

Political influence on environmental sanction charges in Swedish municipalities

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Abstract

Earlier literature has established that enforcement of the Swedish Environmental Code varies greatly across municipalities. This is problematic due to differences in application of the law and from an efficiency perspective. This study shows that the variation can to some extent be explained by the ruling political coalition. Green Party representation in the ruling coalition is estimated to have a positive effect on the number of environmental sanction charges handed out by the local environmental offices. A difference in differences approach and IV-estimation is used to address the endogeneity issues. I argue for the random distribution of local party representation in the municipal council and use the absence of local parties as an instrument for Green Party representation in the ruling coalition.

Keywords: Environmental code, Decentralization, Law enforcement

JEL-codes: K42, K32, Q01

1 Introduction

Ever since Paul Samuelson's seminal 1954 article *The pure theory of public expenditure*, economists have been interested in the optimal provision of a public good. Aspects of this problem include the pros and cons of centralized versus decentralized provision in a multilevel political system, see e.g. Williams (1966) or Besley and Coates (2003). In Sweden, enforcement of the environmental law is a public good that ever since the introduction of the Swedish Environmental Code in 1999, to a large extent has been provided at the municipal level. Potentially, this has both positive and negative consequences.¹ The benefits of high environmental standards in one municipality are also beneficial to surrounding municipalities. Streams, for example, can run across municipality borders and air moves unobstructed (Boskovic 2011). But enforcement of the Environmental Code, or the lack thereof, might also produce externalities. Lenient enforcement helps the municipality to appear business friendly (DS 2006:67 p.18) but the costs, however, are shared by the surrounding municipalities.

Both theory and practice can be used to argue for either centralization or decentralization. From a theoretical point of view, *Oates's decentralization theorem* (Oates 1972) essentially states

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¹Arvidsson (2008) looks at a possible centralization of enforcement of the Swedish Environmental Code from a legal perspective.

that without externalities, local provision of a public good is optimal while introducing externalities makes the optimal provision level unclear.

From a practical point of view, the arguments for local provision are e.g. that environmental aspects are closely related to other municipal issues such as urban planning and that municipal workers can work in different departments to gain a broad knowledge of complex issues (SOU 2002:14 p.76). The current Swedish government's opinion on municipalities' responsibility for enforcing national laws and regulations is that decentralization is beneficial, but that a greater measure of centralized guidance is needed to uphold fairness and equality before the law (Skr. 2009/10:79 p.1). This is contrary to a government inquiry initiated in 2003 which suggested that enforcement and surveillance should in principal always be run by the government (Skr. 2009/10:79 p.31). And while the environmental enforcement was further decentralized with the birth of the Environmental Code, the enforcement of the animal welfare law was centralized in 2009 due to among other things, large variances in municipal implementation (DS 2007:33 p.33).

Thus, neither theory, nor practice gives any clear guidance on the optimal provision level of environmental enforcement. Hence, it is important to investigate the potential effects associated with the different provision levels.

The focus of this study is not on the optimal (de)centralization decision. The focus is rather on the risks that are associated with decentralization. One of these risks is the differences in the application of the law. This is problematic for two reasons, legal security and efficiency. Firms should not be treated differently depending on geographical location. Also, if we assume that the national government constructs national legislation to maximize total welfare, it cannot be efficient if each municipality makes its own interpretation since they do not have the same incentives to take externalities into account.

This study establishes that there are large differences in the application of the Environmental Code in terms of environmental sanction charges issued, both across municipalities and within municipalities over time. It is then argued that even though it should not matter, the ruling political coalition of a municipality, more specifically the role of the Green Party, can explain parts of these differences. The estimates are consistent across different models and identification strategies. The precision of the estimates, however, varies with standard error specification.

As was implied above, as a measurement of application of the law, I use the normalized number of environmental sanction charges (fines hereafter) issued across Swedish municipalities. The Swedish Environmental Code, on which the fines are based, is the same for all municipalities. That the enforcement of the Environmental Code varies across municipalities is to some extent already known. This was a main motivation for a government investigation of the application of the Environmental Code (DS 2000:67 p.24). The report was published in 2004 and the overall conclusion regarding environmental sanction charges was that the fines are in general a good and effective instrument, but there was criticism against the "*differences that exist between environmental offices with regard to issuing fines*".² Also researchers have noted the disparities between the municipalities' enforcement of the Environmental Code. Lars Korsell, a Swedish criminologist, comments on the situation in Sweden that "[t]his inequality in the application of the regulations is naturally a problem that might be approached from several different perspectives. It involves issues of equality before the law and of the legislation being suppressed in certain instances by local interests" (Korsell 2001). In an article where the legal aspects of centralized enforcement is discussed, Arvidsson (2008) writes that in the Swedish system, municipalities can "*passably undisturbed choose to, in violation of the law, give lower priority to environmental issues, if not deviate completely from the*

²All quotes from Swedish sources in this paper are my translations.

current environmental code.” Regarding differences in the application of the law across municipalities, our study is complementary since it uses a specific measure of application of the law to detect the variation across municipalities.

I use a new data set on environmental sanction charges from 2003 to 2009 to investigate the connection between fines issued by the environmental offices in Swedish municipalities and the ruling political coalition. The fines are mainly results of errors found during environmental inspections and administrative errors such as firms being late submitting environmental reports to the environmental office. The errors resulting in fines are regulated in the Swedish Environmental Code and thus everything else equal, no significant systematic differences ought to be found.

To overcome the inherent difficulties of estimating effects of endogenously elected parties I apply two identification strategies.³ The first strategy is a difference in difference approach where the treatment group is defined as the municipalities where the Green Party was included in the ruling coalition during any or both term periods 2003 - 2006 and 2007 - 2010. The second identification strategy applied is an instrumental variable approach. The absence of other alternatives (local parties) with which to form a coalition for either the left or right wing will be used as an instrument for Green Party inclusion in the ruling coalition in municipalities with an unclear election outcome. The IV results indicate that OLS underestimates the effect but the IV-estimates are less precise.

Different potential mechanisms have been proposed and are discussed in the paper, e.g. budget assignment, increased number of inspections etc, but there is also anecdotic evidence of direct political pressure on the environmental offices. For example in one municipality in southern Sweden the politicians refused to affirm two fines issued by environmental inspectors and motivated this by writing that ”the electorate must demand [of the politicians] to do their utmost to make [the municipality] not look business unfriendly” (Ds 2000:67 p.160f). More examples are provided in the result section.

Utilizing that some municipalities (voluntarily) report the number of inspections, net cost of the environmental board etc. in their annual reviews, I try to evaluate some of the proposed mechanisms.

Related literature

Some earlier empirical studies have looked at different aspects of environmental enforcement. Boskovic (2010) develops a structural model where states face a tradeoff between air quality and mobile firms. Using U.S. data, he finds that states where enforcement is decentralized also increase their pollution levels and attract more firms. This is a very interesting finding. I cannot investigate this relationship with Swedish data since there is no exogenous change in decentralization of environmental enforcement. What distinguish this paper from Boskovic (2010) is my focus on specific political parties and their influence on the enforcement. Also, I focus more on the instruments of environmental enforcement rather than the direct environmental effect. All data on plant specific emissions in Sweden are reported by the firms themselves making it difficult to evaluate the effect of enforcement on environmental outcomes. The same differences can be found between this paper and Sigman (2004). She investigates the effect of decentralization on water quality in streams that run across states. The findings are that decentralization does not have any effect on the water quality within a state. However, the water quality in downstream states is negatively affected by upstream states gaining control over environmental regulation and enforcement implying free riding.

Regarding the Green Party’s effect on environmentally related outcomes, Folke (2010) utilizes

³See for example Besley and Case (2000) for a discussion of these problems.

how seats are allocated in Swedish municipalities to see how the marginal seat of different parties affects a number of outcomes. Among other things Folke finds a positive effect of an extra seat for the Green Party on the municipality's environmental ranking. The general findings in our study are in line with those in Folke (2010) but apart from the identification strategy, this paper differs from his mainly in two ways. Firstly, while Folke studies the effect of an extra seat, in this study the effect of being included in the ruling coalition is examined. Secondly Folke looks at an outcome where the Green Party is supposed to have a positive effect. That is different from the relationship investigated in this paper. There is no theoretical reason to why the number of fines in a municipality should increase when the Green Party enters the ruling coalition since the law is the same in all municipalities.

Outline

The rest of the paper is organized as follows. In section 2 the institutional background to environmental monitoring in Sweden and the Swedish political scene are presented. The data used in this paper is described in Section 3. In section 4 the problems with estimating party effects in a proportional election system are discussed. Both the difference in differences and the IV-strategies are thoroughly described here. The main results and some robustness checks are presented in section 5. Also some potential mechanisms are investigated here. Section 6 concludes the paper with some final thoughts on the enforcement of the Swedish Environmental Code.

2 Institutional background

Environmental monitoring in Sweden⁴

In 1998 the new Swedish Environmental Code was adopted. It came into force in the beginning of 1999. The reform further decentralized the monitoring of firms' environmental performance to the Swedish municipalities and counties. For the potentially most hazardous facilities, monitoring is still managed on a national level by the Swedish Chemical Agency and the Swedish Board of Agriculture. Environmental enforcement is thus performed at three nested levels (national, county and municipality), where the more hazardous objects are managed at higher levels. The enforcement at the municipality level quantitatively makes up the vast majority of all monitoring. For example, of the total number of fines in 2009, 89% were handed out at the municipality level while the rest were distributed evenly on the other two levels.

The focus in this study is on fines resulting from enforcement on the municipality level. It is the environmental protection office of each municipality that has the practical responsibility of the environmental enforcement. The office is complemented by an environmental board constituted by politicians who meet roughly once a month to lead the office's work.⁵

All firms are possibly subject to environmental inspections. The most hazardous types of businesses, as regulated in the Environmental Code, are classified into four different categories A, B, C and U. In 2004 the distribution of firms in the different categories was approximately 500 A, 5,500 B and 17,500 C (SEPA 2004 p.75). The classification represents and determines among other things, environmental hazard level, permits and licenses needed for the type of business and the frequency of inspections. The most environmentally hazardous firms are classified as an A.

⁴Facts in this section are gathered from the Swedish Environmental Code (1998:808), the ordinance on environmental penalties (1998:950) and regulation 1998:899.

⁵In a few instances, more commonly in recent years, two or three small municipalities share environmental protection office and or environmental board.

Municipalities usually are responsible for monitoring firms in categories B - U and non-classified firms.⁶ The frequency of inspections can be anything from several times a year to practically never and consists of both planned and unplanned inspections. Inspections are performed by inspectors from the environmental protection office of the municipality. The duration of the inspection varies with the size of the facilities. If any faults are found they are reported by the inspector and eventually the firm can be fined.

The fines considered in this paper are issued by the local environmental offices in each municipality. They are to a great extent a result of firms not having the right permission for their business, firms being late with their environmental reports or the consequence of failing parts of the inspection. The fines can be issued directly by the environmental office.⁷ Fines lie in the range between 1.000 and 1.000.000 SEK.⁸ The firms also pay a fee for the inspections which in theory should make the inspectors carry their own costs. The fines on the other hand do not stay in the municipality but go straight into the national treasury. There is thus no direct monetary incentive for municipalities to have a high level of fines.

Fines themselves are not the driving force behind environmental progress. But they are an integral part of the monitoring process and without them, any legislation runs the risk of being ineffective. The fines are intended to be issued with "*quickness, simplicity and clarity*" (SOU 2004:37) in order to increase acceptance at the firm level. It is not clear whether a low level of fines is an unambiguously positive indicator of inspection or environmental quality. Few fines could mean either of two things. It could be the case that the environmental enforcement works perfectly so that firms comply with the Environmental Code. But it could also be the case that the enforcement works poorly so that very few violations are discovered. In general, a measure of efficient environmental enforcement is not available. Other proposed measures, such as number of inspections, man months per year or size of budget suffer from the same disadvantages as fines. Usually a battery of indicators is suggested (Impel 2010) if one were to evaluate the efficiency of the monitoring in order to get a more complex picture of the process. In Sweden unfortunately, data on number of inspections, complaints dealt with etc. is not collected at a national level.⁹

Parties and politics in Sweden¹⁰

Elections are held the second Sunday in September every fourth year. Aside from the occasional vote on a local issue, the electorate cast their vote in three different elections: national, county council and municipal. The focus in this paper is on the last two term periods, 2003-2006 and 2007-2010.

Historically, even though several parties have received substantial vote shares, Sweden has been classified as a bipartisan system, see e.g. Petterson-Lidbom (2008), but during the early 21st century this picture has changed. For the last two terms, eight parties were represented in the parliament and in a substantial share of the Swedish municipalities. The parties are the Center Party (C), the Christian Democrats (KD), the Conservative Party (M), the Green Party (GP), the Left Party (V), the Liberals (FP), the Social Democrats (S) and the Swedish Democrats (SD).¹¹

⁶The distribution of firms over categories gives further evidence that municipalities manages the majority of enforcement.

⁷For more serious offences, violations may lead to prosecutions in court.

⁸Approximately €110 and €110.000.

⁹Some municipalities, however, report them in their annual reviews which I utilize in the result section to evaluate some proposed mechanisms.

¹⁰The political scene in Sweden has been dealt with extensively in earlier papers in economics and even more so in political science, see e.g. Bäck (2003) and Folke (2010).

¹¹The acronyms come from their Swedish names except for the Green Party.

There are two distinct blocks in Swedish politics, here denoted left (L) and right (R) wing. The left wing consists of V and S. The right wing consists of C, FP, KD and M. On a national level there are two more parties with substantial representation, the Green Party and the right wing populist Swedish Democrats. The Green Party often cooperates with the left wing in national elections while on a municipality level there is substantial variation across municipalities with respect to which block the Green Party cooperates, even from term to term. In the most recent two elections the Swedish Democrats also gained seats in many municipalities but they have yet to be included in a ruling majority. In municipality elections there are many more parties represented. It is common to see local parties (LP) represented only in a single municipality or small region. Local parties typically focus on a small number of specific local issues such as splitting a municipality or stronger emphasize on local questions.

There is thus potential for variation in political majorities. Given the election outcome, there has been potential for the following outcomes, L, L + GP, L + LP, L + GP + LP, R, R + GP, R + LP, R + GP + LP, L + R, L + R + GP, L + R + LP, L + R + GP + LP.¹² Theoretically more outcomes are possible but neither the Green Party, local parties nor the Swedish Democrats has gained large enough vote shares to form a combined or own majority. For more on coalition formation in Sweden see Bäck (2003).

3 Data

The data on fines from environmental inspections was obtained from the Swedish Environmental Protection Agency. It is a complete dataset covering the years 2003-2009. Each original observation contains information on the firm that received the fine, the amount, date, and location (municipality). Data on ruling coalitions was not as easily obtained. Statistics Sweden (SCB) has data on the majority of almost all municipalities for both the 2003-2006 and 2007-2010 term periods. For the 2007-2010 term, the data was supplemented by information from the Swedish Association of Local Authorities and Regions. I have thus been able to double check the information from SCB for one of the term periods and they overlap very well. Any inconsistencies were primarily solved by information from local newspapers or protocols from meetings. If any doubt still existed I let the information from SCB override the other. In the end, less than 3.3 % of the observations could not be assigned a political majority due to missing data.¹³

All types of ruling coalitions listed in section 2 have at some point been formed during the last two term periods. Table 1 shows the frequencies of the different coalition types.

Pure left or right wing coalitions have been the two most common ruling coalitions. There has been more pure right wing than left wing coalitions. Local parties are more likely to be found in right than left wing coalitions and the Green Party is more likely to be found in left than right wing coalitions.¹⁴

¹²SD has been excluded since no political parties are willing to cooperate with them. See the data description for frequencies.

¹³Most of the missing observations are due to jumping majorities.

¹⁴For the identification strategy it is crucial that municipalities with and without local party representation in the council (not in the majority) do not systematically differ prior to the election. This is discussed further in the model section. It seems that local parties cooperate to a larger extent with right wing parties. this would be troublesome if left wing coalitions differ from right wing coalitions in the effect on fines. However, figure 2 shows that pure left and right wing coalitions are similar in levels of fines. Nor do right or left wing dummies show up significantly in the regressions.

Table 1: Frequencies of coalitions

<i>Parties</i>	<i>Freq.</i>	<i>Parties</i>	<i>Freq.</i>
L	136	R LP	47
L GP	60	R GP LP	12
L LP	10	L R	68
L GP LP	3	L R GP	22
R	165	L R LP	6
R GP	26	L R GP LP	6
		Total	561

All municipality and political covariates listed in the model and result sections were also retrieved from SCB. Data on environmental attitudes in municipalities were collected from RiksSOM, a survey made at polling stations during the 2006 election (Holmberg et. al. 2006). Data on number of inspections and net cost of municipality board were gathered from the municipalities' annual reviews. Data on the share of environmental reports being reviewed by the environmental office in each municipality was collected from the Swedish Environmental Reporting Portal. Table 2 shows descriptive statistics. I control for population size and the number of firms to see if changes in these variables affect the number of fines. Changes in the average age and education level are also controlled for as these variables might be proxies for certain municipality types. I also control for the number of workers employed by the municipality to see if there was a large expansion or contraction of the public sector in Green Party municipalities at the same time as the election. Lastly, I also control for the types of industries present the municipality as this is likely to affect the work of the environmental office.

Table 2: Descriptive statistics

<i>Variable</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>Min</i>	<i>Max</i>
Fines	3.17	12.29	0	401
Firms	3,429	7,652	363	126,883
Population	31,491	60,844	2,500	829,417
Average age	42.36	2.38	36.1	48.5
Municipal workers %	9.56	1.79	3.56	15.20
Only elementary school %	11.67	1.55	6.10	16.12
Postgraduates %	0.31	0.45	0	4.2
Firm share %, agriculture	28.76	14.47	1.20	62.01
Firm share %, manufacturing	6.71	1.92	2.31	22.69
Firm share %, construction	7.78	2.69	2.89	20.02
Firm share %, retail	12.4	3.09	4.11	24.94
Net cost of Env board, millions	5.35	10.88	-7	109
Number of inspections	143	193	0	950
Environmental reports reviewed %	53	40	0	100

4 The Model

Estimating party effects in proportional election systems

Firstly, I would like to discuss what theory predicts would happen to the number of fines if we include the Green Party in the ruling coalition. If we assume that the industrial structure stays the same and a constant share of the firms break the law, there is no theoretical reason to why the number of fines would change. This is due to the law being the same in all municipalities. If firms on the other hand start being more careful due to a higher risk of getting caught, we would see a *decrease* in fines with the Green Party in the ruling coalition given that there is no party effect. There are, however, practical reasons to why the number of fines might change and that we might see an increase in the number of fines. As discussed in the introduction, lenient enforcement can be used strategically by a municipality. This has been discussed as a potential problem of decentralized enforcement in Sweden (see e.g. DS 2000:67) and also in the US (Boskovic 2011). There have been instances in Sweden where politicians in the environmental board have been convicted for professional misconduct and fined for not affirming the fines issued by the environmental office (SOU 2004:100 p.138). Any possible competitive advantages should be contrasted to the possible negative consequences of lowering the standards of environmental enforcement. If the Green Party values this tradeoff differently, which is likely, the number of fines might increase.

Potential explanations to why the number of fines increases are for example that the Green Party might assign higher budget shares to the environmental office. They can change the office's priorities. But there are also plenty of anecdotic evidence of political pressure on the environmental office to go easy on firms as will be exemplified further on in the paper. The potential mechanisms are plenty and I will make an attempt to examine some of them in the result section.

It is difficult to causally link a political party to an outcome variable in a proportional election system. In an experimental setting I would like to randomly assign the Green Party to the ruling political coalition in different municipalities and then look at how the number of fines varies. This is not possible since the ruling coalition is not a random variable but an outcome of voter preferences. Estimating a linear regression where the number of fines is dependent on a dummy variable indicating whether or not the Green Party is included in the political majority is likely to suffer from severe omitted variable bias. The Green Party is more likely to be included in the ruling coalition if it has a high vote share. Municipalities where the Green Party has a high vote share can have certain traits which also might affect or correlate with the behavior of the staff of the environmental office, firms etc. There are different strategies to overcome the problem of the non-random assignment of ruling political coalitions. Before elaborating further on the strategy applied in this paper I will make a quick review of some of the earlier methods applied, assuming the reader is somewhat familiar with the different techniques, and also motivate why these methods will not be used in this paper.

The most commonly used method to identify effects of endogenously elected parties is the *regression discontinuity design*, see Lee and Lemieux (2010). The idea is to look at and compare municipalities with election outcomes where the winning coalition is close to the 50% threshold. Petterson-Lidbom (2008) argues that Sweden can be classified as a two party system. If one then looks at election outcomes close to the 50% threshold it can be argued that the political majority is *as good as* randomly assigned. Petterson-Lidbom estimates the causal effect of left versus right wing majority on a number of outcomes. It is assumed that the contrafactual outcome with a vote share of less than 50% for the winner would imply a swing from left to right/right to left

majority. Since the Green Party during the investigated period in Petterson-Lidbom’s paper was much smaller than it is today and is now not considered to belong to any of the established political blocks on a municipality level, this approach cannot be used. It is also rare to find pure L or R majorities close to 50% thresholds. Municipalities close to the thresholds instead often cooperate across the traditional blocks, with the Green Party or with local parties diluting any potential pure left or right wing effect.

Fortunately, new techniques have developed to credibly estimate party effects. Folke (2010) presents an alternative estimation method that causally estimates the effect of an extra seat for parties on relevant outcome variables. It is an identification strategy similar to the regression discontinuity design. Folke takes advantage of the fact that seats in Swedish municipal councils are allocated by the Sainte-Laguë method and that parties thus can gain or lose seats due to small movements not only in their own vote share but also in the distributions of other parties vote shares. By focusing on the minimal distance of a seat change induced by small changes in vote shares for different parties (the small changes are less than 0.25 percentage points) Folke argues that the marginal seat allocation for parties within the threshold is as good as random. The method captures the causal effect of one extra seat for a given party. But this effect is likely to be nonlinear. A marginal seat that tips the scale and gives a party membership in a ruling coalition is likely to have a different effect compared to an extra seat that does not change the ruling coalition. The identification strategy in this paper aims to get at one of those nonlinearities to estimate the effect of including Green Party in the ruling coalition, not the effect of an extra seat.

Difference in differences

I will start out by using a difference in differences (DiD) approach to estimate the effect of the Green Party on the number fines.¹⁵ I use the term periods 2003-2006 and 2007-2010 as potential treatment periods. A municipality is defined as treated if it during the time of observation has a ruling coalition where the Green Party is included. The counterfactual in this case is a ruling coalition where the Green Party is not included. It is not well defined in the sense that there are many different coalition that could be formed instead. I have, however, tried many different interactions and dummies to see whether treatment differs for different coalition formations with and without the Green Party without finding heterogeneous effects. Therefore I use this binary treatment.

The identifying source of variation comes from the municipalities that changed treatment status between the term periods. In addition to estimate the overall treatment effect, I will also try to see if the effect of having the Green Party in the first period only and second period only (loosing versus gaining treatment) is estimated to be different.¹⁶ The estimated equation is the following.

$$F_{it} = \nu\Gamma_{it} + \mathbf{T}_t + \mathbf{M}_i + \mathbf{X}_{it}\boldsymbol{\pi} + \varepsilon_{it} \quad (1)$$

The parameter of interest is ν which measures the effect that the Green Party has on the number of fines. F_{it} is the dependent variable, here normalized as the number of fines per 10.000 firms and six month period. Γ_{it} is a dummy indicating whether the municipality i was treated at time t . \mathbf{T}_t is a vector of time fixed effects, \mathbf{M}_i is a vector of municipality fixed effects and \mathbf{X}_{it} is a vector of time-varying municipality covariates, see data section for further description, and $\boldsymbol{\pi}$ is a vector of coefficients.

¹⁵See e.g. Blundell and MaCurdy 1999 for a nice introduction to DiD estimation.

¹⁶In the text I will write treated municipalities which can refer to both municipalities that lost/gained treatment. It should be evident from the context which type of municipalities treatment refers to.

For DiD to provide credible results it must be that the treatment is as good as random conditional on covariates. As mentioned above, there is a potential problem of endogeneity due to self selection into treatment, see e.g. Besley and Case (2000). The estimate of ν would for example be biased if the inclusion of the Green party is a result of changes in electorate attitude that occur at the same time as the election and also affects the behavior of firms and/or the environmental office. To address the issue of endogeneity I perform the IV-estimation below. Also, since the fines are based on national law there ought not to be any changes due to changes in electorate attitudes. Further, if changes in electoral attitudes, affecting the work of the environmental offices occurred prior to the election we would see separate trends for the treatment and control groups. The common trend assumption is further investigated in the result section. The second important assumption for difference in differences estimation, that the composition of treatment and control groups should remain unchanged before and after treatment, is self fulfilled.

Instrumental variable approach

DiD deals with the problem of unobservable variables that are roughly constant over time. However, there could still potentially be some variables that change over time and endogenously determines Green Party representation while correlating with fines, such as rapid changes in electoral and firm attitudes toward environmental stringency. To add some exogenous variation to Green Party representation in ruling coalitions I will use an instrumental variable (IV) approach. Focusing on a subset of the Swedish municipalities, 90 out of 290, where the election outcome showed no clear block winner, I will use *the absence of local parties* as an instrument for Green Party representation in ruling coalitions. In order for the instrument to credibly help estimating the causal effect between the Green party and the number of fines, we need the relevance and exogeneity conditions to be fulfilled. I will now discuss and motivate each condition.

The relevance condition implies that the instrument should affect the probability that the Green Party is included in the ruling political majority. It is intuitive why the absence of local parties should affect this probability. If no block gained more than 50% of the seats, coalitions with parties outside the traditional blocks need to be established to form some kind of majority. A priori, there are nine different possible ruling coalitions in municipalities where the election outcome is not clear. It is basically the same set as the possible coalitions listed above excluding pure left or right wing rule. The possibilities are the set $\{(L, GP), (L, LP), (L, GP, LP), (R, MP), (R, LP), (R, GP, LP), (L, R), (L, R, GP), (L, R, LP), (L, R, GP, LP)\}$.¹⁷ Reducing this set by removing all alternatives including local parties, we have $\{(L, GP), (R, GP), (L, R), (L, R, GP)\}$ i.e. it takes away six out of the ten a priori possible combination to form a ruling coalition and also increases the share of alternatives where the Green Party is included. Maybe more importantly, the absence of a local party means that coalitions involving the Green Party are the only option to form a ruling coalition with the exception of a coalition across block borders.

Descriptive statistics support this story. Table 3 shows the shares of ruling majorities including the Green Party in the municipalities that has/has no local party representation. We see that the share of municipalities where the Green Party is included in the ruling coalition is much larger when there are no local parties compared to the case where there is an additional possible coalition partner in form of a local party.

The exogeneity condition is not straightforward to validate. Here I will provide some theoretical and empirical arguments for why local party representation is as good as randomly distributed over

¹⁷Which of these possibilities that are practically feasible depends of course on the specific election outcome in the municipality. Also in a few occasions, L or R formed a political minority to rule a municipality.

Table 3: Shares of ruling majorities including MP

	No MP in majority	MP in majority
0 LP seats	0.36	0.64
LP seats > 0	0.63	0.37

Table 4: Observable characteristics

<i>Variable</i>	<i>LP seats = 0</i>	<i>LP seats > 0</i>	<i> Difference </i>	<i>P-value</i>
Green Party in ruling coalition	0.64	0.37	0.27	0
Population	22,605	23,680	1,075	0.67
Firms	2,448	2,406	42	0.84
Average age	41.4	42.4	1	0.01
Municipality employed %	9.83	9.80	0.03	0.87
Only elementary school %	12.02	12.25	0.23	0.23
Postgraduates %	0.24	0.25	0.01	0.77
Firm share %, agriculture	26.2	28.9	2.7	0.22
Firm share %, manufacturing	6.8	7.0	0.2	0.32
Firm share %, construction	9.1	8.8	0.3	0.54
Firm share %, retail	13.2	13.0	0.2	0.79
—				
Environmental interest ratings, figure 1				
Not interested %	2	3.7	1.7	0.42
Not very interested %	23.4	23	1.4	0.92
Pretty interested %	50.0	52.7	2.7	0.64
Very interested %	20.4	16.2	4.2	0.34

municipalities. The only type of municipalities where local parties are underrepresented are the very largest cities in Sweden. Therefore, I leave out the large city groups as defined by the Swedish association of Local Authorities and Regions (see appendix) from the analysis.

Local parties earned seats in roughly half (143 out of 290) of Sweden's municipality councils in the last election. Many of these parties are named after the municipality in which they are active, such as Mariefredpartiet, Strängnäspartiet, Folkviljan i Vänersborg or they have completely generic names such as Kommunens Bästa (For the welfare of the municipality) or Rättvis Demokrati (Fair Democracy). They usually have a very specific agenda and are willing to cooperate with either block to push their issues at heart. For example, Drevvikenpartiet in Huddinge wants to form their own municipality, Mariefredspartiet is willing to form a coalition with either side to strengthen the local democracy and Bjärepatriet in Båstad wants to work across party lines to develop the local tourism industry.

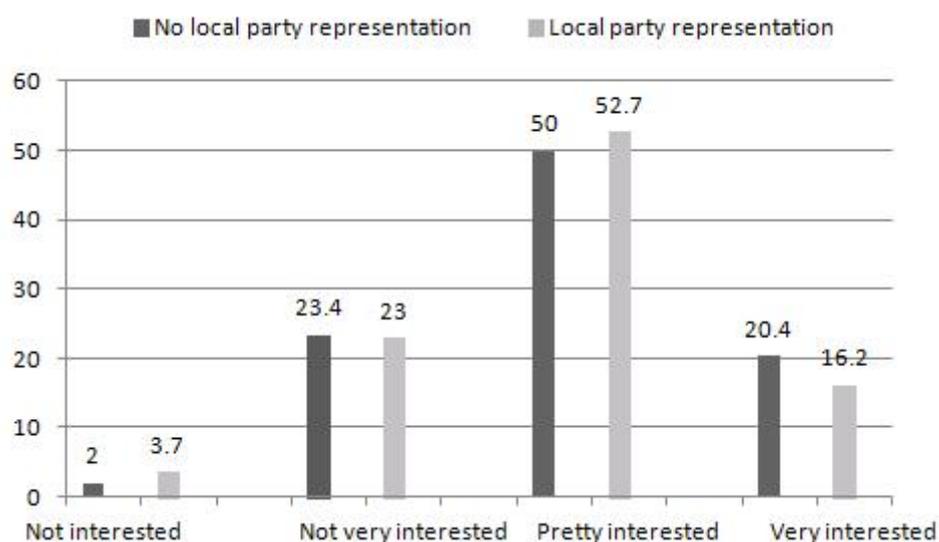
This is just a small sample of a very large variety of issues local parties deal with. What I want to stress with these examples is that the issues do not seem to be tied to certain types of municipalities and that the local parties more often than not are willing to cooperate with either block to put their issues forward. Moreover, if local party representation is as good as randomly distributed there should be no significant differences between observable variables. Table 4 shows descriptive statistics and a t-test on the equality of means on municipality specific variables.

The number of firms and population size are two variables very likely to be strong determinants

of the number of fines in a municipality. It is encouraging to see that the difference between the mean of these variables across municipalities with and without Local party representation is negligible. Except for the Green Party indicator, only one out of the ten variables (average age) turn out to differ in the two groups at conventional significance levels. The industrial structure in a municipality is likely to be an important determinant of the number of fines. They also turn out to be similar across the two groups.

Table 4 shows that observable characteristics do not differ significantly between the two groups. This finding does not reject my claim that local parties are as good as randomly distributed. What cannot be shown but has to be assumed is that the municipalities with and without local party representation neither differ in any significant way in terms of unobservable characteristics that also correlates with the number of fines and changes over time. One unobserved variable is environmental consciousness. Potential bias could come from that the electorate has different opinions about the environment in municipalities with and without local parties. At the election day, a survey (Holmberg et. al. 2006) is always made at a large random sample of Swedish polling stations. In 2006, the survey among other things concerned environmental issues. One of the questions was the following. *How interested are you in general in environmental issues?* The respondent had four different answers to choose from ranging from *not interested* (1) to *very interested* (4). Figure 1 shows the distribution of answers in municipalities with and without local parties.

Figure 1: Interest in environmental issues



We can see that the distributions are similar in both types of municipalities. Somewhat fewer are very interested in municipalities with local parties, but on the other hand, there are more that are quite interested. A t-test on shares of the different answers shows no significant differences. I also make the assumption that firm behavior does not change directly when there is a change in majority. This is motivated by the types of fines that usually are issued. In interviews with environmental inspectors it is often stressed that many fines are the results of misunderstandings or ignorance of the law and not calculated malice (SOU 2004:37). In general environmental inspectors consider firms as having the intention of doing the right thing. But once again, even if this assumption does not hold it would dilute the Green Party effect rather than enhance it. For the above specified

subset I add the following first stage to equation 1.

$$Treat_{it} = \alpha LP_{it} + \mathbf{T}_t + \mathbf{M}_i + \mathbf{X}_{it}\boldsymbol{\gamma} + \epsilon_{it} \quad (2)$$

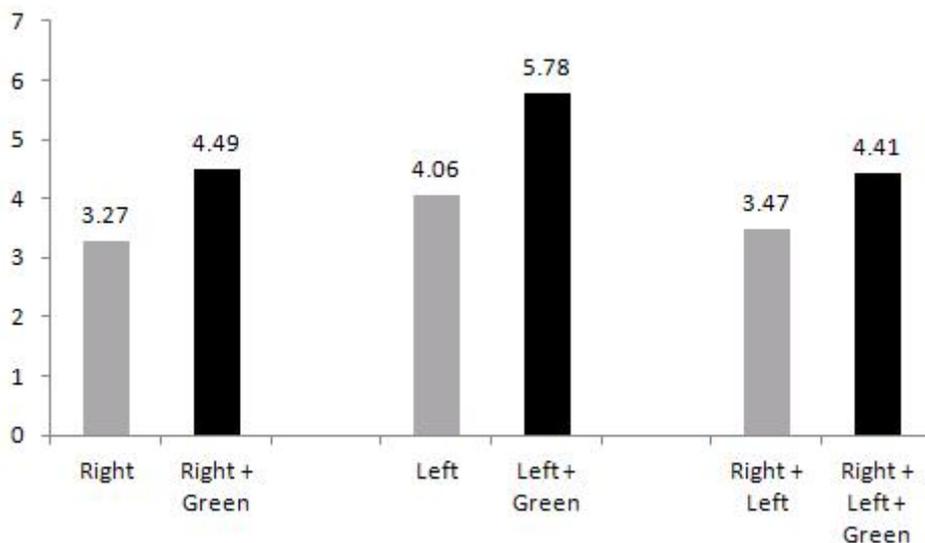
where the new variable LP_{it} indicates whether municipality i at time t after the election had local party representation in its council. In the result section, I compare the OLS result from 1 with the IV estimates obtained when introducing the first stage, adding covariates cumulatively to see if the estimate changes in any significant way. A well defined instrument should not produce results that vary in any substantial way across specifications.

5 Results

Figure 2 shows the number of fines per six months and 10,000 firms comparing ruling coalition formations with and without the Green Party. The numbers are admittedly small, but it is important to normalize fines by municipality size. Only a very small share of the total number of firms is inspected. For example, the average number of inspections at the municipalities that report these in their annual reviews is 143 (see the result section). In 2002 Sweden had around 5,500 firms in the A and B class. About 3,700 of these were inspected and a total of 135 fines were issued to this category (SEPA 2003 p.3). Normalizing by total number of firms is thus somewhat blunt but the results do not change qualitatively when normalizing by other measures such as population or removing all firms with 0 employees.

The numbers in figure 2 indicates that municipalities where the Green Party is included in the ruling coalition, on average issue more fines compared to the same coalition without the Green Party. In relative terms, the differences seem large. The differences in the number of fines between left, right and left + right coalitions are smaller than the differences between the coalitions with and without the Green Party. There is no immediate reason why the number of fines should differ between left and right coalitions. The similarity between the coalitions without the Green Party is rather comforting as it looks like the Green Party is driving the differences.

Figure 2: Fines per 10,000 firms



Results difference in differences

We still have not checked the common trend assumption. Figures 3 and 4 give a visual validation of the common trend assumption and also a preview of the main result. The figures show the trends in fines per 10,000 firms for four different municipality groups. In figure 3 we see the trend for municipalities where the Green Party was not included in the ruling coalition in the first term but were so in the second term (GPS). The control group consists of all municipalities where the Green Party was not included in the ruling coalition in either term (GPN). Hence they have a similar political setting in the first term. This is also the case for figure 4. Here as a control group for the municipalities where the Green Party only was included in the first term (GPF), I use all municipalities where the Green Party was included in both terms (GPA). The control groups were assigned so that each treatment group had the same setting in the first term.

It is not obvious how one should define the exact time of treatment. New routines might take some time to be set. The data on fines are ordered in six month blocks, January-June and July-December. Treatment is thus defined to occur January 1st 2006, the first time period after the election. Judging from figures 3 and 4, it is not obvious that a potential treatment effect has occurred in the first post treatment period.

We see that in the first term, where the two groups have a similar political setting with respect to the Green Party, the trends of both the treated and the control groups are similar. In figure 3, it seems like the inclusion of the Green Party in the ruling coalition has a positive effect on the level of fines after the election. Apart from the shift in levels, the trends in the two groups are still similar. For the municipalities where the Green Party is excluded from the coalition in the second term, it is hard to see a similar effect. The control group issue more fines on average the first periods after the election compared to the municipalities where the Green Party has been excluded. However, this effect seems to disappear towards the end of the term period.

It is also notable that the group where the Green Party is included in the political majority in all periods constantly issues more fines on average compared to the group where the Green Party was absent in both terms. Judging from figure 3 and 4, the parallel trends assumption seems to be fulfilled for the treated and non-treated groups. Also the levels are similar prior to treatment. This is potentially important since large differences in levels could possibly generate different results contingent on dependent variable specification.

The covariates were presented in section 3. In addition to the observable characteristics from table 4 I also control for a set of political variables. The variables are voter turnout and a dummy indicating whether the coalition is left or right wing based. All equations were estimated with municipality and time fixed effect. I include both Newey-West standard errors for panel data and clustered standard errors at the municipality level as there are significant changes in precision when clustering. One observation is one municipality during one six month period.

The results from table 5 indicate that there is weak evidence of a positive effect of the Green Party on the number of fines in a municipality. Column 1 of table 5 shows the result from equation 1 without the municipal, political or industrial structure covariates. Column 2 shows the same regression adding the covariates. Column 3 excludes the municipalities where the Green party was included in the ruling coalition during both terms. The point estimates of all three columns are similar given the standard errors. According to the three first columns, municipalities with the Green Party included in the ruling coalition issue on average about 1.3 more fines per 10,000 firms every 6 months compared to municipalities where the Green Party is absent in the ruling coalition. This is equal to about 0.15 standard deviations or one quarter of the mean.

Column 4 shows equation 1 estimated using two separate dummies indicating whether the

Figure 3: Average fines per 10,000 firms Green Party in second term

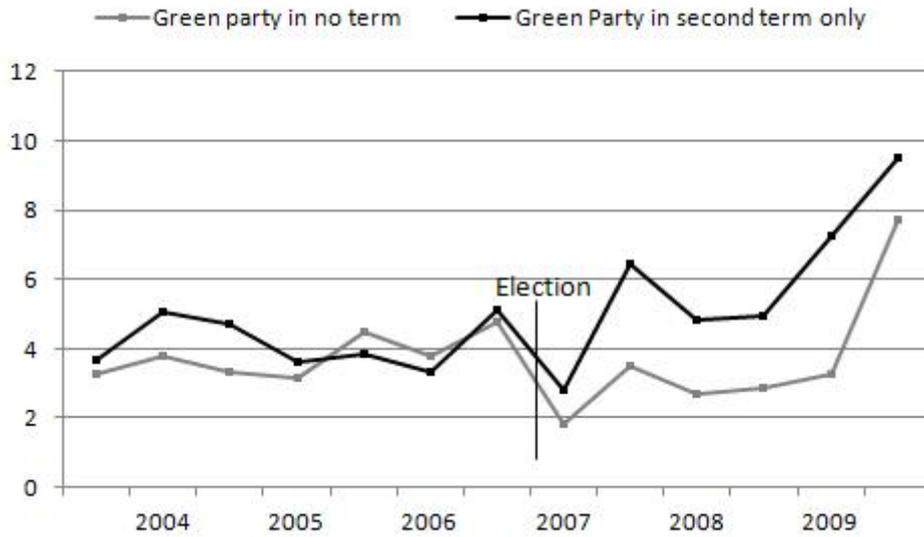


Figure 4: Average fines per 10,000 firms Green Party in first term

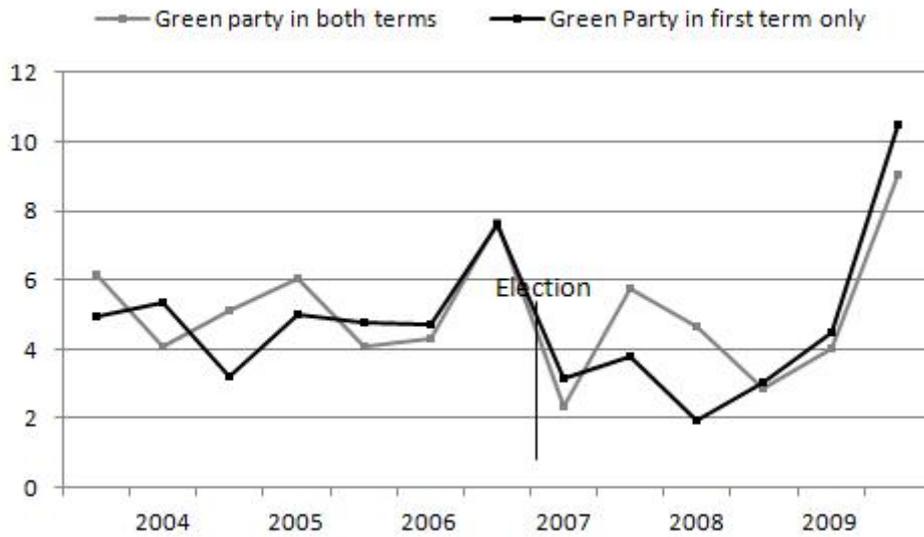


Table 5: DiD estimation

<i>Variable</i>	(1) All	(2) All	(3) No GPA	(4) All	(5) GPS GPN	(6) GPF GPA
N-W S.E.						
Treat	1.087*	1.364**	1.344**			
	<i>0.592</i>	<i>0.612</i>	<i>0.615</i>			
GPS				2.315**	2.262**	
				<i>1.057</i>	<i>1.060</i>	
GPF				0.581		0.464
				<i>0.813</i>		<i>0.874</i>
Clustered S.E.						
Treat	1.087	1.360*	1.344*			
	<i>0.782</i>	<i>0.799</i>	<i>0.803</i>			
GPS				2.315	2.262	
				<i>1.472</i>	<i>1.470</i>	
GPF				0.581		0.464
				<i>0.919</i>		<i>0.921</i>
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Mun Cov	No	Yes	Yes	Yes	Yes	Yes
Pol Cov	No	Yes	Yes	Yes	Yes	Yes
Ind Str	No	Yes	Yes	Yes	Yes	Yes
Observations	3526	3526	3178	3526	2632	2788

S.E. in italic

municipalities were treated in the first or second term, GPF and GPS respectively. Here it becomes obvious what was indicated in figure 3 and 4 namely that it is the municipalities that gains treatment that are driving the results. Excluding the Green Party from a coalition does not seem to have a significantly negative effect.

Column 5 shows a separate regression for municipalities where the Green Party was included in the ruling coalition only in the second term, using the municipalities where the Green Party was never included as the control group. Column 6 shows a regression where the treated municipalities are the ones where the Green Party was present in the ruling coalition only in the first period using the municipalities where the Green Party never were in the ruling coalition as the control group. The results are similar to those of column 4. The Green Party is estimated to have a positive but insignificant effect in the first term and a much larger effect in the second term i.e. gaining treatment seem to cause an effect in the number of fines, but losing treatment does not. The effect of including the Green Party in the second term is estimated to raise the number of fines on average by approximately 2.3 fines per 10,000 firms or 0.23 standard deviations.

The type of standard errors matters for precision as visualized in figure 5. Clustering on the municipality level lowers the precision and the estimates become only marginally significant with p-values just below or above the 10% significance level. However, the point estimates do not seem to depend on subset or specification as they stay similar across specifications.

One can only speculate why there is a difference between the Green Party joining a ruling coalition and leaving it but there are several plausible reasons. Municipalities that have strong ties between local businesses and politicians might issue fewer fines, as suggested in the governmental report about environmental enforcement (Ds 2000:67). For example if the Green Party breaks up an existing coalition these ties might be harder to exploit.¹⁸ It might also be the case that it is politically difficult to motivate cut backs on environmental operations while it is more feasible to expand them. But as these mechanisms cannot be tested we restrict ourselves to noting that there is a difference between the Green Party coming into the ruling coalition and leaving it.

Figure 5: Yearly estimated effect

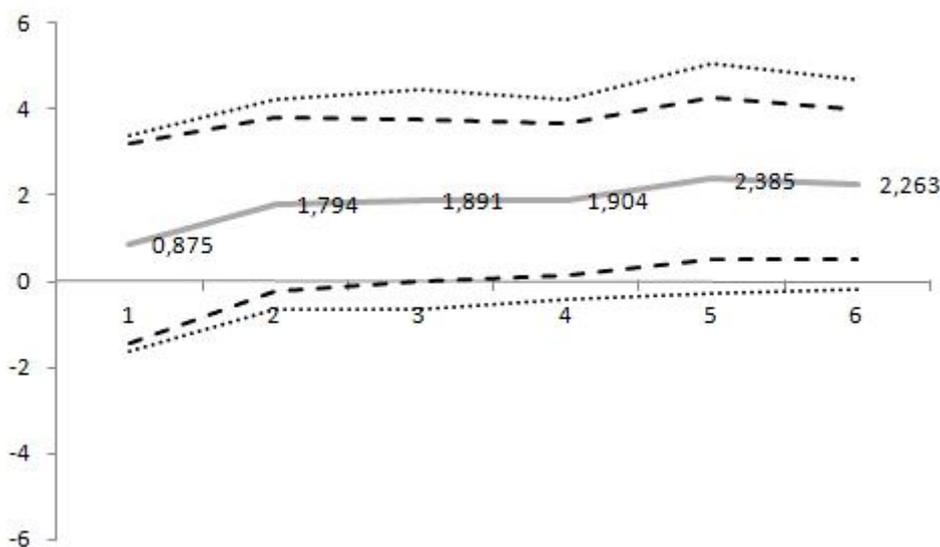


Figure 5 shows column 4 in table 5 estimated with time periods being added cumulatively.

¹⁸I have also estimated the effect of just a change in ruling coalition without finding any effect.

Apart from the first six month period after the election, the estimated effect seems to be very stable as was indicated in figure 3. The solid line shows how the point estimate evolves as time periods are added cumulatively with the dashed and dotted lines showing the 90 % confidence interval for the Newey - West and clustered standard errors respectively. We see that the pattern reproduces figure 3. It is difficult to detect an effect in the first period after the election but as years are added, both the estimate and significance increase.

Obtaining the correct specification of the standard errors with only two groups is difficult. To circumvent this problem, as suggested by Donald and Lang (2007) and applied in e.g. Petterson Lidbom and Skogman Thoursie (2010), I also collapse the two time series in figure 3 into one time series. This is done by subtracting the values for the group of municipalities where the Green Party was never in the ruling coalition from the group where the Green Party was included in the second term. This is summarized in table 6. The difference is regressed on a dummy variable indicating post treatment. Newey West standard errors are used to compensate for any autocorrelation and heteroskedasticity. The results in table 7 come out highly significant and more importantly, very similar to the estimates in table 5.

Table 6: Differences

Year	GP 2 nd term	GP in no term	Difference
2003	3.67	3.26	0.41
2004	5.07	3.81	1.26
	4.69	3.3	1.39
2005	3.62	3.18	0.45
	3.87	4.48	-0.61
2006	3.30	3.80	-0.50
	5.12	4.75	0.37
Election			
2007	2.81	1.79	1.01
	6.47	3.49	2.97
2008	4.82	2.67	2.15
	4.97	2.89	2.07
2009	7.28	3.24	4.03
	9.53	7.71	1.82

Table 7: One time series

<i>Variable</i>	Difference
treat	1.95***
	<i>0.48</i>
Observations	13
N.W. std. err. in italic	

Table 8: IV estimation

<i>Variable</i>	(1)	(2)	(3)	(4)
N-W S.E.				
GPS	7.21*	7.26*	7.41*	7.61*
	<i>3.99</i>	<i>3.89</i>	<i>3.99</i>	<i>4.12</i>
1 st stage F	90.2	91.3	98.9	91.6
Clustered S.E.				
GPS		7.26	7.41	7.61
		<i>5.58</i>	<i>5.62</i>	<i>5.76</i>
1 st stage F		7.32	7.57	7.23
Time F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Mun Cov	No	Yes	Yes	Yes
Pol Cov	No	No	Yes	Yes
Ind Str	No	No	No	Yes
Observations	860	860	860	860
S.E. in italic				

Results IV

Before we move on to the estimation, let us discuss the expected sign of any potential bias. If the inclusion of the Green Party is associated with a change in electorate and or firm attitude to environmental stringency, we would expect the estimates in table 5 to be biased towards zero. Instrumenting the inclusion of the Green Party would thus lead to higher point estimates. Since the effect is found to be present in municipalities where the Green Party is included in the second term, we use these to see how instrumenting for Green Party inclusion affects the results i.e. the estimates in table 8 should be compared to those of column 5 in table 5.

The estimates are much larger using the IV-approach implying that, as discussed, OLS might underestimate the Green Party effect. The point estimates of around 7 are equivalent to an increase of about 0.7 standard deviations. It should be noted, however, that it is a few outliers that drive this huge increase. Removing the top percentile based on number of fines reduces the point estimate to around 4, a number much closer to the OLS estimates which can be seen in table ?? in the appendix.¹⁹ The standard errors have also increased drastically and the OLS estimates are well within the 95 % confidence intervals for the IV-estimates. The lack of precision can be attributed to the few changes (12 municipalities) in instrument statuses that occurred between term periods and which are needed for identifying variation due to the municipality fixed effects.

IV estimation implies that the OLS estimates are biased towards zero. The F-statistics from the first stage regression falls sharply as standard errors are clustered on the municipal level. But the

¹⁹Removing the top percentile in table 5 decreases the point estimates somewhat but increases precision for column 1-3 and decreases precision somewhat for the estimates of column 5.

most important result of table 8 is that given the large standard errors, the point estimates seem extremely stable across specifications. The different point estimates are centered around seven and change very little when controlling for the municipality, political and industrial structure covariates.

As a robustness check, an additional instrument is used to see if the estimates change. In political science, one variable that has proven to have strong predictive power for the ruling coalition in a municipality is the *minimal range coalition*, Bäck (2003). The minimal range coalition is defined as the coalition with the smallest ideological range out of all winning coalitions that would not have a majority without the smallest member. More specifically, all political parties are ranked on a left to right scale. To do this data from Riks-SOM was used. Voters belonging to different parties ranked themselves on a left to right scale (1-5) and the average for each party was used to place the parties along the scale.²⁰ Local parties were put in the middle. All coalitions that were connected along this scale and also held a majority were then chosen. A subset of the coalitions that would lose the majority without its smallest member was then created. Out of this final subset, the minimal range coalition was the one with the smallest ideological range between the two outermost members. I considered membership in this coalition as random as the probability of belonging to this coalition depends on other parties vote share. It is nor monotonically increasing in the own vote share. Membership in this coalition for the Green Party is used as an additional instrument for the inclusion of the green party in the ruling coalition.

The results are in table 10 in the appendix. Unfortunately, this instrument does not bite as well as in for example Bäck (2003) which can be seen by the low F-statistics from the first stage. However, the inclusion of this additional instrument does not change the estimates in any significant way.

In all, the difference in differences and IV-results indicate the Green Party has a positive effect on the number of fines issued in the Swedish municipalities. The precision of the estimates are sensible to clustering but the point estimates remains positive throughout. The results are also robust to alterations of the estimation methods.

Potential mechanisms

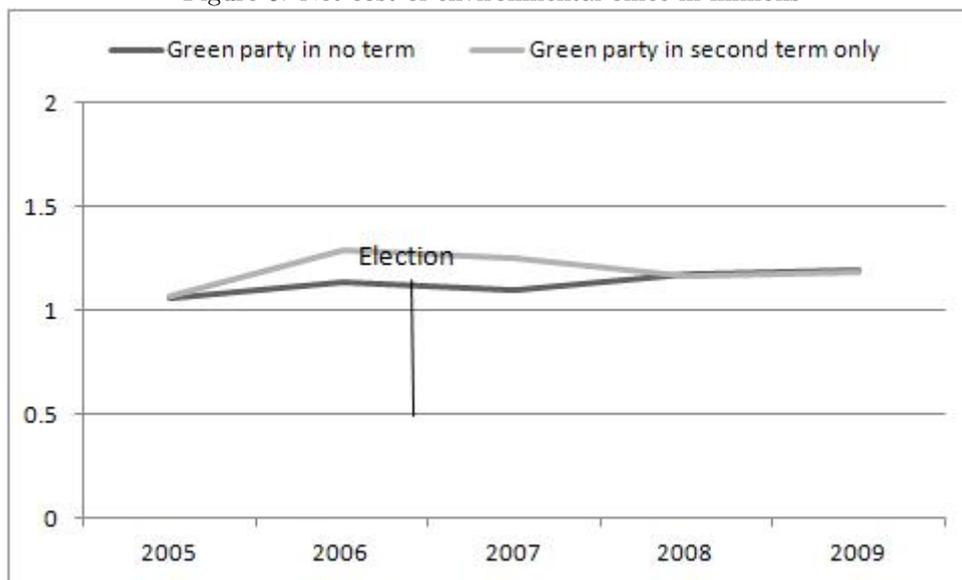
There are a number of potential mechanisms that can explain these findings as was briefly discussed in the introduction. They can to some extent be evaluated using available data. Some municipalities give a detailed account of their environmental boards' cost, number of inspections and number of employees in their annual reviews. I have collected all available data from the annual reviews of Swedish municipalities. This means that I only have data for the subset that choose to give such a detailed account. It is, however, the only available data on covariates which can explain the increases but it comes with the caveat of the data being collected from a nonrandom subset of Swedish municipalities. About 170 of Sweden's 290 municipalities reported either or both the net cost and number of inspections in any year during the investigated period. The unavailability of data is also the reason for why the graphs show different time spans.

The trends in the graphs below belong to the municipalities where the Green Party was included in the second term period and the municipalities where the Green Party never belonged to the ruling coalition since it is in this group the effect seem to be the strongest. Figure 6 shows that there was no significant change in the net cost of the environmental office before and after the election.²¹

²⁰The parties were ranked V(1.484), S(2.141), GP(2.227), OP(2.835), C(3.581), KD(3.683), FP(3.766), M(4.186).

²¹The environmental office is also responsible for health inspections and food inspections. I assume that these make up a constant share of the environmental offices' budget.

Figure 6: Net cost of environmental office in millions



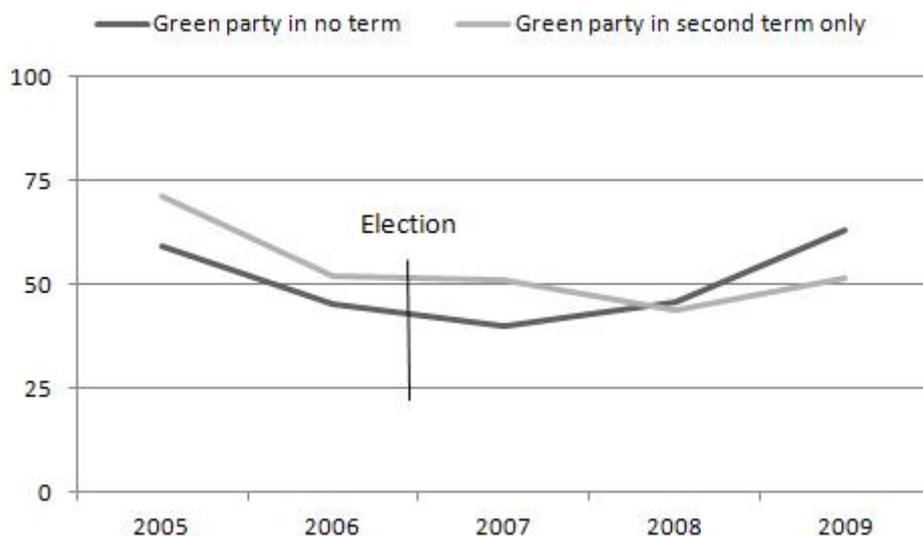
The net cost is somewhat higher in the treated municipalities. However, the trends seem to have been similar over time. The net costs do not show an abrupt change after the election which could have explained the increase in number of fines.

Two other things that could potentially explain the increase in the number of fines in Green Party municipalities are increases in number of inspections or a higher share of the environmental reports actually being reviewed by the municipalities. Figure 7 show the average number of inspections per 1000 firms in treated and untreated municipalities. Firms classified as A, B or C, i.e. the more hazardous firms, can choose to submit their environmental reports via the Swedish Environmental Reporting Portal. In this database there is information on how many of these reports that are reviewed by the environmental office in each municipality. This data is available for all municipalities. However the database only stretches back to 2006. Figure 8 shows the share of reports that are reviewed in treated and untreated municipalities.

It is seen that the number of inspections actually increased somewhat in *untreated* municipalities relative to treated. The difference in the share of reviewed environmental reports is constant over time in both types of municipalities. None of these two variables seem to explain the increase in fines in treated municipalities.

One final explanation that has been proposed is that when the Green Party is in the ruling coalition, the environmental office may be able to work more independently. This cannot be evaluated by statistical methods since there is no good data but there is some anecdotic evidence that politician try to interfere more or less directly with the inspectors work tasks. In a survey, published in the 2004 report to the government which was presented in the introduction (DS 2000:67), 44 % of the environmental inspectors thought that political considerations impede enforcement of the environmental code. In the same report, several anecdotic examples of external pressure on the environmental office from politicians were published. For example, one local government commissioner in a municipality in northern Sweden officially apologized to a firm which received a fine which the commissioner deemed unjust. The same municipality also gave a grant to compensate a non-profit association which was also fined. Further, a senior official in south eastern Sweden stated that they sometime fail to issue fines since the fines have an *“incredibly hard impact and destroy relations between the firms and the regulator.”* And in 2010, a politician in the environmental

Figure 7: Inspections per 1000 firms



board of a suburb north of Stockholm added a special statement to the protocol in conjunction with the new guidelines for the environmental office (Protocol 2010-03-24). There she wrote among other things that she was worried about environmental inspectors *"overzealous inspections in order to expand their operations and secure their own jobs"*. She also expresses worries that increased controls drives entrepreneurs *"out of business and right into the hands of unemployment funds"*. She finishes her statement by asking *"[h]ow do the enforcement affect traders and businessmen.[sic] Is it possible in the long run to operate a business without suffering from the authorities harsh, and possibly in many times misdirected but devastating enforcement?."*

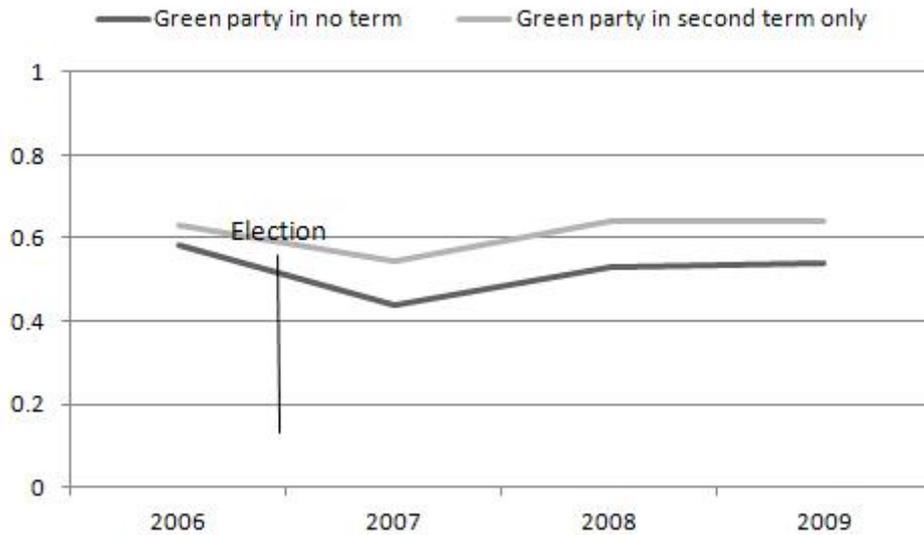
If we assume that the Green Party weighs the tradeoff between environmental standards and business friendliness differently, these kinds of instances of undue influences should be less common in municipalities where the Green Party is represented and could be one explanation to the increase in the number of fines.

6 Conclusions

I have analyzed the effect of including the Green party in the ruling political coalition on the number of fines issued by the environmental offices in Swedish municipalities. To overcome the problems of endogeneity I have applied a difference in differences approach and also introduced some exogenous variation using instruments. The data indicate a positive effect for municipalities where the Green Party joins a ruling coalition but a zero effect when the Green Party leaves. Possible reason for this asymmetry is e.g. that it is politically not feasible to cut back on environmental operations in a municipality while it is easier to motivate expansions. The estimates are robust to different model specifications and identification strategies but the precision depends on standard error specification.

The main conclusion is that even though the Swedish Environmental Code is the same for all, in municipalities where the Green Party joins the ruling coalition, the number of environmental sanction charges increases on average. Various mechanisms behind this increase have been investigated. Although data on these factors are scarce, the number of inspections, share of environmental

Figure 8: Share of environmental reports reviewed



reports reviewed or the net budget of the environmental office do not seem to increase in Green Party municipalities after an election. There is, however, anecdotal evidence that political pressure on environmental inspectors is sometimes exerted in municipalities to e.g. appear more business friendly. If the Green Party is less prone to exert this undue influence this could be a driving mechanism.

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Appendix

Table 9: Municipality group definitions

<i>Group name</i>	<i>Definition</i>
1. Big cities	Population > 200.000
2. Suburban municipalities	More than 50 % of the population commute to work in another municipality most commonly to group 1.
3. Larger cities	50.000 < population < 200.000, at least 70 % living in cities.
4. Commuting municipalities	At least 40 % of the population commute to another municipality
5. Back country municipalities	Population < 20.000 and < 7 people per km ²
6. Commodity producing municipalities	> 40 % of the population between 16 and 64 employed in the commodity producing sector
7. Other municipalities 25.000	Not belonging to prior groups, population > 25.000
8. Other municipalities, 12.500, 25.000	Not belonging to prior groups, 12.500 < population < 25.000
9. Other municipalities, 12.500	Municipalities not belonging to prior groups, population < 12.500

Table 10: IV estimation

<i>Variable</i>	(1)	(2)	(3)	(4)
N-W S.E.				
GPS	7.37*	7.35*	7.54*	7.65*
	<i>3.89</i>	<i>3.78</i>	<i>3.93</i>	<i>4.08</i>
1 st stage F	47.94	51.22	51.11	47.63
Clustered S.E.				
GPS		7.35	7.35	7.65
		<i>5.43</i>	<i>5.43</i>	<i>3.93</i>
1 st stage F		4.03	4.02	3.83
Time F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Mun Cov	No	Yes	Yes	Yes
Pol Cov	No	No	Yes	Yes
Ind Str	No	No	No	Yes
Observations	860	860	860	860
S.E. in italic				

Table 11: IV estimation without 100th percentile

<i>Variable</i>	(1)	(2)	(3)	(4)
N-W S.E.				
GPS	3.50	4.31	4.35	5.21
	<i>3.43</i>	<i>3.43</i>	<i>3.54</i>	<i>3.67</i>
1 st stage F	86.5	89.10	93.23	87.39
Clustered S.E.				
GPS	3.50	4.31	4.35	5.21
	<i>5.23</i>	<i>5.07</i>	<i>5.20</i>	<i>5.34</i>
1 st stage F	6.94	7.22	7.58	7.20
Time F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Mun Cov	No	Yes	Yes	Yes
Pol Cov	No	No	Yes	Yes
Ind Str	No	No	No	Yes
Observations	860	860	860	860
P-values in italic				