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# Local Government Fragmentation and Debt Development in Swedish Municipalities

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## **Abstract**

The common pool problem and veto player model states that fragmented governments generate higher levels of public debt. This study explores these mechanisms in the Swedish setting, which has not previously been investigated, by using panel data for 289 municipalities between 1998 to 2017. In contrast to previous studies, we extend our model to explore potential effects of local government fragmentation for cross-ideological coalitions. When examining fragmented local governments in general, we do not find evidence of higher debt levels. However, when dealing with concerns of endogeneity by employing an IV-estimation, we find support of this proposition. We also find that the effect of local government fragmentation on municipal debt rather seems to be attributed to cross-ideological governments in the Swedish context, which could be due to the presence of predetermined ideological constellations.

Keywords: Sweden, Municipalities, Local Government Fragmentation, Municipal Debt, Cross-ideological Government

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# 1. Introduction

The political structure in Swedish municipalities has changed substantially in the last two decades. The growth of the Sweden Democrats and various local parties has resulted in new and larger coalitions being created by the traditional left- and right parties, not only to obtain a majority but also in official and unofficial attempts to isolate the Sweden Democrats from political influence. Larger coalitions can, according to the veto player model and common pool problem, result in higher expenditures and debt levels due to conflict of interests, compromises and ultimatums (Tsebelis, 2002).

The aim of this paper is to examine how local government fragmentation affects municipal debt in Sweden. Specifically, we ask whether fragmented governments incur more debt, and whether the effect of fragmentation on municipal debt differs between cross-ideological- and traditional left- and right local governments. A fragmented local government, i.e. a weak local government, can be defined as a ruling constellation that consists of many parties (Ashworth et al. 2005; Roubini and Sachs, 1989). In other words, the more parties there are in a ruling coalition - the more fragmented the local government is.

Municipalities in Sweden play an important role in terms of providing local welfare services e.g. elderly care, education and social service for the Swedish population (Dietrichson and Ellegård, 2014). As a complement to self-financing, loans are an important way to fund expenditures and investments in these public goods. The aggregated municipal debt has doubled in the last seven years (SCB, 2018), and the average long-term real municipal debt per capita has increased with 89%, from 10,000 SEK per citizen to 18,900 in the last 20 years (SCB, 2019a).

The increasing municipal debt in Sweden has been frequently discussed in the last years, and both public and private actors have raised concerns of the ability for municipalities to provide a sufficient amount of welfare services in the future (Heimersson, 2018; SKL, 2018; Gustafsson, 2016). Sweden is facing increasing challenges from a changing demography with an ageing population, migration and urbanization for many municipalities (Brorström and Parment, 2016; Kommuninvest, 2018). Thus, there are reasons to believe that the need for loan-financing will increase in order to satisfy the demand for investments in municipal services and, considering a future of higher interest rates paired with weaker economic growth, the costs of servicing the debt will increase (SKL, 2018). For these reasons, it is important to investigate the determinants of municipal debt in Sweden.

The effect of government fragmentation on fiscal outcomes have been widely studied on a national level (Roubini and Sachs, 1989; Alesina and Perotti, 1995; Bawn and Rosenbluth, 2006; Persson, Roland and Tabellini, 2007), but more recently, research has shifted to focus on local governments (Hagen and Vabo, 2005; Ashworth et al, 2005; Rattsø and Tovmo, 2002; Borge, 2005, Geys, 2007; Baskaran, 2013). As of yet, however, the evidence on whether fragmented local governments accumulate more debt is mixed. The inability to reach consensus in this field partly has to do with potential issues of endogeneity, in particular omitted variable bias and non-random assignment in the construction of local government coalitions.

This paper contributes to the literature by examining how government fragmentation affects the municipal debt in Sweden. To our knowledge, this has so far not been studied in the Swedish context and we argue that our study therefore fills an important gap in the existing literature, particularly in the context of the recent changes in the Swedish political landscape. Furthermore, beside examining if fragmented governments incur more debt, we take a new perspective into account by investigating if the effect of fragmentation on long-term municipal debt differs between cross-ideological- and traditional left- and right constellations. Finally, we employ a complementary instrumental variable regression (IV) which contributes to the latest literature that tries to tackle the issues of endogeneity and the lack of consensus within the field.

In order to answer the research question of how local government fragmentation affects the municipal debt in Sweden, we use panel data for 289 Swedish municipalities covering the years of 1998 to 2017. To account for endogeneity to the best of our ability, the data is analyzed by means of a dynamic panel data model with municipality- and time fixed effects along with an additional IV-regression.

The results from our baseline specification, inspired by previous literature, suggests that government fragmentation does not have an impact on municipal debt in Sweden. However, when we address endogeneity concerns by the means of an IV-regression, we indeed find evidence that local government fragmentation on average leads to higher municipal debt. Moreover, extending the baseline model to account for cross-ideological coalitions further nuances our findings. While we cannot claim to fully account for issues of endogeneity in this model, the results seemingly suggest that the hypothesized effect of government fragmentation is primarily relevant for cross-ideological coalitions, and not equally applicable for traditional left- and right coalitions. Our results thus indicate that the baseline specification, often used in the literature, is not appropriate in the Swedish context, where predetermined ideological coalitions are common.

This paper is organized as follows. Section 2 presents the legislative framework in Swedish local governments and how a municipality is governed. Section 3 lays the theoretical foundation for the mechanisms which can explain the effect of local government fragmentation on public debt. Section 4 provides an overview of the existing research in the field and Section 5 describes our data, methodology and empirical strategy. In Section 6, the results from the empirical models are presented as well as robustness checks of our specifications. In Section 7, we discuss the results, policy implications and limitations of the study. Finally, we conclude the paper in Section 8.

## 2. Municipalities in Sweden

Sweden is divided into 290 municipalities which have their own local governments. A local government has the executive responsibility to provide welfare services e.g. education, elderly care, social services, environmental protection, housing and emergency services for the citizens of the municipalities (Dietrichson and Ellegård, 2014).

The two main organs of the local government are the municipality council (Kommunfullmäktige) and the executive committee (Kommunstyrelsen) (SKL, 2019a). The council is the highest organ in the municipality and is selected through an election every fourth year. The council can therefore be viewed as the local “parliament”, i.e. the legislative branch, where the size of the council (the number of seats) differs between municipalities and depends on the size of the population. The main responsibilities of the local council are to vote for budgets and propositions as well as nominating the executive committee. The executive committee represents the executive branch of the municipality and is in charge of the overall economy, coordination of daily operations and drafting the budget proposal.

For this paper, the municipality council plays the key role. It is in the municipal council where coalitions are created in order to obtain the role as chairman for the executive committee as well as adopting propositions and budgets. The ruling constellation or government of the municipality is therefore referred to as the coalition or single party in the municipality council that governs the municipality by nominating the chairman, drafting and adopting budgets, and coordinating the daily operations.

Swedish municipalities have a relatively large amount of freedom in regard to decision-making and financing. A local government in Sweden can, due to a constitutional law which stipulates the municipalities’ degree of autonomy, take their own decisions about the municipal tax rate, investments and the overall political course (Sveriges Riksdag, 2016). However, even

though self-governance is a constitutional right, municipal councils and governments need to adhere to the legislative framework formulated in The Swedish Local Government Act (SFS 2017:725).

An important feature of this legislative framework is the budget rules and restrictions. The Swedish Local Government Act (SFS 2017:725) requires municipalities to have a “sound economic administration” and a budget that covers the next three years, meaning that there should be a budget in place for the first year as well as a plan for the next two budgets. The Act also contains a precept for municipalities to maintain a balanced budget, which requires municipalities that run a deficit in one year to run an equivalent surplus over the next three years. However, there is no retribution if the balance budget law is violated and exceptions from the rule can be made (Dietrichson and Ellegård, 2014). During the time period studied, 21,4% of the observations amongst Swedish municipalities exhibit a budget deficit before extraordinary transactions (SCB, 2019b).

Sweden has a system of local government financial equalization for municipalities in order to create equal economic conditions for all municipalities and provide their inhabitants equivalent service (Regeringen, 2019). The system is complex and is usually divided in five parts. For the purpose of this paper, we focus on the two most financially important pillars: income- and cost equalization (SKL, 2008).

Income equalization requires municipalities with over 115% of the national tax paying capacity to pay a fee, whereas municipalities below this threshold receive a payment. This system aims to equalize differences in the relative tax income between municipalities and it accounts for the largest part of the local government financial equalization system.

Cost equalization is a neutralized grant system where municipalities with a favorable cost structure pay a fee and municipalities with an unfavorable cost structure receive a grant. Determinants of whether a municipality has a more or less favorable cost structure is for example the composition of the population, as some age groups require more public services, i.e. elderly care or daycare. In the absence of this system, sparsely populated municipalities would have difficulties with providing e.g. elderly care unless it levied very high tax rates (SKL, 2008).

Several municipalities rely heavily on the equalization system; for example, 25 % of Malmö municipality’s gross income comes from the equalization system (Malmö stad, 2019), whereas only a handful municipalities are net payers to the system. The local government financial equalization system reduces financial differences between the municipalities, which can be considered as an advantage for the econometric analysis in this study.

### 3. Theoretical Background and Hypotheses

This section provides an overview of the theoretical framework that can explain the potential channels through which fragmented local governments can affect municipal debt. The theoretical framework comprises the concepts of common pool problems and the veto player model. These two models are commonly used to explain why governments might engage in excessive spending and potentially accumulate more debt.

#### 3.1 The Common Pool Problem

The common pool problem denotes the issue of over-exploitation from agents with different interests when there is a common pool of resource (Persson, Roland and Tabellini, 2007). Hardin (1968) initially laid the foundation for “the tragedy of the commons” as an illustration of environmental degradation when many individuals over-exploit a scarce resource. Ostrom (1990, p.3) affirms that this simple theory has been used by many strands of literature in different disciplines to illustrate the problems that can arise when individuals share a limited resource. In terms of political economy, the common resource pool is the government’s tax revenues which will be allocated in the next time period.

Velasco (2000) resembles government net income with a tragedy of the commons problem, since it is modeled as a common pool from which interest groups can extract resources. Since political parties tend to represent different interest groups, which all benefit from a particular kind of government spending, a “spending bias” emerges when parties form a government coalition. Assuming that all interest groups share the same budget constraint and that they enjoy common access to government revenue, each coalition member overspends in order to satisfy the groups they represent. Velasco (2000) argues that this spending bias increases with the amount of parties in a coalition, since  $n$  members base their spending decisions on the total stock of resources instead of taking other parties’ spending into consideration. The failure to internalize the costs associated with overspending from one or more groups thus leads to a form of tragedy of the commons, which can be financed by increasing debt levels.

A potential remedy to the common pool problem in the context of political economy is tight regulation over the budget procedure and high fiscal discipline. Velasco (2000) compiles empirical evidence that European countries with the strongest budgetary procedures on average experience lower budget deficits than countries with less “fiscal discipline”. This reasoning



could be applied in our research of local governments, since the management of tax revenue as a common good should be influenced by the budgetary process. As mentioned in Section 2, Swedish municipalities have relatively large room for self-governance, but are also under strong fiscal regulation in the national law. Thus, if this paper does not find support for the common pool problem, it could be due to successful fiscal regulation of the budget process for local governments in Sweden.

We follow the model for national governments developed by Hallerberg and Von Hagen (1999) but apply the reasoning in the context of local government debt in Sweden. In the model, the budget process features a common-pool resource problem. The failure to internalize cost increases in more fragmented governments should therefore aggregate to higher debt levels than in less fragmented governments. Single party-led or less fragmented local governments should in general find it easier to internalize the overall budget process, and also sanction and penalize individuals who externalize other cost increases. Thus, less fragmented governments should be able to reach budget decisions that are closer to collectively optimal outcomes and sustainable levels of debt for the government (Hallerberg and von Hagen, 1999).

### 3.2 The Veto Player Model

The veto player model, developed by Tsebelis (2002), suggests that every political system consists of so-called veto players. A veto player can be defined as an actor which has the power to block a change of the status quo by not agreeing to the terms. In regard to this paper, a veto player denotes a political party which is a member of a ruling coalition and where the support from the party is necessary for the coalition to stay intact.

According to Tsebelis (2002), the ability to change the status quo for a coalition of veto players is dependent on the number of parties in the coalition, the ideological distance between them and how united the parties are internally. If there are many united parties within a coalition with major ideological differences, it will be difficult for the coalition to change the status quo. The underlying mechanism is the conflict of interest between the coalition members, since each of the parties in the coalition represent their own voters and aim to maximize the voters' utility. Therefore, if the change of status quo is in conflict with the interest of the voters, the party can block the policy change.

Two approaches can be used to explain the relationship between partisan veto players and fiscal outcomes (Tsebelis, 2002). The first approach is called policy inertia and refers to a situation in which the status quo is unstable, e.g. a government has a high level of debt or

increasing deficit, and there is no agreement in the coalition of how the status quo should change. The approach assumes that all parties represent their own voters and do not want their group of voters to bear the cost of the fiscal adjustments. As a result, the theory suggests that a coalition with veto players will delay or avoid implementing necessary fiscal adjustments, which will result in higher debt. Tsebelis (2002) argues that the issue of policy inertia and government inaction is greater when there is an ideological distance between the coalition members or when the ruling coalition is fragmented. This is because the conflict of interest is larger when parties do not share ideology and the coalition consists of several parties. An example can be if there is an unstable status quo, i.e. a high level of debt, with a large coalition consisting of different ideologies. Left-wing parties can advocate to pay off the debt with an increase in the tax rate to increase tax revenues, while right-wing parties can prefer to cut public expenditures. As a result, an agreement of how to tackle the unstable status quo can be delayed or not occur at all.

The second approach is called the collective action approach and it provides a link between the concept of common pool problems and the veto player model (Tsebelis, 2002). The veto player model and the collective action approach explains the underlying mechanism of why excessive spending from a common pool can occur. A party in a coalition, i.e. a veto player, can enforce spending in favor of their interest group by threatening to leave or not support the coalition. Therefore, if there are many parties in the coalition, all can use their veto to maximize their voters' utility and hence increase spending from the common pool.

### 3.3 Hypotheses

To summarize, our two main theoretical models differ in the explained channel to increases in local government debt. The common-pool approach predicts that higher local government debt levels arises due to the mere existence of coalition governments, where the failure to internalize policies which lead to higher debt levels, increases with each new coalition member representing a different interest group. On the other hand, the veto player model plays an important role in terms of explaining the mechanism of why parties in coalitions can enforce excessive spending as well as why fiscal adjustments targeted at improving the fiscal situation can be delayed or not occur at all. Therefore, the common pool problem and veto player model together provide the theoretical underpinnings as to why fragmented governments could be more inclined to accumulate debt to finance excessive spending.<sup>1</sup> Based on this, we formulate the following hypotheses:

H<sub>1</sub>: Fragmentation in local governments contributes to higher debt levels for Swedish municipalities.

Above, we formulate a regularly tested hypothesis in this field of research. However, previous literature has to a large extent disregarded potential mechanisms of government fragmentation between different kinds of coalitions. Swedish politics has in the last decade consolidated to a left (*De rödgröna*) and right (*Alliansen*) political bloc.<sup>2</sup> Especially at the national level, these blocs have run for parliament in predetermined coalitions (Hagevi, 2014), which could potentially spill over to the local level and offset the mechanisms discussed in the theoretical framework above, since a predetermined coalition could act as a single veto player. If this is the case, left- and right governments that are fragmented by definition might not display veto player- or common good problems to the same extent. On the other hand, it is reasonable to assume that cross-ideological coalitions, which consist of parties from both left- and right ideologies, are less likely to be formed prior to an election as a result of the predetermined ideological coalitions. Thus, due to more bargaining and ultimatums when the ideological distance increases, as suggested by Tsebelis (2002), we expect fragmentation within cross-

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<sup>1</sup> In line with Ashworth et al. (2005) we cannot distinguish between the two mechanisms in the empirical analysis, but instead rely on these models as a joint explanation to a possible positive relationship between fragmented coalitions and higher municipal debt.

<sup>2</sup> The left bloc (*de Rödgröna*) consists of the Social Democrats and the Left party and the Swedish Green Party. The right bloc (*Alliansen*) consists of the Moderates, the Centre party, the Liberals and the Christian Democrats.

ideological coalitions to accumulate more debt than left- and right coalitions in the Swedish context and we therefore formulate a second hypothesis:

H<sub>2</sub>: The effect of local government fragmentation on municipal debt is larger for cross-ideological coalitions than left- and right rulings.

## 4. Literature Review

The literature on fiscal outcome responses to government fragmentation is relatively extensive. From the late 1980s and two decades on, economic- and political research has focused on cross-country research in order to establish if there is a relationship between fragmented governments and public fiscal performance, i.e. debt accumulation, public expenditures or deficits. In more recent years, research has acknowledged the methodological challenges when performing cross-country analyses and shifted its focus to local governments within countries instead.

This section first presents an overview of the most influential cross-country analyses and the literature that has inspired future research. Secondly, a review of local level research is presented, followed by a discussion of why there is still no consensus in the field today. Lastly, we present new approaches in the literature to deal with endogeneity issues, especially in terms of the difficulty to control for such unobserved factors that could determine the long-term debt and correlate with fragmentation in local governments.

In the context of a large national debt-build up in the OECD-countries during the 1980s, Roubini and Sachs (1989) argue that political determinants should be considered endogenous, rather than exogenous, when studying government deficits. According to them, the literature in traditional macroeconomics previously has taken policy variables as given even in the presence of the increasing size of national governments. When internalizing political variables in the public debt-analysis, this pioneering article establishes a positive relationship between more fragmented governments and larger deficits. The findings of this paper have attracted the field of political economics to investigate the political determinants of public debt on a national level.

Following the work of Roubini and Sachs (1989), empirical research has increasingly sought to establish the causal effect of political and ideological fragmentation on public expenditures and debt at a national level. Persson, Roland and Tabellini (2007) theorize that more fragmented governments spend more than single-party governments, all else equal. They find evidence for the theory amongst 40 parliamentary democracies between 1960-1998, and

the results suggest that a coalition government on average experiences a higher average increase in public expenditures than a government under single-party rule.

Using time-series cross-sectional data on 17 European countries in Europe between 1970 to 1998, Bawn and Rosenbluth (2006) conclude that an increase in the number of parties in government leads to an average increase of government spending by close to half a percentage point as a share of GDP. The authors claim that “coalitions of many parties will strike less efficient bargains than those composed of a fewer parties”. Thus, the number of parties in government matters for the fiscal deficit. Regarding the ability for coalitions to strike efficient bargains, Alesina and Perotti (1995) argue that coalition governments are less likely to succeed with the implementation of substantial fiscal reforms than single-party governments. Amongst 20 OECD countries between 1960-1992, they find that the probability for a coalition government to successfully implement a fiscal adjustment was 8.7%, whereas the probability for a single-party government was 35.7%.

Far from all research has found convincing results on a national level, however. Bäck and Lindvall (2015) investigate the composition of coalition governments and argue that previous literature has overlooked the importance of variation within coalition governments. The authors find that the effect of coalition governments on public debt rather depends on the parties’ ability to cooperate. These results suggest that the presence of a coalition government does not lead to any average differences in fiscal policy, but rather that a higher (lower) ability to cooperate in a coalition leads to lower (higher) levels of public debt. Edin and Ohlsson (1991) contest the robustness in Roubini and Sachs (1989) results by modifying the functional form and concluding that the “coalition effect” is in fact entirely due to minority governments’ inability to reduce budget deficits. Furthermore, De Haan, Sturm and Beekhuis (1999) find inconclusive evidence for both the Roubini and Sachs (1989) hypothesis (fragmented governments generate more debt) and the position expressed by Edin and Ohlsson (1991) (minority governments generate more debt).

This overview of the most influential research of political determinants on budget deficits and government debt on a national level leaves us with ambiguous results, and no consensus has emerged whether the relationship holds or not. A potential reason for these ambiguous results could be heterogeneity across different countries; for example, differences in the institutional setting, electoral rules or the timing of elections (Ashworth et al., 2005; Bastida et al., 2013). The field of research has therefore in the last two decades shifted to examine local governments within countries instead. Local governments can in general be more homogeneous since they share e.g. the same budget rules, institutional settings and election

periods. Furthermore, focusing on local governments can provide a larger amount of observations than examining cross-country variation (Ashworth et al., 2005).

The literature on local government fragmentation and fiscal performance is relatively extensive. Borge (1995) published one of the first studies that investigates how political strength, i.e. the fragmentation of the government, influences the fiscal performance of a local government. The authors find that political strength matters in terms of preventing excessive spending for Norwegian municipalities. These results are further reinforced by Borge (2005) and Hagen and Vabo (2005), which both find that fragmentation in local governments increased the fiscal deficits in Norwegian municipalities during the 1990s.

Some studies have also managed to establish potential channels of why fragmented local governments can lead to higher levels of debt and expenditures. Geys (2007) examines Flemish municipalities and finds that fragmented local governments are more likely to overspend in line with in political budget cycles, which in turn increases the public debt. These findings are supported by Bastida et al. (2013), which conclude that fragmented local governments in Spain exhibit higher debt levels, and a potential reason is argued to lie within the exploitation of election cycles.

In contrast to these results, there are studies that suggest that the strength or fragmentation of the government has no effect on fiscal outcomes of a local government. Rattsø and Tovmo (2002) and Tovmo (2006) do not find any effects from local government fragmentation on debt when studying Denmark and Norway. Ashworth et al., (2005) examines how local government fragmentation in Belgium affects both short- and long-term debt levels. The authors find no relationship between local government fragmentation and long-term debt levels, although they find that coalitions with many parties exhibit higher short-term debt levels. Le Maux, Rocaboy and Goodspeed (2010) suggest that the relationship between political strength and expenditures depends on the ideology of the parties in charge and that only fragmented governments which are right-wing have higher social expenditures. For left-wing governments, the results are the opposite.

The ambiguous results in the literature are therefore not exclusive for cross-country studies. Instead, the mixed results on both the local- and national level are considered by some to be a result of the methodology being used and issues of endogeneity (Baskaran, 2013; Artés and Jurado, 2015, 2018). One key problem suggested with the early literature is the problem of omitted variables bias (OVB). In other words, there are still unobserved factors that correlate with the main independent variable, i.e. the formulation of a fragmented coalition, and simultaneously affect the dependent variable, e.g. municipal deficit or debt. Previous literature

has often relied on fixed effects and control variables to address time-invariant- respectively time-varying factors to mitigate the problem of OVB. However, it is reasonable to assume that not all time-varying factors are accounted for and that there are still problems with endogeneity (Baskaran, 2013; Artés and Jurado, 2015, 2018). More recent studies have thus attempted to address these issues with new methods.

Baskaran (2013) uses an IV-regression as a complement to fixed effects in order to examine if coalition governments have higher public expenditures in German states. The author uses the number of parties in the parliament as an instrument for the coalition dummy (the validity of the instrument is discussed in Section 5.3.3). The results suggest that coalition governments do not on average have higher public expenditures. Artés and Jurado (2015) examine how minority rulings affect fiscal deficits in Spanish municipalities by using matching as a complement to pooled OLS and fixed effects. Minority constellations can also be used to evaluate government fragmentation, since minority rulings need to involve other parties to enforce political proposes (i.e. reach majority decisions). The results from both the OLS-estimation and fixed effects model suggest that there is no effect from a minority rule on the fiscal surplus, although the matching model shows that minority governments have lower surpluses. Artés and Jurado (2018) employ a regression discontinuity design in an attempt to address issues of endogeneity and find that single-party majorities on average run larger surpluses than coalition governments in Spanish municipalities.

The main contribution of this paper is to examine variation between fragmented local governments in Sweden. The recent trend of more parties in local councils and a higher presence of cross-ideological coalitions makes this particularly interesting to examine in a Swedish context. The most influential studies on fiscal outcomes and fragmentation has to a large extent been focused to Norway (Hagen and Vabo, 2005; Borge, 2005; Borge, 1995; Tovmo, 2006), Spain (Bastida, 2013; Artés and Jurado, 2015; Artés and Jurado, 2018) and Belgium (Ashworth et al, 2005; Geys, 2007). To our knowledge, the effect of local government fragmentation on municipal debt in Sweden has not been thoroughly investigated and therefore, this study fills an existing gap in the literature. Furthermore, the results in the previous literature for national- as well as local governments on fiscal outcomes are far from unanimous, where the potential reason could be issues with endogeneity. Therefore, this paper also complements the existing literature, as an extension to the IV-regression developed by Baskaran (2013), by employing an IV-regression with the aim of mitigating previously discussed challenges of endogeneity.

## 5. Data and Methodology

In this section we discuss how we approach our two hypotheses empirically. The first section provides an overview of the two empirical models that are used to assess our hypotheses stated in Section 3.3. In the next section, we introduce the data as well as the variables used in the empirical models. Finally, the section concludes with a discussion of the empirical strategy as well as an introduction to the IV-regression employed as an extension to baseline specification.

### 5.1 Empirical Models

The empirical models are based on the theoretical framework and inspired by previous literature. Two different models are employed to answer the two hypotheses, where both are estimated by means of a dynamic panel data model (Section 5.3 provides an overview of the features for dynamic panel data models). Model (1) assesses the first hypothesis, i.e. that fragmentation in local governments contributes to higher debt levels for Swedish municipalities, and is expressed as follows:

$$\begin{aligned} \ln Debt_{m,t} = & \alpha_0 + \beta_1 Herf_{m,t-1} + \beta_2 Left_{m,t-1} + \beta_3 Right_{m,t-1} + \beta_4 X_{m,t-1} \\ & + \beta_5 \ln Debt_{m,t-1} + \gamma_m + \theta_t + \varepsilon_m \end{aligned} \quad (1)$$

The dependent variable,  $\ln Debt_{m,t}$ , is the logarithm of the long-term debt per capita for municipality  $m$ , in year  $t$ .  $Herf_{m,t-1}$  is the main independent variable and denotes the Herfindahl Index for municipality  $m$ , in year  $t-1$ , which serves as a proxy for government fragmentation (the variable definitions are discussed in Section 5.2 below).  $X_{m,t-1}$  is a vector of control variables containing socioeconomic characteristics as well as a dummy variable indicating if the government has majority rule. Further, we include the dummy variables  $Left_{m,t-1}$  and  $Right_{m,t-1}$  to control for the ideology of the ruling constellations, where cross-ideological constellations serve as the reference category. In order to control for the previous year's level of municipal debt, we include  $\ln Debt_{t-1}$ , which is the logarithm of the lagged long-term municipality debt per capita. Finally,  $\gamma_m$  denotes municipality fixed effects,  $\theta_t$  denotes year fixed effects and  $\varepsilon_m$  represents the error term. To account for heteroscedasticity across municipalities, we use heteroscedasticity-consistent standard errors



clustered at a municipal level throughout the analysis to obtain unbiased standard errors of the estimates.<sup>3</sup>

The Herfindahl Index and the political control variables are all lagged one year, since it is reasonable that policy changes in year  $t-1$  will affect fiscal outcomes in  $t$  (Bäck and Lindvall, 2015). Furthermore, the socioeconomic variables are lagged with one year to account for that potential debt-effects from changes in population, unemployment, and the dependency ratio are not immediate and that budget decisions taken in year  $t-1$  are based on the socioeconomic factors in year  $t-1$ . Hence, these variables, just as the political variables, are lagged.

As discussed in Section 3.3, the prevalence of predetermined coalitions within ideological political blocs could weaken the hypothesized effect of government fragmentation on municipal debt. Thus, to assess our second hypothesis, we extend model (1) by examining whether the effect of fragmentation within cross-ideological coalitions differs in comparison to coalitions within an ideological bloc. The empirical model is formulated as follows:

$$\begin{aligned} \ln Debt_{m,t} = & \alpha_0 + \beta_1 Herf_{m,t-1} + \beta_2 Crossideo_{m,t-1} + \beta_3 Crossideo * Herf_{m,t-1} \\ & + \beta_4 X_{m,t-1} + \beta_5 \ln Debt_{m,t-1} + \gamma_m + \theta_t + \varepsilon_m \end{aligned} \quad (2)$$

The overall outline of the model is preserved although we include a dummy variable,  $Crossideo_{m,t-1}$ , which takes on the value 1 if a municipality is governed by a cross-ideological coalition and 0 otherwise. The dummy variables for left- and right rulings are excluded from the model and instead jointly serve as the reference category. Further, we include an interaction term,  $Crossideo * Herf_{m,t-1}$ , between the cross-ideological dummy variable and the Herfindahl Index to evaluate if the effect of fragmentation on debt differs between cross-ideological rule and the traditional political blocs.

## 5.2 Data and Descriptive Statistics

This section provides an overview of the variables specified in the empirical models above. To assess the effect of local government fragmentation on municipal debt, we use municipality level panel data for 289 of 290 Swedish municipalities between 1998 to 2017, which spans

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<sup>3</sup> A potential concern with the use of panel data is heteroskedasticity across groups of observations, which suggests that the variance is not constant across municipalities and the error terms are not independently and identically distributed (Verbeek 2005, p. 29). As a result, the standard errors can be underestimated, and misleading statistical inferences can potentially be made.

over five municipal elections.<sup>4</sup> All variables are observed on an annual basis, which provides a total of 5712 observations, and the data is made available from Statistics Sweden, Kolada and the Swedish Association of Local Authorities and Regions (SKL).<sup>5,6</sup> Finally, all economic variables are deflated by the Consumer Price Index to 2010 prices. Table 1 provides an overview of the data.

**Table 1.** *Summary Statistics of Swedish Municipalities, 1998 - 2017.*

| Variable                     | Obs.  | Min.       | Max.       | Mean      | Median   | STD       |
|------------------------------|-------|------------|------------|-----------|----------|-----------|
| Debt                         | 5,712 | 0          | 102,704.50 | 13,460.60 | 9675.22  | 13,336.44 |
| <i>Ln Debt</i>               | 5,712 | 0          | 11.54      | 8.51      | 9.18     | 2.41      |
| Herfindahl Index             | 5,712 | 0.16       | 1          | 0.55      | 0.51     | 0.22      |
| Cross-ideological Government | 5,712 | 0          | 1          | 0.20      | 0        | 0.40      |
| Left Government              | 5,712 | 0          | 1          | 0.38      | 0        | 0.49      |
| Right Government             | 5,712 | 0          | 1          | 0.42      | 0        | 0.49      |
| Majority Government          | 5,712 | 0          | 1          | 0.83      | 1        | 0.38      |
| Population                   | 5,712 | 2,421      | 949,761    | 32,080.52 | 15,314   | 63,617.57 |
| <i>Ln Population</i>         | 5,712 | 7.79       | 13.76      | 9.83      | 9.64     | 0.93      |
| Income                       | 5,712 | 175.58     | 397.66     | 249.18    | 246.34   | 30.20     |
| <i>Ln Income</i>             | 5,712 | 5.17       | 5.99       | 5.51      | 5.51     | 0.12      |
| Dependency Ratio             | 5,712 | 0.50       | 1.17       | 0.80      | 0.81     | 0.08      |
| Refugee Reception Cost       | 5,712 | -52.01     | 20,879.43  | 941.14    | 358.75   | 1,555.46  |
| Financial Equalization       | 5,703 | -16,936.36 | 32,273.49  | 9438.251  | 9,076.74 | 5708.42   |
| Unemployment Rate            | 5,712 | 1.06       | 19.51      | 6.09      | 5.80     | 2.44      |

*Note: All economic variables are fixed in 2010 prices and expressed in Swedish Krona (SEK) per capita.*

### 5.2.1 Dependent Variable

We use the natural logarithm of long-term debt for Swedish municipalities as our dependent variable for the empirical analysis. The long-term debt variable captures liabilities with a maturity date later than one year after it has been registered in the public accounts, in contrast to short-term debt which only holds liabilities with maturity shorter than one year (SCB, 2019a). Short-term debt contains to a larger extent items unrelated to political factors, e.g. supplier invoices and accrued holiday pay for employees. In contrast, long-term debt mostly consists of different kinds of loans (SCB, 2019a). We cannot completely rule out unrelated noise in the long-term variable but establish that it should serve better than short-term debt in

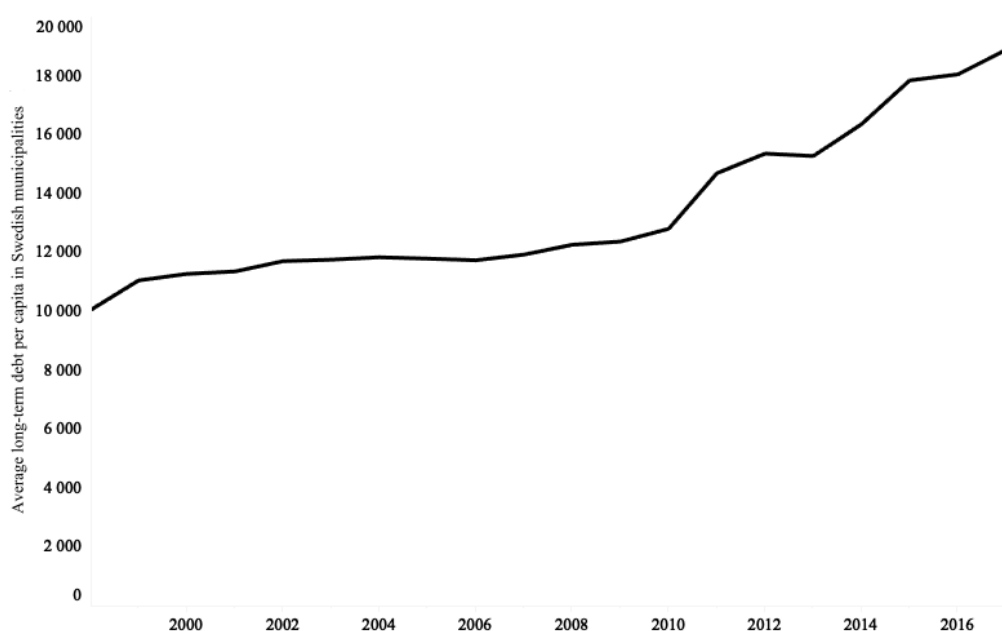
<sup>4</sup> The municipality of Gotland is left out of the data set since the municipality's economic and social responsibilities are extended to the county of Gotland (Region Gotland, 2019), and could therefore bias the results since it has different cost ranges than the rest of the municipalities.

<sup>5</sup> See Appendix Section I for a discussion of data processing.

<sup>6</sup> See Appendix Section II, Table A1 for a detailed overview of data sources and variable definitions.

capturing the potential debt effects related to local government fragmentation. Thus, we argue that long-term debt is a more robust measure of the structural implications of government fragmentation on a municipality’s fiscal performance. For interpretation reasons and to reduce the influence from extreme values, as well as to correct for a right-skewed distribution, we log-transform the long-term debt.<sup>7</sup> Figure 1 displays the average real long-term debt per capita in Swedish municipalities from 1998 to 2017, where we can see an increased rate of debt accumulation after 2010, compared to the period before.

**Figure 1.** *Average long-term debt per capita, 1998-2017.*



*Source: SCB.*

*Note: Values are fixed in 2010 prices and expressed in Swedish Krona (SEK).*

In previous literature, debt outcomes have been measured in different ways. Depending on the econometric strategy, some papers measure both short- and long-term debt (Ashworth et al., 2005; Pettersson-Lidbom, 2001) while others use only long-term debt (Geys, 2007; Bastida et al., 2013). However, in line with our reasoning above, Geys (2007) argues that short-term debt is likely to capture more noise and temporary imbalances.

In the last decade, Swedish municipalities have increasingly unbundled local services to instead be run by municipal enterprises. Today, these companies account for some half of

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<sup>7</sup> Since some municipalities have zero debt and would be omitted in the process of the log-transformation, a constant of one is added to each observation before log-transforming the variable. In total, there are 299 observations with zero debt and these observations can be viewed as outliers (See Appendix Section VI, Table 1A). Therefore, to deal with this in the econometric analysis, a dummy variable is constructed to equal 1 for the 299 observations with zero debt, and equal 0 otherwise.

the investments in municipal services and hold a large share of the external debt (Kommuninvest, 2018). For this reason, it could be argued that a broader dependent variable containing both municipal- and municipal enterprise debt should be used. However, allowing for this broader measure implies a potential threat to the internal validity of the study as there is an increased risk of capturing noise unrelated to political decisions, e.g. poor decisions by a business leader, rather than fiscal consequences of a fragmented ruling constellation. Thus, we restrict the analysis to exclusively measure the long-term municipality debt per capita.

Table 1 shows that the long-term debt for Swedish municipalities ranges from 0 to 102,704 SEK per capita, where the observation with the highest debt per capita is the municipality of Södertälje in 2013.

### 5.2.2 Independent Variables

In order to test the first hypothesis, i.e. that fragmentation in local governments contributes to higher debt levels for Swedish municipalities, we construct a Herfindahl-Hirschman Index (*Herf*) as the main independent variable. This variable indicates the relative strength of a coalition by accounting for not only the number of parties in the coalition but also the size of the parties within the ruling constellation (Ashworth et al., 2005).

The Herfindahl Index is defined as:

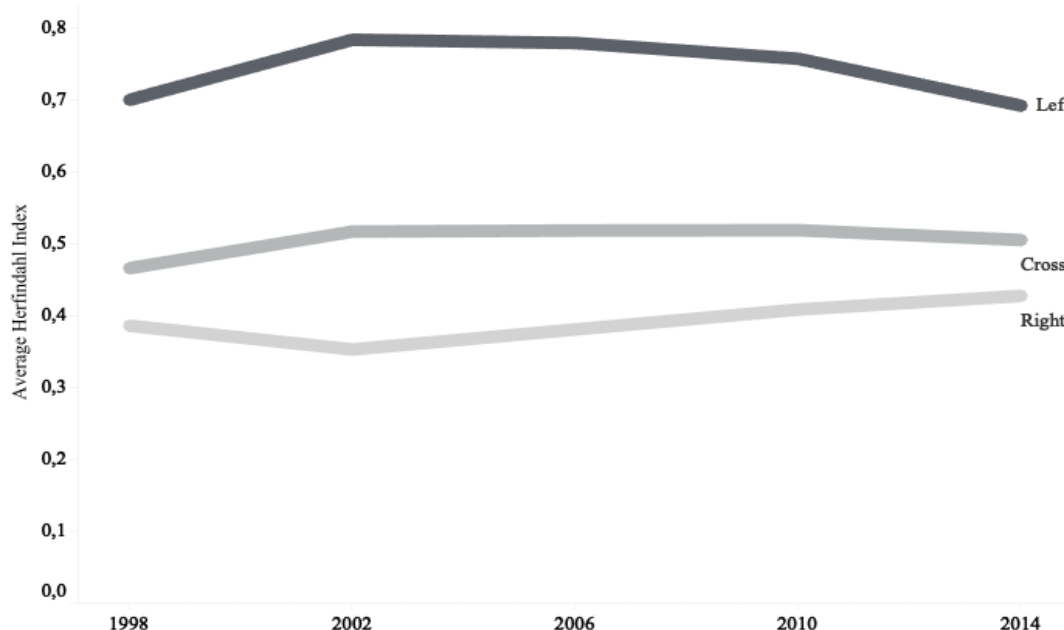
$$Herf = \sum_{i=1}^P SH_i^2 \quad (3)$$

where  $SH_i$  is the share of seats party  $P$  holds in the ruling constellation. The index can take on a value between 0 and 1, where a low value implies that the ruling coalition has many parties with an equal share of mandates and is therefore fragmented. In other words, an increase in the index indicates a less fragmented local government, whereas a decrease indicates a more fragmented local government. If the ruling constellation only consists of one party, the index takes on the value 1. Table 1 shows that the Herfindahl Index ranges from 0.16 to 1, which is a relatively wide range in comparison to previous literature. For example, Borge (2005) obtains a range between 0.14 to 0.55 for Norwegian municipalities during the 1990s, i.e. no single party governments existed in Norway during this time period. In contrast, Swedish municipalities have been under a one-party rule during 169 election terms between 1998 to 2017.

The lowest value, 0.16, corresponds to the municipality of Vingåker between 2002-2006, which was ruled by seven out of eight parties in the local council. The seven-party coalition had in total 19 out of 35 seats, where no party had more than four seats. A coalition such as in Vingåker, with many small parties in a large coalition, generates a low value in the Herfindahl Index and is thus considered to be a fragmented government. According to our hypothesis, this should yield a higher level of debt in the next time period all else equal, and we therefore expect the coefficient to be negative for the Herfindahl Index variable.

Figure 2 shows the average Herfindahl Index for the different ideological constellations. We can see that right-rulings are on average more fragmented than cross-ideological- and left rulings during the time period studied. However, as previously mentioned, predetermined coalitions have been a common element since 2006 and right-rulings can for example seem more fragmented than what is shown in the graph.

**Figure 2.** Average Herfindahl Index for left-, right-, and cross-ideological rulings.



Source: SKL.

Note: The Herfindahl Index can take on a value between 0 and 1, where a low value implies that the ruling coalition is fragmented, and a high value implies a less fragmented local government. The graph shows the average Herfindahl Index after the five elections in our data.

Amongst other approaches in the previous literature is the use of a coalition dummy, which denotes if the local government is run by a coalition or not (Baskaran, 2013). An extension to this can then be to use a dummy variable that reflects the size of the coalitions, which means that a dummy variable is used for a coalition of two parties and a dummy variable for coalitions with three parties and so forth (Edin and Ohlson, 1991). Another approach is to simply use a

continuous variable that shows how the number of parties in the ruling constellation affects fiscal outcomes. However, an issue with these approaches is the lack of information regarding the within-composition of the constellation. Therefore, many studies have used the Herfindahl Index as a measurement for government fragmentation (Borge, 2005; Hagen and Vabo, 2005; Ashworth et al., 2005).<sup>8</sup>

### 5.2.3 Control Variables

The control variables identified for the empirical analysis are classified into three categories: political, demographic, and socioeconomic. In the empirical model, these variables are included in a control vector denoted  $X$ . We control for unobserved time-invariant heterogeneity across municipalities, e.g. cultural and geographical settings, by including municipality fixed effects. Year fixed effects are included to account for potential common time trends in the debt levels amongst municipalities, e.g. national business cycles and general reference rates. Previous literature, such as Ashworth et al. (2005) and Geys (2007), have controlled for the cost of borrowing through the use of a reference rate, i.e. the interest rate for governments bonds which is the same for all local governments. However, time fixed effects should account for such variation over time and therefore, we do not control for the reference rate.

We include the following political control variables to account for heterogeneity between different characteristics in local governments: if the ruling local government has a majority of the seats and the ideology of the ruling constellation. Studies show that having a majority or not can affect the fiscal outcome, where a potential channel can be the inclusion of supporting parties to obtain a majority in the local council (Artés and Jurado, 2015; Edin and Ohlson, 1991). A supporting party can then act as a veto player and give ultimatums in exchange for supporting the minority government. Therefore, not controlling for majority governments could raise questions if the results for our main independent variable, the Herfindahl Index, are attributed to local government fragmentation or if the ruling constellation has a majority or not. We therefore include a dummy variable indicating if the government holds a majority or not, and we expect the sign of the coefficient to be negative, in line with previous literature.

We divide the ruling constellation into three dummy variables; left-, right- and cross-ideological local governments. The ideology of the ruling constellation has commonly been

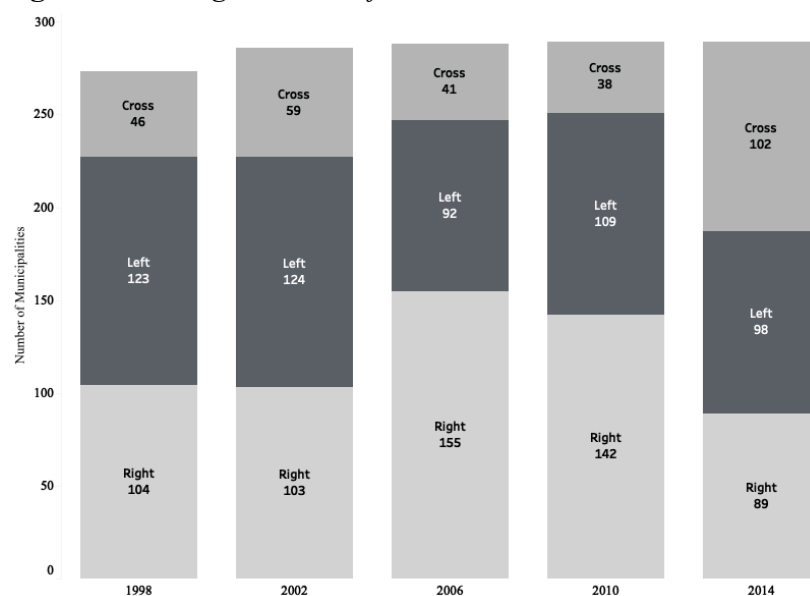
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<sup>8</sup> We evaluate two of these alternative proxies for local government fragmentation in Appendix Section VI, Table 4A, as a robustness check.

used in previous literature as a control variable (Borge, 2005; Hagen and Vabo, 2005; Ashworth et al., 2005; Baskaran, 2013), since it is reasonable that the ability to create a coalition and the debt in the municipality is dependent on the ideology of the parties in the coalition. A right-rule is defined as a local government with one or more right-wing parties in charge and a left-rule is defined as a local government containing one or more left-wing parties in charge.<sup>9</sup> The Green party, as well as local parties, can be a part of either left or right governments. In other words, if the Green party or a local party is a member of a coalition with only right-wing parties, the coalition is defined as a right ruling local government (SKL, 2019b). The Sweden Democrats, which have grown substantially during the studied time period, have not officially taken part in any coalition type and there is therefore no need to define the associated ideology.<sup>10</sup> The third type of constellation, cross-ideological rule, is defined as a local government containing at least one right-wing party and one left-wing party.

Figure 3 provides an overview of the ideological rulings after each municipal election in the dataset. Following the election in 2014, the number of cross-ideological rulings has more than doubled in comparison to after the election in 1998 and the allocation between the rulings has become fairly equal.

**Figure 3.** Local government forms in Sweden between 1998-2017.



Source: SKL.

Note: A few municipalities indicate a change in the constellation between election years. Cross denotes a cross-ideological ruling. The table has been compiled after our data processing (described in more detail in Appendix Section I).

<sup>9</sup> SKL (2019b) defines left-wing parties as the Social Democrats and the Left party. Right-wing parties are defined as the Moderates, the Centre party, the Liberals and the Christian Democrats.

<sup>10</sup> After the election in 2018, which is not included in this study, the Sweden Democrats officially govern in four municipalities (SKL, 2019c).

Municipality-specific socioeconomic and demographic characteristics are included in the analysis in order to control for time-varying heterogeneity between municipalities. Following the global trend, the increasing rate of urbanization in Sweden can lead to more or less favorable demographic composition for the municipalities. Thus, larger populations are likely to lead to a larger demand for public expenditures, and we therefore control for the logarithm of the population size. The variable is log-transformed to curtail the influence of several extreme values. Previous literature, such as Le Maux, Rocaboy and Goodspeed (2010), usually finds that population size has an impact on per capita spending. In a Swedish context, Pettersson-Lidbom (2001) finds that population size has a positive impact on the debt level. Therefore, in line with previous literature, we expect the sign of the population coefficient to be positive.

Since all Swedish municipalities are required to offer the same amount and quality of public services to its inhabitants, the demographic composition and thereby the tax base, is of high importance for the fiscal performance. For this reason, we control for the dependency ratio, defined as the population aged between 0 to 18 and over 65 years divided by the population in working age (19-64).<sup>11</sup> We expect the coefficient of dependency ratio to be positive, since a decreased value should imply lower government expenditures and therefore a potentially lower need to finance expenditures and investments with debt, all else equal. Table 1 shows that the most favorable dependency ratio in our data is 0.50, which is the municipality of Solna in 2008. The highest dependency ratio, 1.17, is attributed to the municipality of Pajala in 2017.

We also control for the average unemployment rate, since it is likely to affect spending on local labor market policies (even though municipalities have a restricted formal responsibility of labor market measures) as well as negatively affect municipal revenue by the loss of income taxes (Bastida et al., 2013; SKL, 2011). Municipalities with a high unemployment rate can therefore be in greater need of loan financing as a way of funding expenditures, and we therefore expect the coefficient for unemployment to be positive.

In line with Pettersson-Lidbom, (2001), Bastida et al., (2013) and Ashworth et al., (2005), we control for the municipal median income (expressed in thousand SEK). On average, income taxes account for about 70% of municipal revenue (SKL, 2019a) and is therefore related to the fiscal capacity of a municipality and the sustainable level of how much debt a

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<sup>11</sup> The population between age 0 to 18 is associated with a net cost, as well as the population after the retirement age of 65 years (Wikstrand, 2015).



municipality can carry. If public goods are assumed to be normal goods, income should have a positive relationship with the demand of public goods, i.e. higher income should lead to higher demand of public goods, which might be at least partly financed by debt (Ashworth et al., 2005; Geys, 2007; Borge, 1995, 2005). On the other hand, higher median income levels could imply higher municipal revenue and lead to a lower need for loan financing. The expected sign of the coefficient is therefore ambiguous. Table 1 shows that the median income per capita ranges between 175,582 SEK in the poorest municipality (Borgholm in 1998) to 397.661 SEK in the richest (Danderyd in 2017).

We include the cost of refugee reception to control for heterogeneity amongst municipalities in the number of refugees received. The variable is defined as the gross cost of refugee reception minus internal income e.g. sales of reception rights and state grants.<sup>12</sup> For this reason, some municipalities have negative values (as can be seen in Table 1). Higher refugee reception costs could lead to higher aggregated costs which therefore might lead to an increased need for municipalities to finance expenditures with debt. Hence, we expect the sign of sign of the coefficient to be positive.

Finally, even though we to a large extent control for variables from which the local government financial equalization system is based on, we include this variable in our econometric analysis. As mentioned in Section 2, equalization payments constitute an important income for several municipalities whereas a few municipalities are net payers to the system. Municipalities that pay or withhold large amounts from the equalization system might be more or less inclined to form different kinds of coalitions in order to deal with the financial and socioeconomic circumstances. It is also possible that municipalities could act less fiscally responsible if they receive large equalization payments compared to municipalities that are net payers to the system. For these reasons, to reduce the risk of omitted variable bias, we control for financial equalization payments. The expected sign of the coefficient is ambiguous since it is difficult to predict what effect the financial equalization has on long-term municipal debt when controlling for socioeconomic and demographic characteristics.

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<sup>12</sup> Swedish municipalities have during the time period studied been able to pay other municipalities to accept assigned refugees for a payment (Bergmansson, 2014).

## 5.3 Empirical Strategy

This section provides an overview of the empirical strategy used to evaluate how government fragmentation affects municipal debt in Sweden. Furthermore, we address and discuss potential challenges with the empirical analysis.

### 5.3.1 Dynamic Panel Data Model

As previously mentioned, the empirical models used in this analysis are estimated by means of dynamic panel data models. The difference between regular panel data and dynamic panel data models (also referred to as autoregressive panel data models) is that the latter includes a lagged dependent variable as an independent variable. In terms of political economy and debt, it is a common approach to use dynamic panel data models since it is reasonable that the level of debt in the previous year affects the debt in the present year, as well as correlates with the formation of a specific type of government (Pettersson-Lidbom, 2001; Bäck and Lindvall, 2015; Bastida et al., 2013). A dynamic panel data approach can therefore mitigate the problem of omitted variable bias and generate more trustworthy statistical inferences.

However, the usage of dynamic panel data has been a subject of discussion, at least in terms of using it together with fixed effects. Nickell (1981) shows formally how combining dynamic panel data and fixed effects results in biased estimates when  $N$  is infinite, and  $T$  is fixed (Nickell, 1981; Verbeek 2005, p. 361).<sup>13</sup> A general agreement however is that the bias can be expressed as  $1/T$ , which means that the size of the Nickell bias decreases with the number of time periods (Nickell, 1981; Verbeek 2005, p. 361; Beck and Katz, 2011). Beck and Katz (2011) suggest that if  $T$  is equal or higher than 20, the bias is small and there should not be an issue in using a dynamic panel data model. The dataset used in this analysis runs from 1998 to 2017 and covers 20 years exactly. We therefore formulate a dynamic panel data model by including a lagged dependent variable,  $Debt_{t-1}$ , in the model in an attempt to mitigate potential problems with omitted bias variables.

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<sup>13</sup> The bias arises due to a correlation between the within transformation of the lagged dependent variable and the within-transformation of the error term. Fixed effects are estimated by subtracting the individual time averages (within transformation) from each of the variables. The individual time average of the dependent variable contains the dependent variable in year  $T$ . The dependent variable in year  $T$  is partly generated by the lagged dependent variable in year  $T-1$ , which is determined by the error term in  $T-1$ . The individual time average of the error term contains the error term in  $T-1$  and hence, the within-transformation of the lagged dependent variable is correlated to the within transformation of the error term.

### 5.3.2 Omitted Variables and Reversed Causality

Two potential issues in the econometric analysis that need to be addressed are omitted variable bias and reverse causality. Omitted variable bias arises if a variable that is correlated with the independent variable and a determinant of the dependent variable is not included in the model (Verbeek 2005, p. 344). An example in terms of this empirical analysis would be to omit the demographic variables introduced in Section 5.2.3. Demographic variables, e.g. dependency ratio and population size, are most likely correlated to election outcomes due to different preferences for political parties and could potentially also be determinants of the debt level. If these variables would be omitted from the empirical model, the estimates of the included variables could be biased and the results would not be reliable. Therefore, to reduce the potential problem of omitted variable bias, two actions are undertaken.

First, as previously discussed, we include a range of political, demographic and socioeconomic control variables that potentially are correlated with our main independent variable and a determinant of the dependent variable. Second, we estimate the regressions with municipality- and year fixed effects, where municipality fixed effects controls for time-invariant and unobserved heterogeneity across the municipalities and year fixed effects accounts for potential time trends for the debt levels amongst municipalities.<sup>14</sup>

Another potential issue is reverse causality (simultaneity), which means that the dependent variable in a model is a determinant of the independent variable (Verbeek 2005, p. 129). In the context of our research question, reverse causality means that the level of debt in a municipality may influence the extent to which fragmented governments are created. This scenario could be reasonable since the financial situation in a municipality could be an important electoral matter and affect the election outcomes. As a result, the estimators could be biased and inconsistent.

Some important features need to be considered in the context of reverse causality in this study. First, the main political independent variables used in this empirical analysis only change through elections every fourth year and are in general fixed between the election years. The level of debt in a municipality can therefore not influence the parameters for the independent variables between election years. The only time reverse causality can potentially be present is therefore in election years when a new local government is elected. However, voters can only observe the level of debt the year prior to the election, and, as already stated, our dynamic panel

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<sup>14</sup>A Durbin-Wu-Hausman-test is performed to evaluate if fixed or random effects should be used. The results from the test can be found in Appendix Section IV.

data models control for the debt level in the previous year. Borge (2005), who employs a similar approach, concludes that reverse causality should therefore not be considered an issue in this kind of models.

### 5.3.3 Instrumental Variable Regression

Despite the use of control variables and fixed effects, it is still possible that there are issues with omitted variable bias. A fragmented coalition is not randomly assigned to a local government, and it is reasonable to believe that the coalition formation could be determined by other variables that are not included in the model, e.g. local specific changes not possible to include as control variables. Therefore, an instrumental variable (IV) regression using Two-stage Least Squares (2SLS) is estimated for the Herfindahl Index to evaluate the robustness of the baseline specification.

An IV-regression is commonly used to mitigate issues with endogeneity by isolating the part of the variation in the independent variable not correlated with the error term (Verbeek 2005, 133). However, identifying instruments that meet the two requirements of relevance and exogeneity is difficult. An adequate instrument needs to be correlated with the endogenous independent variable (relevant) and, conditioned on the covariates, uncorrelated to the error term (exogenous). In other words, the instrument variable should only influence the dependent variable through the endogenous independent variable. The former can be tested by regressing the instrument against the endogenous independent variable, i.e. a reduced form regression, and then perform a F-test. If the value of the F-statistic is above 10, the instrument is considered to be relevant and not weak. The second requirement, exogeneity, is not directly testable since the error term is not observable. However, if the number of instruments exceeds the number of endogenous independent variables (overidentified), we can partly test if some of the instruments are correlated to the error term by performing an overidentifying restriction test, assuming that at least one of the instruments are exogenous (Verbeek 2005, 134).

The instrument that we use is the number of parties in the local council. The instrument has previously been used by Baskaran (2013), who uses the number of parties in the local parliament in Germany to instrument for a coalition dummy variable. Baskaran (2013) argues that the more parties in parliament, the greater is the probability that a coalition will form since more parties are required in the ruling constellation to obtain a majority. In terms of the Herfindahl Index in our empirical analysis, the same reasoning can be applied and extended. More parties in the local council implies that more parties need to share the seats available in

the council and there is therefore a greater chance for a fragmented coalition to be created. The results from the reduced form regression generates a F-statistic of 52.44 (See Table 3A in Appendix Section V), and we therefore consider the instrument to be relevant.

In terms of exogeneity, Baskaran (2013) suggests that there is no reason to believe that the number of parties in the local parliament should have a direct impact on fiscal outcomes, other than through the channel of the creation of a larger and more fragmented coalition. Opposition parties that are not part of the ruling constellation or support a minority ruling do not influence the fiscal policies of the municipality and hence the possible accumulation of debt. A potential threat to the validity of the instrument could be if municipalities with higher debt also have many parties in the local councils. An example could be if parties manage to enter the local council by addressing concerns of high debt levels. However, two features need to be considered here. First, for this to be a problem, it would mean that parties entering the local council must share the same political agenda of addressing debt, which we consider to be unlikely. Second, our dynamic panel data model always controls for the debt in the previous year, and therefore, in that regard, it is possible to consider the instrument exogenous conditioned on the included control variables. Nonetheless, a further discussion of potential threats to the instrument validity is included in Section 7.

As previously mentioned, instrument validity can be partly tested if the number of instruments exceed the number of endogenous independent variables. In the Appendix Section V, we experiment with a second instrument; the number of seats in the local council, in order to conduct an overidentifying restriction test. The overidentifying restriction test generates a p-value of 0.31, which indicates that we cannot reject the null hypothesis that the instrument is exogenous. However, fully assuming that both instruments are exogenous is not reasonable due to the limitations of an overidentifying restrictions test. Failing to reject the null hypothesis does not guarantee that the instruments are exogenous, and we are therefore careful to draw any inferences in terms of the validity of the instrument and causality.

## 6. Results and Analysis

### 6.1 Fragmented Local Governments and Debt

This section presents the results from the estimation of Model (1), in which we evaluate the first hypothesis that local government fragmentation results in higher debt levels for Swedish municipalities. Table 2 shows the results from the dynamic panel data model and the IV-regressions for Model (1), where the baseline specification in Column (1) and the IV-regression in Column (4) are used for interpretation. In Section 6.2, we present the results from Model (2) in which we evaluate the second hypothesis that the effect of local government fragmentation on municipal debt is larger for cross-ideological coalitions than left- or right rulings.

Table 2 and Column (1) shows that the baseline specification suggests no statistically significant effect of local government fragmentation, which means that we cannot reject the null hypothesis that local government fragmentation does not have an effect on municipal debt. Column (2) and (3) are included to evaluate the robustness of the baseline specification, and the results show that the estimate is not statistically significant in any of the three specifications. Thus, the results should remain without further interpretation. The results are in line with Rattsø and Tovmo (2002) and Tovmo (2006), which neither find any statistically significant results for government fragmentation on fiscal outcomes using a Herfindahl Index as proxy for government fragmentation.

Two possible reasons for the non-statistically significant results from Model (1) can be, as previously discussed, issues with endogeneity and the predetermined coalitions that have been a common element in Swedish politics in the last three election terms. We attempt to address concerns of endogeneity in Column (4), where the baseline specification from Column (1) is estimated using Two Stage Least squares, by instrumenting the number of parties in the local council on the Herfindahl Index.

Column (4) shows that the coefficient on the Herfindahl Index comes out negative and statistically significant at the 5% level, and the results are robust to the exclusion of control variables in Column (5). This is in line with previous literature regarding fragmentation and fiscal outcomes such as Borge (1995, 2005) and Hagen and Vabo (2005), but contradicts the findings of Baskaran (2013) from whom we got the inspiration for the instrumental variable.

**Table 2.** *The effect of local government fragmentation on long-term municipal debt, 1998-2017.*

| VARIABLES                  | (1)<br>DPD          | (2)<br>DPD        | (3)<br>DPD         | (4)<br>IV           | (5)<br>IV          |
|----------------------------|---------------------|-------------------|--------------------|---------------------|--------------------|
| Herfindahl Index           | 0.19<br>(0.14)      | 0.17<br>(0.10)    | -0.03<br>(0.08)    | -1.73**<br>(0.79)   | -2.03***<br>(0.63) |
| Right Government           | -0.06<br>(0.06)     |                   | -0.10***<br>(0.03) | -0.31***<br>(0.11)  |                    |
| Left Government            | -0.08<br>(0.06)     |                   | -0.03<br>(0.04)    | 0.25*<br>(0.14)     |                    |
| Majority Government        | -0.08*<br>(0.04)    |                   | -0.08**<br>(0.03)  | -0.30***<br>(0.10)  |                    |
| Dependency Ratio           | -0.22<br>(0.76)     |                   | 0.21<br>(0.26)     | -0.54<br>(0.42)     |                    |
| Unemployment Rate          | 0.02**<br>(0.01)    |                   | 0.02***<br>(0.01)  | -0.00<br>(0.01)     |                    |
| Refugee Reception Cost     | -0.00<br>(0.00)     |                   | -0.00**<br>(0.00)  | 0.00<br>(0.00)      |                    |
| Ln Population              | 2.80***<br>(0.53)   |                   | -0.04**<br>(0.02)  | 3.08***<br>(0.31)   |                    |
| Ln Income                  | 1.20***<br>(0.28)   |                   | 0.94***<br>(0.11)  | 1.14<br>(0.73)      |                    |
| Financial Equalization     | -0.00<br>(0.00)     |                   | 0.00<br>(0.00)     | -0.00<br>(0.00)     |                    |
| Ln Debt Previous Year      | 0.37***<br>(0.03)   | 0.39***<br>(0.03) | 0.59***<br>(0.02)  | 0.37***<br>(0.02)   | 0.38***<br>(0.02)  |
| Constant                   | -28.36***<br>(5.10) | 5.38***<br>(0.26) | -1.19*<br>(0.63)   | -31.01***<br>(4.97) | 6.65***<br>(0.42)  |
| Observations               | 5,411               | 5,419             | 5,411              | 5,411               | 5,419              |
| R-squared                  | 0.82                | 0.81              | 0.88               | 0.91                | 0.90               |
| Adjusted R-squared         | 0.82                | 0.81              | 0.88               | 0.91                | 0.90               |
| Municipality Fixed Effects | YES                 | YES               | NO                 | YES                 | YES                |
| Year Fixed Effects         | YES                 | YES               | NO                 | YES                 | YES                |
| First Stage F-statistic    |                     |                   |                    | 52.44               | 57.30              |

*Robust standard errors clustered at municipalities in parentheses.*

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

*Note: DPD denotes Dynamic Panel Data models and IV denotes Instrumental Variable models. Time subscripts are not reported since all variables are lagged with one year. We control for observations with zero debt in all specifications, as discussed in Section 5.2.1. Column (4) and (5) report the second stage results for the number of parties in parliament as an instrument for the Herfindahl Index. The dependent variable is the natural logarithm of long-term debt per capita.*

The magnitude of the coefficient implies that a municipality at the mean level of the Herfindahl Index with a one standard deviation decrease (i.e. moving to a more fragmented local government with 0.22) would give an average increase of 18.1% in the long-term debt.<sup>15</sup> The result suggests that a lower value on the Herfindahl Index, i.e. a more fragmented local government, on average experiences higher long-term municipal debt compared to less fragmented local governments. Thus, in contrast to the baseline specification, the results from the IV-regression are in line with the theoretical predictions and the first hypothesis. However, the magnitude of the coefficient indicates a much larger effect from government fragmentation on debt than we expected. Baskaran (2013) experienced a similar change in magnitude when employing the same instrument for a coalition dummy, where the effect of coalition governments on public expenditures increases substantially in the IV-regression. Nonetheless, provided that the instrument is valid, and that the IV estimation gives us more consistent estimates, we note that accounting for endogeneity changes the interpretation of the coefficient as well as indicating a large effect from government fragmentation.

While this is not in the main scope of this paper, we can note that with respect to the control variables, the baseline results in Table 2 are largely in line with our expectations. Population size and the median income are both statistically significant and positive. The results are in line with previous literature (Ashworth et al., 2005; Pettersson-Lidbom, 2001), and the positive median income indicates that public goods are a normal good. Furthermore, the unemployment rate is statistically significant and has, as expected, a positive average effect on the dependent variable.

For the political control variables, we can see that the ideological dummy variables, Left- and Right Government, are statistically significant on a 1% respectively 10% significance level only in the IV-regression in Column (4). The results indicate that right-wing rulings on average generate lower debt levels while the impact of left-wing rulings have an opposite impact. However, the results cannot be considered robust. The result for the dummy variable that denotes if the municipality has a majority or not is negative and statistically significant, and therefore goes in line with the findings of Artés and Jurado (2015) and Edin and Ohlson (1991). The estimate is robust to all specifications, which indicates that rulings with a majority experiences on average lower levels of debts, all else equal.

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<sup>15</sup> The interpretation from a log-level regression is as follows:  $\% \Delta y = 100 * (e^{\beta_1} - 1)$ . See e.g. Ford (2018) for an explanation.



## 6.2 Cross-ideological Coalitions and Debt

A second reason for the non-statistically significant results in the baseline specification in Column (1) could be the prevalence of predetermined coalitions in Sweden. In the last decade, both left- and right-wing parties have formed ideologically predetermined constellations which could distort the theoretical channels through which local government fragmentation could lead to higher municipal debt. Table 3 and Column (1) shows the results from Model (2), where we examine the second hypothesis that the effect of local government fragmentation is larger for cross-ideological coalitions, by including an interaction term between the Herfindahl Index and the cross-ideological dummy variable. The control variables are in general in line with Model (1) and for the sake of brevity, we do not include these results in Table 3.

The interaction term is negative and statistically significant on the 5% significance level in the baseline specification, which indicates that the effect of government fragmentation on long-term municipal debt differs for cross-ideological rulings, in comparison to left- and right rulings. The total effect of government fragmentation, if there is a cross-ideological ruling coalition in place, is -0.31, and the direction of the sign is in line with the results from the IV-regression in Table 1.<sup>16</sup> This implies that a one standard deviation decrease, of 0.13 in the Herfindahl Index for cross-ideological coalitions, would give an average increase of 3.5% in the long-term municipal debt. In other words, cross-ideological coalitions with a lower value on the Herfindahl Index, i.e. a more fragmented local government, on average experience higher long-term municipal debt than less fragmented cross-ideological coalitions.

Column (2) and (3) show that the interaction term is not statistically significant when estimating a pooled OLS respectively with fixed effects and no control variables included. Hence, the results are contingent on controlling for political-, demographic- and socioeconomic control variables as well as municipality- and year fixed effects. For left and right blocs together, the coefficient for the Herfindahl Index is positive and statistically significant from zero on a 5% level. However, the results for the Herfindahl Index could be attributed to ideological differences, since we do not control for left- or right rulings which together constitute the reference group to the dummy variable for cross-ideological coalitions.

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<sup>16</sup> The total effect of local government fragmentation for cross-ideological coalitions is calculated as:  $0.23 + (-0.54 * 1) = -0.31$

**Table 3.** *The effect of cross-ideological government fragmentation on long-term municipal debt, 1998-2017.*

| VARIABLES                                       | (1)<br>DPD          | (2)<br>DPD        | (3)<br>DPD        |
|---|---------------------|-------------------|-------------------|
| Herfindahl Index                                | 0.23**<br>(0.11)    | 0.22*<br>(0.11)   | 0.06<br>(0.05)    |
| Cross-ideological Government                    | 0.34**<br>(0.14)    | 0.28**<br>(0.14)  | 0.00<br>(0.08)    |
| Herfindahl Index * Cross-ideological Government | -0.54**<br>(0.25)   | -0.32<br>(0.25)   | 0.13<br>(0.15)    |
| Ln Debt Previous Year                           | 0.37***<br>(0.03)   | 0.39***<br>(0.03) | 0.59***<br>(0.02) |
| Constant  | -28.74***<br>(5.15) | 5.34***<br>(0.26) | -1.15*<br>(0.63)  |
| Observations                                    | 5,411               | 5,419             | 5,411             |
| R-squared                                       | 0.82                | 0.81              | 0.88              |
| Adjusted R-squared                              | 0.82                | 0.81              | 0.88              |
| Control Variables                               | YES                 | NO                | YES               |
| Municipality Fixed Effects                      | YES                 | YES               | NO                |
| Year Fixed Effects                              | YES                 | YES               | NO                |

*Robust standard errors clustered at municipalities in parentheses*

*\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$*

*Note: DPD denotes Dynamic Panel Data Models. Time subscripts are not reported since all variables are lagged with one year. We control for observations with zero debt in all specifications, as discussed in section 5.2.1. The dependent variable is the natural logarithm of long-term debt per capita.*

Finally, while Model (2) possibly still suffers from some of the same issues of endogeneity<sup>17</sup> as the baseline specification in Model (1), the result from the second specification suggests that in the Swedish context, where there are relatively well-defined ideological political blocs, the hypothesized effect of local government fragmentation on municipal debt seems to be relevant primarily for cross-ideological coalitions.

<sup>17</sup> An important remark is that we cannot perform a similar test of endogeneity by the means of an IV-specification as for model (1), due to the inability to construct a relevant and valid instrument for the rainbow variable as well as the interaction term.

## 6.2 Robustness- and Sensitivity Checks

### 6.2.1 Alternative Proxies for Government Fragmentation

As previously discussed in Section 5.2.2, earlier literature has employed other proxies than a Herfindahl Index to evaluate how government fragmentation affects fiscal outcomes. Baskaran (2013) uses a dummy variable indicating if the ruling government is a coalition or not to investigate the effect of fragmentation on public expenditures. Ashworth et al. (2005) instead uses the number of parties in the ruling government as a complement to the Herfindahl Index to evaluate the effect of local government fragmentation on debt in Flemish Municipalities.

As a first robustness check, we replicate the IV-regression from Table 2 and Column (4) although we change the main independent variable from the Herfindahl Index to a dummy variable that takes on the value of 1 if there is a coalition, and 0 if otherwise. Furthermore, we change the independent variable to the number of parties in the ruling constellation in the second specification. In this way we can evaluate if the results are robust to alternative proxies for government fragmentation.

An advantage with these two variables is that we can use the same instrument as in the IV-regression in Model (1); the number of parties in the parliament. Baskaran (2013) uses the instrument for a coalition dummy, while the number of parties in the ruling parliament essentially is the same variable as the Herfindahl Index, although it contains no information on the within-construction of the coalition. Therefore, the arguments regarding the validity of the instrument in Section 5.3.3 can be applied here as well.

Table 4A in the Appendix Section VI shows that both variables are positive and statistically significant on the 5% significance level. In other words, coalition governments on average experience higher debt than single party governments and the more parties there are in the ruling constellation - the higher debt, all else equal. The results are in line with our first hypothesis and the findings from the IV-estimation using the Herfindahl Index, and we therefore argue that our results are robust to different proxies for government fragmentation.

We also test the robustness of Model (2) by interacting the number of parties in the ruling local government, instead of the Herfindahl Index, with the cross-ideological dummy. Column (3) in Table 4A shows that the interaction term is not statistically significant and therefore not robust to a more general proxy of government fragmentation. Thus, Model (2) is only statistically significant when employing the Herfindahl Index which takes the relative weight of the coalition parties into consideration.

## 6.2.2 Geographical Heterogeneity

To further evaluate the robustness of the results, we explore if geographical heterogeneity is present in the sample. We divide our data into three subsamples: urban-, semi-urban- and rural-municipalities, from SKL's official classification of municipalities.<sup>18</sup> Table 5A in Appendix Section VI shows the results from the IV-estimation of Model (1) as well as from Model (2).

For the IV-regression from Model (1), we can see that the results for government fragmentation are mainly driven by urban municipalities. For urban municipalities, the Herfindahl Index is negative and statistically significant from zero at the 10% significance level. However, we are cautious when interpreting the results due to smaller and diverging sample sizes. Furthermore, the test suggests that the results for cross-ideological coalitions may be driven by semi-urban municipalities, but then again, this could be a result of the larger sample size compared to the other geographical categories.

## 6.2.3 Outliers

As discussed in Section 5.2.1 we include a dummy variable equaling 1 for a total of 299 observations with zero debt to control for the effect from these extreme values.<sup>19</sup> Table 6A in Appendix Section VI provides the results of the IV-regression from model (1) as well as from model (2), when excluding the dummy variable for zero-debt observations and from when excluding these outliers from the regression altogether.

The results from Model (2) are robust to both the exclusion of the dummy variable as well as the exclusion of the outliers. For Model (1) and the IV-regression, the coefficient is not statistically significant when removing the control variable. However, when excluding the outliers, we find that the coefficient of the Herfindahl Index is negative and statistically significant on the 10%-level. Thus, the estimate is robust to the exclusion of outliers. Finally, it is also worth noting that the R-squared decreases substantially for model (2) when we exclude the outliers from the regression, which could suggest that the outliers have an impact on the overall fit of the model.

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<sup>18</sup> We exclude low-commuting municipalities close to larger cities from the robustness check, since the definition does not say anything about if the municipality is rural or urban.

<sup>19</sup> Section III in the Appendix shows that the distribution of the variable is right-skewed due to the outliers.

## 7. Discussion

Does local government fragmentation affect municipal debt in Sweden? Our baseline results suggest that there is no such effect from government fragmentation, which contradicts our expectation and the first hypothesis. However, when we instrument the Herfindahl Index with the number of seats in the local council in an attempt to address endogeneity in Model (1), we find evidence that fragmentation in local governments results in higher debt levels for Swedish municipalities, although the magnitude is larger than expected. The results are robust to different proxies for government fragmentation.

The sign of the coefficient from our IV-regression is in line with our first hypothesis as well as Borge (1995; 2005) and Hagen and Vabo (2005), which all find that government fragmentation affects fiscal outcomes. In terms of debt, Ashworth et al. (2005) find that fragmentation only matters for short-term debt and that there is no effect from fragmentation on long-term debt for Flemish municipalities, which contradicts the results from our IV-regression. The potential channels of the relationship between fragmentation and debt could be that fragmented local governments contain one or more veto players, which might delay or block necessary fiscal adjustments to mitigate increasing debt levels. Another potential channel could be the common pool problem, which suggests that all parties can engage in excessive spending since the cost of overspending is shared by all parties, assuming that the excessive spending is financed by loans.

Another reason for the failure to reject the null hypothesis in the baseline specification could be the prevalence of ideological predetermined coalitions in Sweden, which means that many collaborating parties could act as a single veto player. To explore this possibility, we construct a second model where we include a dummy variable for cross-ideological coalitions and incorporate an interaction term between the dummy variable and the Herfindahl Index. Here, we find evidence that the theorized effect of government fragmentation on municipal debt is relevant mainly for cross-ideological coalitions, in line with our second hypothesis.

We believe that both the IV-regression and Model (2) provide plausible explanations to why the baseline specification contradicts the first hypothesis, and the findings from both models point in the same direction; fragmented local governments in Sweden on average experience higher debt levels. Furthermore, in both models, the estimated coefficient of local government fragmentation on municipal debt is relatively large.

The major difference between the findings is that Model (2) suggests that the hypothesized effect from fragmentation only exists for cross-ideological coalitions, while for

traditional left- and right-rulings together the suggested effect is the opposite, i.e. that less fragmentation increases the municipal debt. However, since we do not control for ideological differences in Model (2), the results could be attributed to ideological differences between the political blocs and are therefore difficult to interpret. As shown in Figure 2 (Section 5.2.2) right-rulings are on average more fragmented than left-rulings, and Table 1 provides an indication that right-rulings on average experience higher debt levels. Thus, the results for the Herfindahl Index in Model (2) can be biased due to ideological differences.

Intuitively, the results from Model (2) makes sense in terms of the ideological blocs that have been present in Sweden the last decade. Pre-election determined coalitions could reduce the potential effect of fragmentation by offsetting the theoretical channels through which local government fragmentation could lead to higher municipal debt. For pre-determined coalitions, the risk of conflict concerning the policy- and budget process is arguably smaller since it is reasonable that most of the political agreements have already been made. In contrast, ideological differences within coalitions are, according to the veto player model, an important determinant into which extent parties take advantage of their veto power. Hence, cross-ideological rulings could to a larger extent experience a higher risk of political conflict and situations in which veto players use their veto to enforce excessive spending. This reasoning is also in line with Bäck and Lindvall (2015), which suggest that the effect of fragmentation on debt rather lies within the ability for a coalition to cooperate. In the context of this paper, predetermined coalitions could in general have a greater ability to cooperate and therefore not experience the same issues as fragmented cross-ideological rulings.

In terms of policy implications, we suggest that local policy-makers should be aware of the veto player model and common pool problem prior to forming a coalition. In other words, policy-makers in fragmented local governments, especially cross-ideological constellations, should keep in mind that negotiations and ultimatums face a greater risk of excessive spending and debt accumulation. Furthermore, if there is an unstable status quo, e.g. an accelerating debt level, policy-makers in a fragmented government should consider putting their different interest groups aside and not exercise their veto to block fiscal adjustments.

The results are particularly interesting for policy-makers following the trend of an increasing number of cross-ideological local government coalitions in Sweden. The election in 2018 (which is not included in this study) resulted in a new record level of 114 cross-ideological local government coalitions, an increase of 14% from the previous election in 2014 (SKL, 2019c). Thus, the results from this study together with the increasing presence of cross-

ideological coalitions in Swedish municipalities highlights the importance for future research to continue studying the fiscal effects of these local government constellations.

In terms of external validity, an interesting discussion is to which extent the results are applicable to policy-makers and political parties on a national level in Sweden. After all, Swedish politics is relatively similar at the local- and national level; the parties and predetermined coalitions in the local councils are in general also present on the national level (apart from local parties). However, national and local governments differ in their responsibilities, and it could be the case that the attitude towards loan financing differs on the national level since recent governments might have been more inclined to pay off debt rather than taking new loans. In recent years, the nominal public-sector gross debt has decreased while municipal debt has increased (The Swedish Fiscal Policy Council, 2019). Furthermore, the national governments in Sweden could also be more exposed to interest from media and the population, which could lead to a constraint when it comes to the extent to which parties can take advantage of their role as a veto player in a coalition.

An interesting discussion, in terms of external validity, is also whether the results are applicable on the local level in other countries with similar characteristics as Sweden. Our results suggest that the political landscape (i.e. predetermined coalitions) seems to have an effect on the relationship between local government fragmentation and municipal debt in Sweden. We believe that most countries are unique in this respect and should be approached accordingly. Our results, which we argue are relevant at least in the context of Swedish politics, show that identifying and adapting the methodology to the political landscape in the studied country is of high importance and could, in addition to endogeneity, explain the mixed results in the existing literature. We are therefore careful to make any claims regarding the applicability of the results on a national level as well as to other countries and instead, we encourage future studies on the area to investigate the external validity further.

Regarding the internal validity, there are some limitations that need to be considered in terms of the empirical analysis. The results from the IV-regression are large in magnitude and are very much dependent on the validity of the instrument, and we are therefore careful to make any claims regarding the validity, and endogeneity can still be present. One potential reason for the large magnitude could be that the IV-regression estimates the effect of government fragmentation for those municipalities which have experienced changes in the number of parties. It could be reasonable that these municipalities are to a larger extent forced to create more fragmented governments due to additional parties in the local council and could therefore

experience greater issues with ultimatums and veto players. As a result, the effect of government fragmentation on debt in the IV-regression could be large.

Another potential reason for the possibly overestimated effect of local government fragmentation on long-term debt could be that the instrument does not meet the condition of exogeneity and that the estimate is biased to some extent. We have already established that the instrument is not considered to be weak in Section 5.3, although since exogeneity is not directly testable, it is not possible to rule out endogeneity in the instrument. A possible concern in terms of instrument exogeneity could be if coalitions with many parties in the council experience additional competition from the opposition parties and identify a greater risk of losing their power in the next election. Ruling constellations in municipalities with many parties in the council could therefore be more likely to engage in excessive spending to increase the probability of staying in power. Hence, the number of parties in the local council could have an influence on debt through another channel than the formation of fragmented local governments. Another possible channel could be if many parties in the local councils also result in more fragmented oppositions, which could perhaps limit their abilities to block excessive spending from the ruling constellation. Thus, more parties in the local council could lead to more fragmented oppositions and higher debt. Taken together, there is reason to believe that there still exist possible challenges to the internal validity of the results, and we accordingly suggest that additional instruments for government fragmentation should be tested in future research to further evaluate the robustness of the instrument.

For Model (2), it is reasonable to assume that there are remaining issues of endogeneity just as in the baseline specification, which we have not been able to fully account for in this model. Thus, the effect of government fragmentation for cross-ideological rulings in Swedish municipalities should further be studied in future research, where additional methods to address remaining issues of endogeneity should be of interest. Another potential limitation in this study concerns the many different ways to measure municipal debt. Our measure of long-term debt serves as, to our knowledge, the most suitable proxy for local public debt. We however invite future research to study the effect on alternative measures of debt as well.

Finally, an important remark is that increased debt levels do not necessarily have to be considered a problem. Municipalities in Sweden need to invest in order to meet the demand for public goods as well as staying competitive towards other municipalities, and loans can be an important tool to finance these investments if self-financing is not an option. This paper examines the effect on debt to problematize the substantial increase in Swedish municipal debt in the last 20 years. However, for future research, more direct fiscal outcomes can also be of



interest to study in the context of Sweden, e.g. public expenditures or municipality deficits, to further evaluate the relationship between government fragmentation and fiscal outcomes.

## 8. Conclusion

This paper aims to examine the effect of local government fragmentation on long-term debt for Swedish municipalities. The literature on fiscal consequences from local government fragmentation has yet to reach a consensus, and the intention of this paper is to contribute to this field of research by examining the relationship in a Swedish context, while addressing endogeneity concerns.

We estimate two dynamic panel data models by examining the long-term debt for 289 Swedish municipalities over a period of 20 years, from 1998 to 2017. Our theoretical framework comprises the veto player model and common pool problem to explain the channels of how local government fragmentation can affect municipal debt. The first model examines our first hypothesis, that fragmentation in local governments contributes to higher debt levels for Swedish municipalities. Furthermore, a complementary IV-regression is estimated to address issues of endogeneity, where the number of parties in the parliament is used to instrument for the Herfindahl Index. The second model addresses the hypothesis that the effect of government fragmentation is larger for cross-ideological coalitions, compared to traditional left- and right-rulings, due to predetermined ideological coalitions.

With respect to the first model, the baseline specification does not yield statistically significant results and there is no evidence that local government fragmentation has an effect on long-term debt in Swedish municipalities. However, our IV-regression contradicts this finding and suggests that fragmented local governments on average experience higher debt levels, in line with our first hypothesis. The magnitude of the coefficient increases substantially, in line with previous literature that has employed the same instrument (Baskaran, 2013). Furthermore, our second model suggests that the effect of local government fragmentation is different for cross-ideological coalitions in contrast to left- and rights-rulings. In line with our second hypothesis, the effect of fragmentation for cross-ideological coalitions is according to theory, and more fragmented cross-ideological coalitions experience higher debt levels.

Taken together, we cannot firmly establish causality in the question of how fragmented local governments affect municipal debt in Sweden, since we are not able to establish if the effect from fragmentation applies to all local government constellation or only for cross-

ideological coalitions. Nonetheless, the results from the IV-regression of Model (1) and the interaction term from Model (2) point in the same direction and a relevant question for future research is to investigate if the effect of government fragmentation is general or only applicable to cross-ideological coalitions.

From a Swedish perspective, the results regarding cross-ideological coalitions are reasonable and intuitive. The presence of predetermined ideological coalitions, such as *Alliansen* and *de Rödgröna*, could distort the theoretical channels since a coalition could potentially act as a single player and experience less issues with veto players which could enforce excessive spending or maintain a status quo. Our results from Model (2) thus seem to suggest that the baseline specification is not appropriate in the Swedish context, where predetermined ideological coalitions are common. However, even though we consider the results to be relevant in a Swedish context, we are humble to potential remaining issues of endogeneity, e.g. non-random assignment of fragmented local governments and/or cross-ideological coalitions. For future research, we thus primarily suggest exploring the fiscal consequences from cross-ideological coalitions, especially considering the increasing occurrence of this kind of coalitions in Swedish municipalities.

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# Appendix

## I. Data Preparation and Coding of Variables

During the time span of the data, two municipalities have split and the observations are dealt with accordingly: Knivsta municipality contains 14 observations, since it was founded in 2003, after a referendum to split from Uppsala Municipality (Knivsta kommun, 2019). Hence, observations for Uppsala municipality are also excluded until 2003. Nykvarn municipality split from Södertälje municipality in 1999 and for the same reason, observations in 1998 are excluded for these municipalities (Nykvarns kommun, 2019). These observations are excluded in order to reduce the risk of measurement error in accordance to the municipal splits. Furthermore, we drop observations where no specific local government rule is defined, or the local government has alternated between different majority constellations. These 57 observations are labeled as “jumping majorities” in the dataset and have no clear ruling constellation during the election term. 4 observations in Dorotea municipality (2014-2017) have been excluded from the data set since it is the only municipality that has been ruled by a non-traditional party. As we cannot define the ideology of the party, we exclude these observations from the data set.

When compiling the political variables, we define the ruling constellation as the ruling party or parties, as given by SKL. Further, if a ruling constellation has had an official supporting party during an election term, we include this party in the coalition due to the fact that it should have the possibility to exert political power in the constellation and thus obtain some influence over the coalition budget.



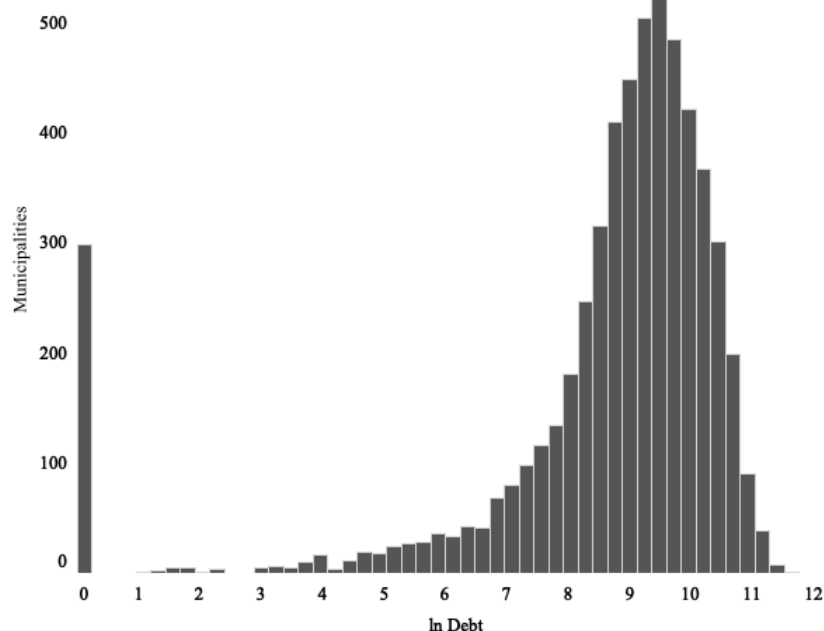
## II. Description of Variables and Data Sources

**Table A1.** *Definition and source of variables.*

| Variable                            | Description  | Source  |
|-------------------------------------|--|---|
| <i>Ln Debt</i>                      | Dependent variable. Natural logarithm of municipal long-run debt. Contains the following items: New long-term liabilities, long-term liabilities and undisclosed loans to municipal enterprises, long-term loans from financial institutions, long-term loans in foreign exchange, long-term debt to municipal companies, overdraft - other long-term debt, long-term debt for reimbursements and investment aid, long-term leasing debt. Values are expressed per capita and deflated to 2010 price levels.   | Statistics Sweden   |
| <i>Herfindahl Index</i>             | Herfindahl-index indicating the degree of political fragmentation in local governments. Ranges between 0 to 1. Higher values indicate less fragmented local governments and v.v.   | Own construction based on data over local government mandates from SKL (Swedish Association of Local Authorities and Regions) |
| <i>Cross-ideological Government</i> | Dummy variable = 1 if the ruling coalition is a cross-ideological local government.  | SKL (Swedish Association of Local Authorities and Regions)  |
| <i>Left Government</i>              | Dummy variable = 1 if the ruling coalition is a left government  | SKL (Swedish Association of Local Authorities and Regions)  |
| <i>Right Government</i>             | Dummy variable = 1 if the ruling coalition is a right government   | SKL (Swedish Association of Local Authorities and Regions)  |
| <i>Majority Government</i>          | Dummy variable = 1 if the ruling coalition has a majority of the seats in the local council.   | SKL (Swedish Association of Local Authorities and Regions)  |
| <i>Dependency Ratio</i>             | The share of population in non-working age to the population in working age. Calculated as the amount of population between ages 0 to 18 divided by 19 to 64. Values lower than 1 indicate a positive score, whereas values over 1 indicate a negative score.  | Statistics Sweden   |
| <i>Unemployment Rate</i>            | The average municipal unemployment rate (%). Calculated as the number of unemployed individuals divided by the number of individuals in the labor force, ages 16-74.   | Statistics Sweden   |
| <i>Refugee Reception Cost</i>       | The gross cost minus internal income and sales of reception requirements to other municipalities for refugee reception. Refers to refugees received within the framework of the municipal refugee reception system. Costs consist of: introduction and reception of refugees, administration, interpreters, financial aid, introductory compensation and temporary housing. Internal income refers to the ability for a municipality to pay other municipalities to accommodate refugees. Values are expressed per capita and deflated to 2010 price levels. | Kolada.se   |
| <i>Ln Population</i>                | Natural logarithm of the municipal population measured Dec. 31   | Statistics Sweden   |
| <i>Ln Income</i>                    | Median of the total earned income as of Dec 31 every year, for individuals in ages 20-64. Values are expressed per capita and deflated to 2010 price levels.   | Statistics Sweden   |
| <i>Financial Equalization</i>       | Total annual transactions related to the local government financial equalization system. Comprises grants/payments for income equalization, cost equalization and structural grants. Values are expressed per capita and deflated to 2010 price levels.  | Kolada.se   |

### III. Distribution of Dependent Variable

**Figure 1A.** Histogram over the distribution of  $\ln Debt$ .



### IV. Durbin-Wu-Hausman test

When estimating the effect of local government fragmentation on long-term municipal debt, we need to take into account time invariant and municipality invariant differences between municipalities. This can be done either by incorporating random effects or fixed effects into the model. The difference between these two could have a great impact on the coefficients and it is important to make the most efficient use of the data available (Verbeek, 2005, 351).

We therefore conduct a Durbin-Wu-Hausman test in order to test if the fixed effects and random effects estimator are significantly different, with the null hypothesis that  $(\widehat{B}_{FE} - \widehat{B}_{RE}) = 0$ . If the two betas are significantly different, the individual effects,  $\alpha_i$  and the independent variable,  $x_{it}$ , are correlated, which means that fixed effects is the only one that is consistent (Verbeek, 2005, 351).

**Table 2A.** Durbin-Wu-Hausman Test.

| $\chi^2$ | Prob > $\chi^2$ |
|----------|-----------------|
| 1653.84  | 0.00            |

The null hypothesis, i.e. that the difference in coefficients is not systematic, can be rejected on the 1%-significance level and we conclude that fixed effects is more suited for our model than random effects.

## V. Instrument Validity

In order to test the exogeneity condition when performing an IV-regression, we introduce a second instrument; the number of seats in the local council. With two instruments and one endogenous regressor, the model is overidentified which enables us to perform a Sargan overidentifying restrictions test. Thus, we test if the number of parties in the local council is jointly exogenous with the second instrument.

The number of seats in the local council is initially based on the population size in the municipality, although the final decision of how many seats to allocate is decided by the local governments themselves. A larger number of seats in the local council means that it is easier for parties to enter the local council since it requires less votes to get one seat. Therefore, more seats in the local council could result in more parties in the council and more fragmented ruling coalitions.

A threat to the validity of the instrument could be if local governments decide to reduce the number of seats due to cost saving purposes and high debt levels. However, since we control for the debt in the previous year as well as the population size, we argue that the instrument is exogenous conditioned on the included control variables.

**Table 3A.** *Test of instrument validity and relevance.*

| VARIABLES                  | (1)<br>IV           | (2)<br>IV           |
|----------------------------|---------------------|---------------------|
| Herfindahl Index           | -1.73**<br>(0.79)   | -1.63**<br>(0.78)   |
| Constant                   | -30.95***<br>(4.96) | -30.78***<br>(4.94) |
| Observations               | 5,411               | 5,411               |
| R-squared                  | 0.91                | 0.91                |
| Adjusted R-squared         | 0.91                | 0.91                |
| Control Variables          | YES                 | YES                 |
| Municipality Fixed Effects | YES                 | YES                 |
| Year Fixed Effects         | YES                 | YES                 |
| First Stage F-statistic    | 52.44<br>(0.00)     | 26.80<br>(0.00)     |
| Sargan-Hansen J-statistic  |                     | 1.02<br>(0.31)      |

*Robust standard errors clustered at municipalities in parentheses*

*\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$*

*Note: IV denotes Instrumental Variable models. Time subscripts are not reported since all variables are lagged with one year. P-values are reported in parentheses for the First Stage F-statistic and Sargan-Hansen J-statistic.*

Table 3A and Column (2) shows that the reduced form regression with both instruments generates a F-statistic of 26.80, which suggests that both instruments together are relevant. Furthermore, the Sargan-Hansen overidentifying restriction J-test generates a p-value of 0.31, which means that we cannot reject the null hypothesis that the instruments are exogenous.

However, we choose to not employ both instruments in the main specification since the instrument the number of seats in the parliament is relatively weak, and the number of parties in the parliament alone should therefore yield more reliable estimates. Thus, we do not interpret the coefficient for the Herfindahl Index in Column (2).

## VI. Robustness and Sensitivity Analyses

**Table 4A.** *Alternative proxies for local government fragmentation.*

| VARIABLES   | (1)<br>IV           | (2)<br>IV           | (3)<br>DPD          |
|---|---------------------|---------------------|---------------------|
| Coalition Government                                    | 0.94**<br>(0.43)    |                     |                     |
| Number of Ruling Parties                                |                     | 0.17**<br>(0.07)    | -0.02<br>(0.02)     |
| Cross-ideological Government                            |                     |                     | -0.05<br>(0.14)     |
| Number of Ruling Parties * Cross-ideological Government |                     |                     | 0.04<br>(0.04)      |
| Constant  | -33.40***<br>(5.33) | -30.74***<br>(4.85) | -28.27***<br>(5.13) |
| Observations  | 5,411               | 5,411               | 5,411               |
| R-squared   | 0.91                | 0.92                | 0.82                |
| Adjusted R-squared                                      | 0.91                | 0.91                | 0.82                |
| Control Variables                                       | YES                 | YES                 | YES                 |
| Municipality Fixed Effects                              | YES                 | YES                 | YES                 |
| Year Fixed Effects                                      | YES                 | YES                 | YES                 |
| First Stage F-statistic                                 | 46.23               | 120.96              |                     |

*Robust standard errors clustered at municipalities in parentheses*

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

*Note: DPD denotes Dynamic Panel Data models and IV denotes Instrumental Variable models. Time subscripts are not reported since all variables are lagged with one year. We control for observations with zero debt in all specifications, as discussed in Section 5.2.1. We do not estimate a specification with an interaction term between the coalition government dummy variable and cross-ideological government dummy variable since a cross-ideological government is a de facto coalition.*

**Table 5A.** Geographic heterogeneity test of Swedish municipalities.

| VARIABLES                                       | DPD                  |                 |                     | IV                   |                  |                     |
|---|----------------------|-----------------|---------------------|----------------------|------------------|---------------------|
|   | (1)<br>Urban         | (2)<br>Rural    | (3)<br>Semi-urban   | (4)<br>Urban         | (5)<br>Rural     | (6)<br>Semi-urban   |
| Herfindahl Index                                | 0.35<br>(0.28)       | 0.14<br>(0.20)  | 0.20<br>(0.16)      | -4.01*<br>(2.28)     | -1.54<br>(1.06)  | -0.74<br>(1.08)     |
| Cross-ideological Government                    | -0.10<br>(0.48)      | 0.09<br>(0.19)  | 0.66***<br>(0.21)   |                      |                  |                     |
| Herfindahl Index * Cross-ideological Government | 0.16<br>(0.93)       | -0.37<br>(0.35) | -1.08***<br>(0.37)  |                      |                  |                     |
| Constant  | -46.77***<br>(16.29) | 1.90<br>(13.66) | -30.86***<br>(8.29) | -71.93***<br>(21.86) | -1.62<br>(10.22) | -18.67***<br>(6.56) |
| Observations                                    | 981                  | 1,004           | 2,786               | 981                  | 1,004            | 2,786               |
| R-squared                                       | 0.82                 | 0.85            | 0.83                | 0.89                 | 0.93             | 0.92                |
| Adjusted R-squared                              | 0.82                 | 0.85            | 0.83                | 0.88                 | 0.92             | 0.92                |
| Control Variables                               | YES                  | YES             | YES                 | YES                  | YES              | YES                 |
| Municipality Fixed Effects                      | YES                  | YES             | YES                 | YES                  | YES              | YES                 |
| Year Fixed Effects                              | YES                  | YES             | YES                 | YES                  | YES              | YES                 |

Robust standard errors clustered at municipalities in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Note: DPD denotes Dynamic Panel Data models and IV denotes Instrumental Variable models. Time subscripts are not reported since all variables are lagged with one year. We control for observations with zero debt in all specifications, as discussed in Section 5.2.1.

**Table 6A.** Robustness test of extreme values in dependent variable.

| VARIABLES                                       | Exclusion of dummy variable |                     | Exclusion of outliers |                     |
|---|-----------------------------|---------------------|-----------------------|---------------------|
|   | (1)<br>DPD                  | (2)<br>IV           | (3)<br>DPD            | (4)<br>IV           |
| Herfindahl Index                                | 0.30**<br>(0.14)            | 0.34<br>(1.14)      | 0.21**<br>(0.10)      | -1.19*<br>(0.68)    |
| Cross-ideological Government                    | 0.44***<br>(0.17)           |                     | 0.26**<br>(0.11)      |                     |
| Herfindahl Index * Cross-ideological Government | -0.82**<br>(0.33)           |                     | -0.34*<br>(0.21)      |                     |
| Constant  | -26.92***<br>(4.49)         | -32.96***<br>(7.46) | -24.77***<br>(4.55)   | -27.84***<br>(4.81) |
| Observations                                    | 5,411                       | 5,411               | 5,116                 | 5,116               |
| R-squared                                       | 0.58                        | 0.81                | 0.47                  | 0.77                |
| Adjusted R-squared                              | 0.58                        | 0.80                | 0.47                  | 0.76                |
| Control Variables                               | YES                         | YES                 | YES                   | YES                 |
| Municipality Fixed Effects                      | YES                         | YES                 | YES                   | YES                 |
| Year Fixed Effects                              | YES                         | YES                 | YES                   | YES                 |

Robust standard errors clustered at municipalities in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Note: DPD denotes Dynamic Panel Data models and IV denotes Instrumental Variable models. Time subscripts are not reported since all variables are lagged with one year. Columns (1) and (2) report results from model (1) and (2) without a control for observations with zero debt. Columns (3) and (4) report results from model (1) and (2) after excluding observation with zero debt.