusion can be reached for the variable showing the number of election parties (CHGPART). The likelihood that original representatives retain their seats increases if they use the possibility of changing the number of local representatives. If the representatives increase the number of seats for the next term, they probably increase their chance of re-election.

Table 4: Results of regression analysis for retained mandates (elect)

	All municipalities	Up to 500 inhabitants	501-2,000 inhabitants	More than 2,001 inhabitants
Constant	83.66281 (5.84055)****	88.08640 (44.73210)****	79.51666 (30.09129)****	75.60618 (22.12448)****
CHGCAN	- 0.10651 (-5.84055)****	- 0.10663 (-3.94654)****	- 0.09634 (-3.76030)***	
PARTIC	- 0.26118 (-3,27837)***	- 0.18203 (-1.81267)*	- 0.47070 (-3.25815)***	
AREA	- 0.00138 (-3.24500)***			
CHGMUN	0.18439 (3.30643)****	0.20570 (2.38724)***	0.19785 (2.52950)***	
CHGPARG	- 0.01086 (-2.03096)**	- 0.01610 (-2.71655)***		
INHAB				
POV				
N	845	492	257	96
Adjusted R squared	0.1426	0.1180	0.1946	0.00012

Note: All estimates are regressions with t-statistics in parenthesis. The dependent variable is % share of re-elected politicians, * = significant at 10% level; ** = significant at 5% level; *** = significant at 1% level; **** = significant at 0.1% level.

Table 5: Results of the regression analysis for the participation of the electorate in the elections

	All municipalities	Up to 500 inhabitants	501-2,000 inhabitants	More than 2,001 inhabitants
Constant	-4.42088 (-18.0330)****	-4.52996 (-7.82924)****	-3.73865 (-8.62550)****	-4.23793 (-6.69079)****
CHGCAN	0.12057 (24.1506)****	0.14121 (19.7190)****	0.09355 (11.77113)****	0.05339 (3.58009)****
AREA				0.00026 (2.19411)**
CHGMUN	- 0.07510 (-4.3636)****	- 0.08884 (-3.61669)****	-0.05541 (-1.91379)*	
CHGPARG	0.00745 (4.6488)****	0.001847 (3.48705)****	0.01399 (2.97401)**	
INHAB	0.00007 (2.0653)**			
POV	1.72241 (4.1971)****	1.53151 (2.51024)**	1.20626 (1.78254)*	2.58765 (4.37889)****
N	1667	1046	465	156
Adjusted R squared	0.3150	0.3232	0.3375	0.1923

Note: All estimates are regressions with t-statistics in parenthesis. The dependent variable is change of voters participation in % points, * = significant at 10% level; ** = significant at 5% level; *** = significant at 1% level; **** = significant at 0.1% level.

The situation is somewhat different in large municipalities where established political parties known at the national level play an important role in comparison with small municipalities. These parties usually gain more votes and they are allocated the first mandates. A higher number of mandates increases the chance of smaller parties' success and threatens the ability of big parties to create ruling coalitions or to rule independently. The increase in the number of representatives could potentially help in retaining seats in smaller municipalities, but there are no significant results for bigger municipalities.

The factor of the size of the municipality plays a role in this regard, in particular in terms of the municipalities affected by floods (see table 3). The estimates of the regression analysis employing the dependent variable of the number of retained mandates show this dependency. In this model, the variable AREA remained in the model and it is statistically significant.

With the growing size of municipalities the statistical impact of the variables, in the form of the number of inhabitants and the area of the municipality, reflected the smaller likelihood of re-election of the representatives, which indicates increased competition among the candidates in larger municipalities. An analysis excluding the variable of AREA from the test has also been carried out. In this case the variable INHAB (the number of inhabitants) is statistically significant in this analysis.

The second dependent variable examined was the change in the electorate participation in elections. During the tests the voters' participation in the elections in smaller municipalities (up to 500 inhabitants), which was most of the municipalities, and in larger municipalities (2 000 inhabitants and more) was proven to be statistically significant. If the municipality was affected by floods, regression estimates show a tendency to participate in the elections more than in the municipalities that had not been flooded. A relatively higher participation of voters could also be estimated in the larger municipalities affected by the floods (see table 5).

The estimates of the regression analysis in table 5 show the likely higher participation of the electorate in larger municipalities regardless of whether they were affected by the floods or not. The coefficient of the variable, in the form of the number of inhabitants (INHAB), amounted to 0.00007 and it is statistically significant. The actual importance of this result could only be seen for the largest municipalities, as the estimate for the variable AREA is quite low. The average size of a municipality in a data file is 1 275 ha with the median being 791 ha. The influence of other variables (POV, CHGCAN) is estimated with a higher actual impact on voters' participation.

Relevance of the research results

The analysis of the results of local elections in the Czech Republic confirmed the conclusion of previous studies by Abney, Hill [1966] and Davis, Seitz [1982] stating that natural disasters tend not to have an impact on changes in political representation. When presenting this conclusion two significant factors must be pointed out – when working with statistical data it

must be stressed whether the current representatives stood again or not, and the degree of political competition (and its changes) should be captured.

On the other hand, Achen, Bartels [2002] recently discovered that natural disasters in the USA did affect electoral outcomes at a national level. The difference, in comparison to this paper, is that Achen, Bartels [2002] tested the influence of floods on national elections.

Finally, Arceneaux, Stein [2006] opened the question of voters' beliefs regarding responsibility for flood damages. Without undertaking the qualitative research it is difficult to unambiguously prove that voters in the Czech Republic do not blame their municipal representatives for flood damages (although the results of the regression indicate so). However, from Chapter 2 it is clear that in reality municipalities often do not endorse all of their actual responsibilities due to financial or political reasons. In the past the national government always stepped in to cover flood damages and to subsidise the majority of flood protection measures. As a result, the ability of voters to recognize the responsibility distribution is low. Further, the historical experience regarding floods (or natural disasters in general) or mechanisms of damage prevention is rather low due to the dynamic evolution of the new institutional structure in the 1990s' and the favourable climatic conditions in most of the 20th century.

The undertaken research included also qualitative part during which stakeholders on various levels (national and local) were interviewed to reveal economic and institutional changes caused by floods. However, results of the qualitative analysis were published elsewhere (see Čamrová, Viktorová [2006]).

Conclusions

This paper tried to reveal whether natural catastrophes affect the political behaviour of individuals, specifically the catastrophic floods of 2002 in the Czech Republic and the local elections that took place in the same year were analysed. Considering the unquestioned responsibility of Czech local governments to protect their inhabitants against the flood threat, the hypothesis was tested whether the electorate considers this responsibility when voting in local elections. This hypothesis was revealed via a simple regression model within which the election results in a sample of flooded and unaffected municipalities were compared.

The main result of the regression analysis showed that floods have no statistically significant impact on the change in the political representation in flooded municipalities, which supports some of the conclusions of the studies cited on the same subject. Nevertheless, the media generally treat floods as a factor that is able to affect the popularity of politicians and the election results. The actual results of local elections in the Czech Republic do not support this view. There are, however, other factors that are significant for local election results, such as political competition and the change in the size of local representation. Besides, the analysis revealed that there is a higher participation of the electorate in the municipalities that were affected by the floods. This was especially the case in small municipalities of up to 500 inhabitants and municipalities of 2 000 inhabitants and more.

Despite the fact that local representatives are politically accountable to their electorate in terms of protection against floods in the Czech Republic, the electorate perceives other political variables as much more important. The reason might be the frequency and the nature of floods that decrease their significance as a political factor. Compared to other factors, floods occur much less often and they are therefore viewed by the electorate as a random and often purely natural phenomenon.

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