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The Municipal Equalization System and its Implications for Economic Growth and Efficiency

An empirical study on the income and cost equalization system for Swedish municipalities

by

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Abstract This paper investigates the correlation between Sweden's municipal equalization system and economic growth and efficiency for the years 2005 to 2022. This paper uses panel data for all 290 municipalities and a fixed effects model to study the two main parts of Sweden's municipal equalization system: the income equalization system and the cost equalization system. This paper examines multiple variables that are associated with a municipality's economic growth and efficiency. These variables include Gross Regional Product (GRP), tax capacity, employment, tax rate, aggregated costs, as well as several variables related to disaggregated costs. Dummy variables are used to categorize municipalities based on traits such as population density, marginal effects, and whether they contribute (give) to or receive (take) benefits from the system allowing comparisons between municipalities. The aim of this paper is to contribute to the limited existing literature on this subject by offering insights into how the system correlates with municipal incentives for fostering economic growth and efficiency. This will be achieved by examining variables related to growth and spending in municipalities. Overall, the estimates presented in this paper do not provide reliable evidence of a correlation between the system and economic growth and efficiency. Yet, some findings in this study suggest a connection between the system and economic growth and efficiency. For example, variables like aggregated costs and the arena variable indicate a correlation.

Keywords: *The Municipal Equalization System, Income Equalization, Cost Equalization, Sweden, Fiscal Federalism, Economic Efficiency, Marginal Effects*

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Introduction

A decentralized governance approach is believed to enhance efficiency, foster innovation, and contribute to increased economic growth through greater competitiveness. This is because self-governance enables sub-governments like municipalities to take their own initiatives for improvement, allowing them to explore new and creative solutions for resource allocation. This perspective is based on the theory of fiscal federalism, which proposes that decentralizing power enables a more effective use of public resources because of greater local knowledge and increased competition among sub-governments. One of the most decentralized countries in the world is Sweden, with 290 municipalities. Each municipality is responsible for providing services such as elderly care and education for its residents, which are primarily financed through municipal taxes. However, to ensure that all municipalities can provide services with the same standard regardless of income disparities and structural costs, a municipal equalization system is implemented to redistribute resources.

The current system in Sweden has been in practice since 2005 and consists primarily of income equalization and cost equalization. Income equalization aims to level out differences in tax revenues, while cost equalization takes into account that different demographic factors give rise to different costs. In 2022, the system redistributed approximately SEK 178 billion, which constitutes the second largest source of income for municipalities on average. However, in municipalities such as Åsele, Pajala, and Dorotea, the equalization system accounts for over half of the per-resident expenditure in the municipal budget. This, combined with the persistent categorization of certain municipalities as contributors (givers) and others as recipients (takers) within the system, raises concerns. This is because the system may create negative incentives for municipalities, leading to reduced efforts in pursuing economic growth and efficiency.

Further, the reason for this is that, on the one hand, the efforts of municipalities to increase their income do not guarantee an increase in their budget. This is because of the marginal effect, which is 95 percent on average for municipalities that receive from the system and 85 percent for municipalities that contribute. However, the marginal effect varies among municipalities due to the method used to determine the amount received or contributed through the income equalization system. Some municipalities have a negative marginal effect. This implies that a municipality that enhances its tax capacity through increased employment may have reduced total revenues due to the redistribution from the system [Sveriges Kommuner och Regioner, 2023]. Consequently, the system potentially reinforces negative incentive structures for givers. On the other hand, the guaranteed income provided to takers through the system creates a potential negative incentive structure that reduces their drive to generate income autonomously. In addition, the moral hazard problem may lead municipalities to allocate money towards prestigious projects such as new sports stadiums, instead of prioritizing investments in education or growth-promoting activities. Hence, the system can increase the risk of municipalities misappropriating funds for non-productive endeavors. Consequently, the system could impede economic growth for all municipalities in Sweden. Therefore, this paper examines the correlation between the equalization system and municipalities' incentives for economic growth and efficiency, specifically examining the marginal effect by including it as a dummy. Accordingly, the research question for this paper is the following:

How does the equalization system correlate with municipalities' incentives for efficiency and economic growth?

This is examined because the correlation continues to be uncertain, which is primarily due to the limited research available on this topic [Riksrevisionen, 2020]. However, the Swedish government has recently initiated an inquiry to review the equalization system [Regeringskansliet, 2022], which underscores the importance of the findings presented in this paper. To investigate this empirically, this paper uses a fixed effects model on panel data for all 290 municipalities in Sweden for the years 2005 to 2022. This paper includes dummy variables to categorize municipalities based on specific traits such as population density, marginal effects, and whether they contribute (give) to or receive (take) benefits from the system, allowing for comparisons to be made. In this paper, certain delimitations have been made, for instance, the introduction grant, regulatory grant, and fees are not considered due to their minor role in the equalization system.

This paper presents findings on variables including Gross Regional Product (GRP), tax capacity, employment, tax rate, aggregated costs, and various variables related to disaggregated costs. The findings regarding GRP and tax capacity indicate that there is a correlation to the system. However, because of issues relating to each variable, the results are unreliable. No correlation is found when using employment or the tax rate. Regarding the aggregated and disaggregated cost variables, a correlation can be observed. For example, a positive correlation is found for the arena variable pertaining to small cities. However, because of low R^2 values, low explanatory power is provided. Therefore, this paper does not provide reliable implications regarding the system.

To answer the research question, this paper is organized in the following way: Section 2 describes the theory of fiscal federalism and presents previous empirical research on the topic. Section 3 describes the equalization system and its marginal effects, as well as this paper's contribution to the literature. Thereafter, Section 4 presents the method, data, and variable descriptions. In Section 5, the empirical results are presented and analyzed. A discussion and conclusion follow in Section 6. Lastly, in Section 7, suggestions for future research are given.

2

Theory

This chapter provides an overview of both theory and previous empirical research. The theoretical framework of fiscal federalism is explained. Also, empirical findings regarding the implications of decentralization for economic growth and efficiency are presented. Empirical evidence is also presented regarding the implications of equalization systems for economic growth and efficiency. This is done to contextualize the results found in this paper. The chapter is structured as follows: first, the theory of fiscal federalism is explained. Then, empirical findings on decentralization are given. Finally, empirical findings pertaining to equalization systems are explained.

2.1 Fiscal Federalism and Its Implications

In this section, the theory of fiscal federalism is explained. The core concept of fiscal federalism is to create a balance between central control and local autonomy in fiscal matters. That is, fiscal federalism refers to the division of financial responsibilities and powers between different levels of government. The goal of fiscal federalism is to create a balance between centralizing certain functions for efficiency and distributing resources to meet local needs and promote regional autonomy and efficiency. This implies a distribution, i.e., a decentralization of responsibilities between the central government and sub-governments regarding, for instance, the management of revenue, taxation, and expenditures. According to fiscal federalism, the allocation of responsibilities is determined based on the proximity of service provision. This is due to the fact that local parks and libraries are more efficiently managed by a local sub-government, whereas the central government is better suited to handle the responsibility of national defense. This is contingent on a clear description of fiscal obligations [Oates, 2005].

Further, Hayek [1945] argues for the benefits of a decentralized system because it facilitates individual influence on local decisions and fosters competitiveness, leading to improved services out of concern of losing residents to other municipalities. For this reason, Hayek [1945] also argues that it incentivizes sub-governments to be more resource-efficient, which could help limit the size of expenses. In like manner, Niskanen [1975] argues for decentralization as a means to promote fiscal restraint and efficiency. He argues that tax competition between municipalities encourages sub-governments to adopt more efficient and growth-promoting efforts. This is because municipal tax competition provides individuals and businesses with the choice to select jurisdictions with different tax regimes and public services. Therefore, it asserts that the advantage of a decentralized system is that it aligns the interests of politicians and bureaucrats with those of residents, fostering greater accountability in a democratic society. In like manner, Baskaran et al. [2016] suggests that decentralization can encourage innovation through competition among local governments, boosting the efficiency of public service delivery.

However, the division of responsibilities can become more intricate, particularly in areas such as education and healthcare, where higher resource allocation is necessary to maintain consistent standards across municipalities. This issue is interconnected with the fact that each sub-government is responsible for financing its local services through sub-government taxes, whereas the central government is responsible for financing services at the national level using state taxes. Due to the heterogeneous characteristics of municipalities, some need financial support from the state, i.e., a municipal equalization system, to meet the requirements, which may lead to unfavorable incentive structures [Karreskog and Trygg Kupersmidt, 2016]. Karreskog and Trygg Kupersmidt [2016] argues that the equalization system disconnects decision-makers from their ability to influence local politics, as it undermines efforts to promote sustainable policies. This disconnect gives rise to moral hazard and principal-agent issues. The principal-agent problem arises when the central government delegates tasks to sub-governments without effective oversight or mechanisms to ensure that the agent acts in the principal's best interest [Hedge et al., 1991]. For instance, the government may give grants to sub-governments with the intention of improving infrastructure. However, some municipalities may choose to allocate the funds towards constructing a new arena instead of investing in education and elderly care. Sanandaji [2013] claims that municipalities focus less on their main operations, such as education, because of the system.

He suggests that the system causes excess investment in prestige projects and that this is one of the reasons why Charleston and Houston experience the highest growth rates in the United States, in comparison to San Francisco and New York, which experience low growth.[1] He also suggests that this is why Malmö and Berlin do not experience high economic growth, and that the reason for this could be that municipalities are not credited for pursuing sustainable municipal growth.

Moreover, Persson and Tabellini [1973] argues that sub-governments can take excessive risks due to the expectation of central government bailouts in the event of economic failure. Thus, there is a risk that funds provided by the central government may be used less restrictively compared to taxes collected directly from residents within the municipality. Therefore, the competitive advantage associated with decentralization may diminish.

To summarize, fiscal federalism argues for decentralization of power and responsibilities, asserting that it leads to higher efficiency. This perspective is supported by Hayek [1945], Niskanen [1975] and Baskaran et al. [2016]. The main argument is that local knowledge and competition contribute to the provision of better services. However, contrasting viewpoints are presented by Karreskog and Trygg Kupersmidt [2016], Hedge et al. [1991] and Persson and Tabellini [1973]. They emphasize that a decentralized system has the potential to reduce efficiency due to moral hazard and principal-agent issues that arise from equalization systems required to promote equality among municipalities. Sanandaji [2013] further argues that such issues can lead to disparities in growth among municipalities over time.

2.2 Empirical Evidence: Decentralization, Efficiency and Economic Growth

This section presents evidence about the correlation between decentralization and economic growth as well as efficiency. According to findings made by Moussé and Razafimahefa [2015], decentralization can enhance efficiency, but only under specific conditions. The findings suggest that a sufficient level of expenditure decentralization is necessary for positive outcomes. According to their estimates, expenditure decentralization should exceed approximately 35 percent to yield positive outcomes. This means that transferring the authority and responsibility for public spending decisions from a central government to sub-governments is necessary.

[1] Expenses for main operations are examined in this paper, but no correlation is found.

Additionally, they find that expenditure decentralization should be accompanied by revenue decentralization to achieve favorable results for efficiency. This means that giving greater authority and control over revenue generation and collection to sub-governments is positively correlated with efficiency. The findings suggest that in order to improve public service delivery, effective autonomy of sub-governments, strong accountability across institutions, and strong local capacity are necessary. The authors findings suggest that without such conditions, decentralization can hinder the efficiency of public service delivery.

In like manner, Burret et al. [2021] finds evidence suggesting that decentralization overall increases efficiency. In their study pertaining to Switzerland, a relatively small role is found for the growth of sub-governmental GRP. However, it is shown that it has a significant impact on the economic performance of sub-governments as measured by GRP per employee. The findings reveal a positive association between sub-governmental labor productivity and expenditure decentralization, while revenue decentralization shows a negative relationship. The negative correlation for revenue decentralization contrasts the findings made by Moussé and Razafimahefa [2015]. However, the authors findings suggest that decentralization supports, rather than hinders, the economic performance of sub-governments.

Furthermore, Zhao et al. [2021] studies the connection between sub-government competition and innovation efficiency in China. According to the authors, China's federal structure encourages sub-governments to compete for resources and economic development. The study shows that regional innovation efficiency is positively linked to sub-government competition. The positive correlation between competition and innovation efficiency is stronger in areas with higher levels of decentralization, i.e., higher levels of autonomy, which is in line with findings by Moussé and Razafimahefa [2015].

In conclusion, Moussé and Razafimahefa [2015], Burret et al. [2021] and Zhao et al. [2021] find evidence that a decentralized system contributes to economic efficiency. However, while Moussé and Razafimahefa [2015] finds that a higher level of expenditure and revenue decentralization is needed for efficiency, Burret et al. [2021] finds that revenue decentralization is not positively linked to increased growth.

2.3 Empirical Evidence: Equalization Systems, Efficiency and Economic Growth

This section presents evidence on how municipalities respond to equalization systems, i.e., the response to horizontal grants from the central government. It addresses the issue that some municipalities tend to develop a long-term dependence on the equalization system, as highlighted by SOU [2020]. This dependency arises from a combination of factors such as low economic growth, increasing unemployment, and an aging population. As a result, this sets in motion a negative cycle where a municipality without sufficient economic resources to invest in growth promoting activities remains stagnant and increasingly reliant on the equalization system over time.

Smart [2007] examines how Canadian sub-governments react to increases in equalization transfers pertaining to tax rates. The estimates show that, on average, tax rates in sub-governments receiving grants were noticeably and significantly higher as a result of the transfer formula. This is because receiving regions may increase their tax rates due to the distortions caused by equalization. That is, when a municipality receives equalization transfers, it can create a situation where higher local tax rates lead to increased transfers. This happens because higher tax rates cause a decline in economic activity and tax capacity, which in turn triggers an increase in equalization transfers to compensate for the loss. Therefore, receiving regions may be incentivized to raise their tax rates in order to benefit from higher equalization transfers. Hence, ultimately leading to increased reliance on central government transfers in the long run.

In like manner, Aronsson and Wikström [2021] claims that studies using data from different countries demonstrate that local tax rates increase as a result of equalization among sub-governments using equalization schemes that are similar to the Swedish one. In some instances, the correlation is fairly large. This implies greater subsidies from the equalization system for receiving municipalities [Aronsson and Wikström, 2021]. Consequently, it may also increase tensions between those municipalities receiving the transfers and those providing them.

Further, Buettner and Krause [2021] examines how sub-governments in Germany adapt their property transaction taxes in response to equalization mechanisms between sub-governments. He found that if complete equalization of fiscal capacity were implemented, the tax rate would increase by about 1.3 percentage points.

The equalization system in Germany is similar to the one in Sweden, but with the difference that Sweden uses the tax rate of the county to decide and can therefore be directly influenced by state governments' tax policies.

Riksrevisionen [2020] conducted investigations on the impact of the income equalization system on the municipal tax capacity. Although they found that municipalities with lower transfers experienced an increase in tax capacity, they question the validity of the results. This is because Riksrevisionen [2020] investigated the response of municipalities following a modification of the system using difference-in-differences (DiD). However, the modification was deemed too small to draw inferences. Hence, their research does not establish a clear connection between the system and economic performance, leaving the correlation with Swedish municipalities uncertain. They also highlight the challenges of measuring the system using current methods.

Moreover, Stehn and Fedelino [2009] examine whether relying on economic transfers weakens fiscal discipline and promotes pro-cyclical fiscal policies in the sub-governments that receive them. According to their estimates, sub-governments benefiting from the transfer system have not reduced primary expenditure significantly in response to rising deficits. Instead, they have relied on transfers from the central government to ensure debt sustainability. It is also shown that they have implemented pro-cyclical policies, specifically by increasing expenditures during periods of economic upheaval. In contrast, sub-governments that contribute to the system have prioritized fiscal sustainability through budgetary adjustments, and they have exhibited less pro-cyclical spending patterns. Thus, evidence put forth by Stehn and Fedelino [2009] suggests inefficient allocation of resources for receivers, i.e., that moral hazard and principal-agent issues prevail in decentralized countries.

To summarize, the potential negative loop for sub-governments because of central government transfers is explained by SOU [2020]. Evidence for this loop, is found by Smart [2007]. He finds that tax rates increase specifically for municipalities that receive contributions. Similar results were found by Buettner and Krause [2021]. Further, Aronsson and Wikström [2021] claims that local tax rates have increased as a result of equalization for countries that have similar systems to the Swedish one. Moreover, Riksrevisionen [2020] finds that reduced equalization contributed to increased economic efficiency. However, due to measurement issues, these results are unreliable. Lastly, evidence found by Stehn and Fedelino [2009] regarding expenditures and the economic cycles suggests evidence for moral hazard and principal-agent issues.

3

The Equalization system in practice

This chapter explains Sweden's equalization system. This is done to provide the reader with a better understanding of its implications for various municipalities as well as how the marginal effect of income equalization can create negative incentives for efficiency and economic growth. Further modifications to the system are addressed, and a section of this paper's contribution to the literature is included. The chapter starts with a section describing the current system. Then, an explanation of the marginal effects is given. This is followed by recent modifications to the system. Lastly, a section motivating this paper's contribution to the literature is presented.

3.1 A Description of the Municipal Equalization System in Sweden

The Swedish equalization system is designed to ensure that all municipalities have equal opportunities to provide basic public services such as education, healthcare, and social welfare to their residents regardless of the municipality's financial capacity and structural cost disparities [Riksrevisionen, 2020]. The system consists of five parts: income equalization, cost equalization, structural grants, introduction grants, and a regulatory grant or fee depending on whether the municipality is a contributor or receiver. In 2023, the system will redistribute approximately 178 billion SEK, of which 165 billion are given as grants to municipalities, and 13 billion are contributed by other municipalities in fees. The amount received or contributed is based on several factors, including each municipality's tax capacity, population size, and demographic composition as this affect its costs for providing public services.

Income equalization is by far the largest item in the system and accounts for 70 percent of the redistribution [Ekonomifakta, 2023]. The current system constitutes a large part of the state's total transfers to municipalities. Each municipality's tax capacity revenue is redistributed across the entire municipal collective according to its assigned marginal effect. The marginal effect determines how much increases in a municipality's tax capacity is redistributed in the income equalization system.

The second largest item in the system is the cost equalization system, which is geared towards eliminating structural cost disparities. The standard cost, which is mostly based on the municipality's demographic structure, is the basis of the cost equalization system. There are eight sub-models for municipalities: preschool and childcare, primary school, upper secondary school, adult education, elderly care, individual and family services, infrastructure, and overall operational costs. The system ensures that municipalities with more expensive demographics receive compensation. The standard cost is also adjusted for other factors, such as geographic conditions or socio-economic structure, that could indicate that the municipality has higher costs than other municipalities. The amount received or contributed depends on the national average of costs and not on the local municipality's or region's cost level. Therefore, a municipality cannot effect the amount received or contributed through reducing or increasing costs [SKR, 2022].

In addition to the income equalization and the cost equalization, a structural grant is given to 60 municipalities, mainly in the counties of Jämtland, Västerbotten, and Norrbotten. The support covers regional policy elements such as costs due to high unemployment or low population. The introduction grant and regulatory grant/fee are to make sure that the grants and fees do not cause excessive fluctuations for each municipality between years [Statistiska Centralbyrån, 2023].

In Table 3.1, the amounts received or contributed to the system are shown for 9 municipalities for the year 2022. For example, Åsele and Pajala receive more than SEK 30,000 per resident each year, which is more than half of the average municipal budget of roughly SEK 50,000. Most municipalities that receive the largest amounts are smaller municipalities located in the north of Sweden. However, there are some exceptions. For example, Eskilstuna and Malmö each receive SEK 16,623 and SEK 14,632 per resident, respectively. Note that they mostly receive money through income equalization. That is, they do not have higher structural costs, but rather low incomes. According to Malmö Stad [2023], Malmö receives a quarter of its revenue from the equalization system. In contrast, the two top municipalities contributing the most to the system in total were Lidingö and Danderyd.

Despite the fact that Danderyd and Lidingö contribute to income equalization, they receive income from the cost equalization system. This is primarily the result of their demographic composition, since Danderyd and Lidingö both have a significant proportion of school-age children and elderly residents [Karreskog and Trygg Kupersmidt, 2016]. As illustrated in the table, Lidingö contributes with SEK 17,311 per resident to the income system, but receives SEK 4,429 from the cost equalization system.

Table 3.1: Equalization per resident, chosen municipalities for year 2022.

Ranking	Municipality	Total Equalization[1]	Income Equalization	Cost Equalization
1	Åsele	30 840	18 686	10 122
2	Pajala	30 223	14 369	11 403
3	Dorotea	29 937	14 704	13 068
4	Bjurholm	29 084	17 267	11 385
5	Övertorneå	28 565	15 222	8 664
85	Eskilstuna	16 623	14 302	2 327
121	Malmö	14 632	13 463	969
289	Danderyd	-24 290	- 30 485	6 195
290	Lidingö	-12 822	- 17 311	4 429

Source: Statistiska Centralbyrån [2023] The total equalization excludes the regulatory contribution of (+)2760 for receivers and the regulation fee of (−)2760 for contributors.

3.2 A Description of the Marginal Effects of Income Equalization

In this section, an explanation of the marginal effects determining the amount received or contributed to the income equalization system is given. In the income equalization system, grants and fees are determined by the county tax rates and the relative tax capacity. Therefore, the variations in county tax rates do not represent the tax rates decided upon by municipalities or regions but rather only the degree to which municipalities have assumed regional responsibilities or vice versa. The reason for choosing county tax rates when calculating the amount of grants and fees is to ensure municipalities do not influence the level of income equalization received [Statistiska Centralbyrån, 2023]. A possible outcome of the current marginal effect is negative marginal effects, where a municipality has a lower tax rate than the county tax rate and the relative tax capacity is increasing. That is, some municipalities incur financial losses due to the expansion of its tax capacity [SACO, 2008].

Currently, the marginal effect is 95 percent on average for municipalities with a tax capacity below 115 percent of the national average tax capacity (takers). For municipalities with a tax capacity above 115 percent of the national average tax capacity (givers), the marginal effect is, on average, 85 percent. Thus, if a taker increases its revenue, 95 percent of the increase is given to the system. So, for example, if a municipality increases its tax capacity by SEK 100, it will keep SEK 5. In contrast, if a municipality is a giver and increases its tax capacity by SEK 100, SEK 85 will go to the system and SEK 15 will benefit the municipality itself [Karreskog and Trygg Kupersmidt, 2016]. During 2022, fifteen municipalities contributed to the system, while the remaining 275 municipalities received from it. In this manner, the system ensures that all municipalities have roughly the same per-resident budget [Riksrevisionen, 2020].

Table 3.2 depicts three different types of municipalities to demonstrate how the outcome of marginal effects works in practice. To simplify, it is assumed that all three municipalities have a tax rate of 20 percent and that the average income per resident in Sweden is SEK 250,000 per year. If the tax capacity per resident increases from SEK 200,000 to SEK 300,000, from a low-income to a high income municipality, the total revenue per resident increases by SEK 1,250 [1]. To clarify, if the tax revenue per resident for the municipality increases by SEK 20,000 the increase in total revenue per resident increases by SEK 1,250 on average.

Table 3.2: The effect from income equalization for three various municipalities.

	Low income	Average income	High income
Average tax capacity (tax capacity per resident)	200 000	250 000	300 000
Tax revenue per resident	40 000	50 000	60 000
Equalization basis (115 percent of the average tax capacity)	287 500	287 500	287 500
Equalization (85 or 95 percent of the distance to the tax equalization basis)	16 625	7 125	- 2 125
Total revenue per resident	56 625	57 125	57 875

Source: Karreskog and Trygg Kupersmidt [2016]

Based on the marginal effects, if the tax capacity increases in a municipality, for instance, because of decreased unemployment. The amount received by municipalities with low tax capacities will be reduced, while the amount contributed by municipalities with high tax capacities will be increased. In this way, the marginal effect can cause a negative financial consequence for some municipalities.

[1] Total revenue per resident: $57,875 - 56,625 = 1,250$

An example of this is Österåker, where the marginal effect in 2018 was approximately -9 percent. That is, the municipality will incur losses of SEK 109 if they increase their tax capacity by SEK 100. In contrast, Kungsbacka had the highest positive marginal effect of about 20 percent .

According to Ekonomifakta [2018], this may effect the incentives for municipalities to promote growth-seeking measures that would increase the tax capacity negatively. They also point out that even with a positive marginal effect, the cost of implementing new projects can be greater than the benefit from tax revenues. For example, consider a scenario where Kungsbacka invests in projects aimed at boosting business activities in the municipality. The cost of the project is SEK 100,000 which is paid by the municipality itself. However, the municipality's budget will not break even by increasing tax revenues by SEK 100,000 due to the income equalization system. Instead, it must increase tax revenues by at least SEK 500,000[2], or five times the project cost, in order to break even. [3]

3.3 Past Modifications of the Municipal Equalization System (2005-2022)

This section explains the modifications made to the system from 2005 to 2022. The modifications have been made to reduce the potential distortionary effects of the system. One example is the change in the marginal effect for municipalities contributing to the income equalization system. In 2005, it was lowered from 95 percent to 85 percent. Then, it was further reduced from 85 percent to 60 percent in 2014. However, following a change in government, they reverted back to 85 percent in 2016.

Another example is the earned income tax credit (jobbskatteavdraget) which was adopted in 2007, requiring that increases in the municipality's tax rate be partially compensated by an increase in the resident's earned income tax credit paid by the central government. According to Karreskog and Trygg Kupersmidt [2016], the implementation of the earned income tax credit in 2007 could affect the incentives for municipalities to increase their tax capacity since the increase is reduced for the residents because of the contributions from the central government. In addition, in 2016, an investment grant was established [Statistiska Centralbyrån, 2023].

[2]Total revenue: $500,000 * 0.20 = 100,000$.
[3]Breakeven = Total revenue - Total cost: $100,000 - 100,000 = 0$.

On an important note, the changes to the system are minor, making it difficult to derive a significant change in incentives for municipalities from the modifications using DiD, much like concluded by Riksrevisionen [2020]. However, structural breakpoints have been made to examine the data and compare it to modifications made to the system. However, coinciding breaks and modifications made according to the literature that are significant enough to perform a DiD, are not found. The structural breakpoints for GRP and tax capacity are shown in the Appendix. The breakpoints pertaining to the other regressions are not reported in this paper. For additional details on the modifications made to the equalization system, please refer to Table 1 in the Appendix.

3.4 Contribution to the Literature

This section explains how this paper contributes to the literature. Since Riksrevisionen [2020] do not establish a clear correlation between tax capacity and the system using DiD, this paper uses a different method to examine the relationship. In addition, this paper examines other variables as well, such as GRP, employment, and tax rate. Moreover, while previous studies like Riksrevisionen (2020) do not explore how municipalities spend their resources, this essay aims to address this gap by providing estimations on growth-promoting activities, such as infrastructure development and business promotion. In addition, it examines potential instances of wasteful spending, specifically focusing on how small cities invest in arena projects. By evaluating costs at both an aggregated and disaggregated level, this paper addresses the principal-agent problem and moral hazard.

Moreover, this paper examines how different municipalities respond to the system. This is done by sorting municipalities based on traits like whether they give or take from the system, their marginal effects, and their population density using dummy variables. This allows for an examination of how different groups of municipalities correlate to the equalization system. Also, by focusing on Swedish municipalities, this paper contributes by giving country-specific estimations on a topic where the literature is scarce. This can contribute to policy discussions and reforms in Sweden. Overall, this is how the paper contributes to the existing literature.

4

Methodology and Data

This chapter presents the data, variables, and methodology used in this paper. The chapter starts with a description of the data and variables used, which will be given in two separate sections and is outlined as follows: Section 4.1 presents the data. Then, Section 4.2 presents the variables for the regressions. This is followed by an explanation of the method used in this paper, followed by a section presenting the general regression model with fixed effects. Then, the method used in this paper is explained, and a section giving the general regression model with fixed effects follows.

4.1 Data Description

This section presents the data. The sample includes data from all 290 municipalities in Sweden, measured at a yearly frequency ranging from 2005 to 2021. However, the regressions examining aggregate and disaggregate costs range from 2011 to 2021 due to a lack of data at the municipality level. The data is collected from SCB, SKR and Kolada and the sources for each variable are listed in Appendix. Moreover, the dependent variables used in this paper are the following: GRP, tax capacity, employment, tax rate, expenditures for main activity, expenditures for operational activity, expenditures for business promotion, infrastructure, and arena investments. What is more, a multicollinearity test was performed for each regression, and the result for the baseline tax capacity regression is displayed below, showing that the level of multicollinearity does not exceed reasonable limits. However, it is noted that the value of higher education (EDU) is somewhat higher. Although the correlation tables for the other regressions are not presented in this paper, the level of multicollinearity is acceptable for all of them.

Table 4.1: Cross-correlation table

Variables	TC	IE	CE	EDU	POPG	FB	TAX	DDR	ET	TOTW
TC	1.000									
IE	-0.429	1.000								
CE	-0.022	0.214	1.000							
EDU	0.728	-0.624	-0.171	1.000						
POPG	0.348	-0.309	-0.332	0.494	1.000					
FB	0.320	0.062	0.012	0.237	0.321	1.000				
TAX	-0.333	0.524	0.159	-0.462	-0.432	-0.320	1.000			
DDR	0.102	0.420	0.505	-0.324	-0.388	-0.228	0.341	1.000		
ET	0.407	-0.302	0.035	0.205	0.147	-0.387	-0.071	0.194	1.000	
TOTW	0.207	-0.208	-0.113	0.381	0.182	0.266	-0.220	-0.386	-0.108	1.000

4.2 Variable Description

Tax Capacity ($TC_{i,t}$) is the taxable amount in Swedish kronor per capita at the start of the taxable year. In calculating the tax capacity for year t, the taxable amount based on the tax assessment for year $t-1$ is applied to the incomes of year $t-2$. The variable is not seasonally adjusted, which motivates the choice to apply the Hodrick-Prescott (HP) filter. This also made the variable stationary. Source, SCB.

Gross Regional Product ($GRP_{i,t}$) is the economic growth measured for municipalities. It is measured based on the production side, i.e., the total value of all products and services produced in a municipality divided by the population in the municipality. Since the variable was not seasonally adjusted and non-stationary, an HP filter was applied. Source, Kolada.

Cost ($C_{i,t}$) is calculated as gross costs minus internal and external revenues for all current municipal activities, both actual operations and business operations are divided by the municipality's population. Note that this variable does not include all municipalities because of a lack of data. Thus, the sample size is smaller. For the same reasons as previously mentioned, an HP filter was applied. Source, Kolada.

Income Equalization ($IE_{i,t-n}$) represents the amount in SEK of the subsidies/fees divided by the total population in each municipality on November 1 of the previous year. This variable has been seasonally adjusted using the HP filter, which also made the variable stationary. Source, Kolada.

Cost Equalization ($CE_{i,t-n}$) represents the amount in SEK of the subsidies and fees divided by the total population in each municipality on November 1 of the previous year. An HP filter has been applied. Source, Kolada.

Tax Rate ($TAX_{i,t}$) Municipal tax rates, excluding funeral fees and county council tax. Due to issues of non-stationarity, an HP filter was applied. Source, SCB.

Population Growth ($POPG_{i,t}$) The change in population by percentage for the previous year, refers to the 31st of December. Source, Kolada.

Highly Educated ($EDU_{i,t}$) refers to those aged 25 to 64 having a higher education, divided by total population aged 25 to 64. Higher education is defined as at least three years of post-secondary education or more. Due to issues of non-stationarity, an HP filter was applied. Source, Kolada.

Foreign Born ($FB_{i,t}$) The percentage of the population born in foreign countries divided by the total population in the municipality. The reference date is December 31st. Source, Kolada.

Demographic Dependency Ratio ($DDR_{i,t}$) is calculated as the sum of the number of people aged 0 to 19 and the number of people aged 65 and older, divided by the number of people aged 20 to 64. A value greater than 1 means that the group of older and younger people is larger than the working-age group. Due to non-stationarity, an HP filter was applied. Source, Kolada.

Employment Total ($ET_{i,t}$) is the number of people employed in the ages 20 to 64 divided by the number of people aged 20 to 64 in each municipality. Employed people are registered residents of the municipality who earned employment income, as well as individuals who earned revenue through active business operations. The reference date is December 31st. Source, Kolada.

Total Wage ($TOTW_{i,t}$) is measured as the amount of income of daytime workers in the municipality, regardless of where they live, i.e., commuters are included. The measure is an average of the total wage. Source, Kolada.

Expenditures for Main Activity ($EXPMA_{i,t}$) is measured as gross cost minus internal revenues and sales to other municipalities and regions for the municipality's ongoing actual activities divided by the number of residents in the municipality. The actual activities included in this measure cover the following areas: work areas and premises, port operations, commercial operations, housing operations, air traffic, bus, car, and rail transportation, maritime traffic, electricity and gas supply, district heating, water supply, and sewage management, as well as waste management.

Due to non-stationarity and the fact that the variable was not seasonally adjusted, an HP filter was applied. Source, SCB.

Expenditures for Operational Activity ($EXPOA_{i,t}$) incorporates the same areas as $EXPMA_{i,t}$, but it also includes business operations. For the same reasoning as for $EXPMA_{i,t}$, an HP filter was applied. Source, SCB.

Expenditures for Business Promotion ($EXBP_{i,t}$) is defined as the net amount spent on activities for business promotion divided by the total population in the municipality. An HP filter was used due to the variable's non-stationarity and the fact that it was not seasonally adjusted. Source, SCB

Infrastructure ($I_{i,t}$) This variable is measured as the gross cost minus internal revenues and sales to other municipalities and regions for infrastructure, protection, rescue services, etc., divided by the number of residents in the municipality. The costs refer to the following activities: planning, housing improvement, business promotion, tourism activities, consumer and energy advice, streets, roads, parking, parks, environmental and health protection, alcohol permits, and rescue services. For the same reasoning as for previous variables, an HP filter was applied. Source, SCB.

Arena Investment ($AR_{i,t}$) is measured as the net expenses related to sports facilities divided by the number of residents in the municipality. This variable covers the years from 2011 to 2022, and the expenses pertain to purchases of land and technical facilities, machinery, and equipment, as well as contracts with contractors and consultants. Source, SCB.

Givers and Takers Dummy($GTd_{i,t}$) The dummy is represented as a giver when a municipality has paid a fee and as a taker if the municipality has received a subsidy from the income and cost equalization system.

Marginal Effects Dummy($MEd_{i,t}$) which determines how much a municipality either gives or takes from the income equalization system, is calculated using the following formula:

$$MEd_{i,t} = \frac{TAX_{i,t} + (\frac{1.15 \cdot POP_{i,t}}{POP_{s,t}} - 1) \cdot TAX_{c,t}}{TAX_{i,t}} \tag{4.1}$$

Where the different indices are i = municipality, s = Sweden, and c = county. Judging by the equation, the marginal effect is calculated using the tax rate of the municipality and the county tax rate, as well as the total population of Sweden divided by the municipality tax rate. The regional tax rate differs between fee-paying and subsidy-receiving municipalities in the same region. This is why municipalities do not necessarily increase their budgets when their tax capacity increases. The dummy is later categorized into five groups. The first group has negative marginal effects, i.e., they pay a higher fee when increasing $TC_{i,t}$. The second group has a positive marginal effect ranging between 5 and 10 percent. The third group ranges between 10 and 15 percent, and the fourth group covers municipalities with marginal effects of 15 to 21 percent. To clarify, if a municipality in the 15 to 21 percent group increases its tax capacity, the revenue it retains for its budget is equivalent to 15 to 21 percent of the total revenue.

Population Density Dummy ($POPDd_{i,t}$) is created based on groupings made by Sveriges Kommuner och Regioner (SKR). SKR's classification comprises of nine groupings, later assorted into three major groups. The groupings are based on traits such as urban size, closeness to bigger urban regions, and commuting patterns. The dummy included in this paper is categorized according to the following groupings:

A1. Large cities: Municipalities with at least 200,000 residents, of which at least 200,000 reside in the largest urban area.

A2. Commuting municipality near a large city: Municipalities where at least 40 percent of the population commutes for the purpose of working in a large city or a city nearby.

B. Moderately large cities as well as municipalities near moderately large cities: municipalities with at least 50,000 residents, of which at least 40,000 live in the largest urban area, or where at least 40 percent of the population commutes to work in a larger city.

C. Smaller cities and rural municipalities: Municipalities with less than 40,000 residents live in the largest urban area.

4.3 Method

The estimation method used in this paper is a fixed-effects model. This model is applied to strongly balanced panel data and computed using Stata SE 17.0. By using the fixed effects model, an analysis of changes in the relationship between municipalities over time can be made. When using a fixed effects model, omitted variable bias is reduced because it evaluates changes within groups across time. A random effect model, on the other hand, evaluates changes in error variance components across municipalities [Park, 2011].

Further, to examine the regressions for heteroskedasticity, a Breusch-Pagan test was conducted. Since the result showed the presence of heteroskedasticity issues, clustered standard errors have been applied to each regression. This approach was taken due to its suitability for correcting regressions using pooled OLS. Moreover, to examine endogeneity concerns associated with the tax capacity variable, lagged variables of the system have been tested. Thus, the income and cost equalization variables have lagged by up to 4 years. The regressions, including the lagged variables, show correlation, suggesting that this variable has endogeneity issues. This is why the paper has examined several other variables like employment and tax rate as well since these are less suspected of endogeneity concerns.

Moving on, baseline results have been made for each regression, i.e., excluding dummy variables. The benchmark analysis has later been built on using three main dummy variables, which are the following: a givers and takers dummy, a marginal effects dummy, and a population density dummy. This is done to estimate how different municipalities respond to the system.

4.4 Model and Regression Specification

To examine the correlation between the equalization system and economic growth and efficiency, the following panel data model with fixed effects for municipality and year is used to estimate the various regressions in this study:

$$Y = \alpha + \theta_k X_n + \beta_k X_{t-n} + \psi_d + \varrho + \phi + \epsilon \tag{4.2}$$

Y is a row vector $nx1$ representing the dependent variables, for example, tax capacity, GRP, or aggregated cost. The intercept is a row vector $nx1$, denoted as α. $\theta_k = (\theta_1 ..., \theta_k)$ is a nxk matrix and captures the effect of the explanatory variables denoted by X_n. $\beta_k = (\beta_1 ..., \beta_k)$ is a nxk matrix and captures the impact of the lagged explanatory variables denoted by X_{t-n}.

The various dummies are denoted by ψ_d. In addition, there are three error terms in the generic model, the time-specific error term (ϱ), the within-municipality error term (v), and the overall error term (ϵ). Each error term is a vector of size $nx1$.

Since estimating the correlation between the system and economic growth and efficiency is complex, several dependent variables with different combinations of dummy variables are examined, which implies multiple regressions. Below, two regression specifications are presented for improved understanding. In the regressions presented, the dependent variable contains a specific observation for municipality i at time t where $i = 1, 2, ..n$ and $t = 1, 2..t$ represent municipality and year, respectively:

Regression for Efficiency and Economic Growth:

$$\Delta Y_{i,t} = \beta_0 + \psi_{i,t} + \beta_1 IE_{i,t-n} + \beta_2 CE_{i,t-n} + \beta_4 EDU_{i,t} + \beta_3 POPG_{i,t} + \beta_5 FB_{i,t}$$

$$+\beta_6 TAX_{i,t} + \beta_7 DDR_{i,t} + \beta_8 ET_{i,t} + \beta_9 TOTW_{i,t} + \varrho_t + v_i + \epsilon_{i,t} \tag{4.3}$$

This is the main regression for estimating efficiency and economic growth. The dependent variables $\Delta Y_{i,t}$ used in this paper are GRP, tax capacity, employment, and tax rate. The hypothesis of this regression is that income equalization and cost equalization have a negative correlation to the dependent variables when using the control variables presented in the equation. This is motivated by the fact that the system might lower incentives for municipalities on average to invest in growth-promoting activities [Ekonomifakta, 2023]. This hypothesis is built on findings made by Buettner and Krause [2021], that equalization systems tend to raise the tax rate, which has negative implications for economic efficiency. In addition, the variables income and cost equalization have been used without lags and with lags to capture the short- and long-term effects of the equalization system. Further, using lags is also motivated by concerns for endogenity.

The baseline regression has been built on by including various dummy variables. The dummies are; givers and takers, marginal effect, and population density. The hypothesis for the regression including a dummie for giver and taker is that there is a negative correlation between the equalization system and, for instance, tax capacity for takers and givers. This hypothesis builds on Karreskog and Trygg Kupersmidt (2016) regarding negative incentives for both contributors and receivers in the system.

The hypothesis for the marginal effect dummy is that municipalities with a negative marginal effect should have lower incentives than municipalities with a positive marginal effect. Overall, regardless of the marginal effect, it should have a negative correlation with the dependent variables. To clarify, municipalities with a positive marginal effect are expected to still have a negative correlation, but a smaller one than those with negative marginal effects. This is because of the incentives it gives rise to, as explained by Karreskog and Trygg Kupersmidt (2016). For the population density dummy, the hypothesis is that smaller cities are expected to have a larger negative correlation than larger cities. This is because smaller cities tend to receive a relatively larger amount in contribution which could affect their incentives to improve their efficiency and economic growth more.

Regression for Spending Patterns and Moral Hazard Issues

$$\Delta Y_{i,t} = \beta_0 + \psi_{i,t} + \beta_1 IE_{i,t} + \beta_2 CE_{i,t} + \beta_3 POPG_{i,t} + \beta_4 FB_{i,t}$$

$$+\beta_5 DDR_{i,t} + \beta_6 ET_{i,t} + \beta_7 GRP_{i,t} + \varrho_t + v_i + \epsilon_{i,t} \tag{4.4}$$

This is the main regression for estimating spending patterns pertaining to moral hazard issues. The dependent variables $\Delta Y_{i,t}$ used in this paper are aggregated costs and various disaggregated costs, for example, arena investments and infrastructure. Note that the regressions for the expenditure variables do not incorporate lagged versions of the income or cost equalization variables. This is because the funds are fully used each year. The main hypothesis when including dummies for givers and takers and population density dummies is that takers from the system are expected to have higher incentives to increase their costs than municipalities that contribute to the system. This hypothesis is based on issues of moral hazard, as explained by Persson and Tabellini [1973]. Moreover, when examining disaggregated costs, it is expected that smaller cities have a positive correlation with unnecessary investments like arena projects, while larger cities that contribute to the system do not. These hypotheses are based on the arguments proposed by Persson and Tabellini [1973] and Sanandaji [2013].

5

Empirical Results

This chapter presents the empirical findings of this paper. One section presents the results for GRP and tax capacity. However, due to the inherent challenges in estimating GRP and the endogeneity issues related to tax capacity, a sensitivity analysis is conducted using employment and tax rate. Another section covers how the equalization system correlates to spending patterns and investments. This is done by examining aggregated as well as disaggregated costs. In this manner, principal-agent issues and moral hazard are investigated. The chapter is organized in the following way: the first section shows the results pertaining to GRP and tax capacity. Then, findings for aggregated and disaggregated costs are shown. Lastly, a section covering the sensitivity analysis is presented.

5.1 Results for Efficiency and Economic Growth

This section presents the empirical results for GRP and tax capacity. The baseline regression for GRP can be found in Table 5 (Appendix). In the baseline regression, a positive correlation between the system and GRP is observed. This contrasts with the hypothesis, as the system was expected to decrease economic growth due to creating negative incentive structures. However, no other regression tables are reported in this paper pertaining to GRP, which is because of ambiguous findings.[1] One example of an ambiguous finding is that both a positive and negative correlation can be found for municipalities within the same marginal effects group but at different lags. For example, both positive and negative correlations are found for the system within the groups of 5 to 10 percent and 10 to 15 percent. This shows inconsistencies in the correlation over time. The same inconsistencies are found when examining GRP, including the takers and givers dummy, i.e., the dummy sorting municipalities based on those that contribute (givers) and those that receive (takers) from the system.

[1] Lagged variables are examined to account for the potential correlation between the system and GRP that emerges over a few years. Up to 4-year lagged versions are examined.

However, measuring a variable like GRP is challenging because it is influenced by multiple factors that are difficult to capture in a regression. Furthermore, considering the presence of inconsistent estimates with notably low R^2 values in this paper, an alternative variable, tax capacity, is examined next.

Table 5.1 presents the baseline result for tax capacity. Each column represents the result of one regression. This table includes lagged versions of tax capacity, ranging from a lag of 1 year up to 4 years. The lagged variables provide insight into how the correlation appears over time. This is done to examine concerns of endogeneity pertaining to tax capacity as well as long-term effects. The reason why concerns about endogeneity pertain to this variable is because the system is inherently dependent on the tax capacity of municipalities. To clarify, the amount given or received by the income equalization is determined by the tax capacity of the municipality from the year before. Therefore, changes in the tax capacity of the municipality would result in changes in the amount given or received by the system. This mutual dependence implies endogeneity. While it is possible to use an instrumental variable to handle endogeneity, it was not done in this paper because of challenges in finding a suitable instrumental variable. Instead, this paper takes a different approach, which is to lag the income and cost equalization variables to take the endogenity issue into consideration. When doing this, endogeneity was found, which makes the estimates unreliable. Despite the presence of endogeneity, the results will be explained. However, meaningful inferences will not be made pertaining to this variable.

Moreover, in the first regression of Table 5.1 without lagged variables, a negative correlation between the income equalization variable and tax capacity is found. In regression 2, with one-year lags for the income and cost equalization variables, the negative correlation still holds. Yet, the coefficients are smaller than the one without lags. When considering regressions 3 to 5, representing results from a two-year lag to a five-year lag, the correlation still holds with a p-value of 0.01. However, a positive correlation for the income and cost equalization variables is found for tax capacity. These ambiguous results could be an indication of the endogeneity concerns discussed previously.

Table 5.1: Tax Capacity Baseline

$\Delta Y_{i,t}$	(1) $TC_{i,t}$	(2) $TC_{i,t}$	(3) $TC_{i,t}$	(4) $TC_{i,t}$	(5) $TC_{i,t}$
$IE_{i,t}$	-2.801***				
	(0.110)				
$CE_{i,t}$	-0.005				
	(0.075)				
$EDU_{i,t}$	502.257***	896.876***	802.481***	556.936**	645.085***
	(93.164)	(132.945)	(177.660)	(242.314)	(242.411)
$POPG_{i,t}$	-704.247***	-743.127***	-468.407***	-455.849***	-504.400***
	(54.185)	(72.496)	(88.140)	(88.125)	(86.852)
$FB_{i,t}$	128.582***	88.126***	49.144**	58.122*	33.400
	(12.776)	(16.958)	(24.651)	(31.848)	(35.229)
$TAX_{i,t}$	1,364***	1,427***	1,393***	1,572***	1,583***
	(349.511)	(403.082)	(421.159)	(415.642)	(432.709)
$DDR_{i,t}$	22,087***	13,216**	10,239*	19,696***	32,752***
	(4,176)	(5,182)	(5,668)	(5,476)	(5,528)
$ET_{i,t}$	-258.552***	-210.877***	-220.172***	-238.799***	-228.926***
	(20.966)	(27.261)	(33.360)	(35.426)	(38.620)
$TOTW_{i,t}$	0.700***	0.844***	0.887***	0.897***	1.034***
	(0.251)	(0.233)	(0.206)	(0.207)	(0.244)
$IE_{i,t-1}$		-0.681***			
		(0.143)			
$CE_{i,t-1}$		-0.269***			
		(0.089)			
$IE_{i,t-2}$			1.063***		
			(0.148)		
$CE_{i,t-1}$			-0.225**		
			(0.110)		
$IE_{i,t-3}$				1.042***	
				(0.116)	
$CE_{i,t-3}$				0.461***	
				(0.148)	
$IE_{i,t-4}$					0.870***
					(0.114)
$CE_{i,t-4}$					0.907***
					(0.183)
α	19,050***	15,890***	17,118***	18,598***	18,292***
	(1,567)	(2,060)	(2,543)	(2,692)	(2,864)
N Observations	4,930	4,640	4,350	4,060	3,770
N Municipalities	290	290	290	290	290
R^2	0.333	0.102	0.115	0.131	0.168

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Furthermore, Table 6 in the Appendix presents the results, including a dummy for givers and takers of the system. Overall, the correlations that are found show that there is a negative correlation for both groups on average. Notably, the coefficient for givers shows a larger negative impact than for takers of the income equalization variable. Further, the evaluation of the differences between takers and givers is difficult to compare due to differences in changes in the total revenue for a municipality depending on if it is a giver or a taker. This is shown in Table 3.2 (85 percent for givers and 95 percent for takers). This indicates that, on average, municipalities that are contributors to the system could benefit more from increasing their tax capacity, considering a municipality's total revenue. In Table 7, also included in the Appendix, estimations including a dummy for marginal effects are presented. A negative correlation is found for all groups for the income equalization variable and tax capacity. Municipalities having a negative marginal effect ($< 0\%$) have on average the largest negative correlation to the income equalization variable. However, due to the small differences between the groups and the fact that the group with the second largest negative impact is the group with the highest marginal effect ($15 - 21\%$), the interpretation of the result should be taken with caution. Overall, the regression estimates presented in Tables 6 and 8 support the hypothesis that the equalization system, regardless of whether a municipality receives or contributes, and regardless of the specific marginal effect, may provide incentives that discourage improvements in tax capacity.

However, as mentioned, the results between the various groups are not easily interpreted. In addition, the results has like the others estimations for tax capacity endogeneity concerns. By checking the lagged variables, this is taken into consideration. In Table 8 (Appendix) the variables of the system with a one-year lag can be found, showing a similar coefficient for the municipalities with a negative marginal effect as without lags. For the other groups, the coefficient has become smaller or shows no significance. Estimation by using lags from two to four years is more ambiguous, with few significant results (not presented).

In Table 9 (Appendix), results when including the population density dummy are presented. The findings for commuting municipalities near a large city (A2), moderately large cities as well as municipalities near moderately large cities (B), and smaller cities (C) all have a negative correlation for the income equalization. Yet, no correlation is found for large cities (A1), but as can be seen, the number of municipalities in this group is small.

Moreover, Table 5.2 presents the regressions for tax capacity, including a dummy for givers and takers as well as a dummy for the marginal effects. Consistent with the hypothesis, all regressions show a negative correlation for the income equalization variable. Thus, this finding suggests that both givers and takers, irrespective of their marginal effects, have a negative correlation with tax capacity. For example, as represented by the first regression: givers with a negative marginal effect of $< 0\%$, have a coefficient of -3.129. In the fifth regression, representing takers with a positive marginal effect of $15 - 21\%$, a coefficient of -2.665 is found. This result suggests that givers have a larger negative correlation on average in comparison to takers. This difference implies that these municipalities may have less motivation to boost their economic growth because their income is distributed to the system instead of benefiting the municipality itself. However, when comparing municipalities that are all takers but with different marginal effects, it is shown that takers with 0 to 5 percent have a coefficient of -2.317, while the group with the highest marginal effect has a coefficient of -2.665. This is not entirely in line with the hypothesis, since the smallest negative effect is expected for those with the highest marginal effect.

Table 5.2: Tax Capacity with Givers and Takers Dummy and Marginal Effects Dummy

	(1)	(2)	(3)	(4)	(5)
$\Delta Y_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$
$\psi = GTd_{i,t}$	Givers	Takers	Takers	Takers	Takers
$\psi = MGEd_{i,t}$	$< 0\%$	$0 - 5\%$	$5 - 10\%$	$10 - 15\%$	$15 - 21\%$
$IE_{i,t}$	-3.129**	-2.317***	-3.238***	-3.259***	-2.665***
	(0.863)	(0.454)	(0.212)	(0.156)	(0.907)
$CE_{i,t}$	-2.421	0.628	-0.342**	0.144	-0.0911
	(2.307)	(0.403)	(0.152)	(0.127)	(0.353)
$EDU_{i,t}$	1,675*	-785.4*	737.9**	527.5**	763.0
	(679.7)	(408.7)	(291.8)	(255.9)	(1,560)
$POPG_{i,t}$	-1,593**	-455.9*	-707.0***	-855.6***	-847.0***
	(585.2)	(261.0)	(86.05)	(118.8)	(222.4)
$FB_{i,t}$	318.8	259.9***	98.82***	136.7***	-134.5
	(193.2)	(79.31)	(32.96)	(30.17)	(282.3)
$TAX_{i,t}$	-3,456	1,911	792.1	-846.4	-4,440
	(3,200)	(2,170)	(942.9)	(739.9)	(5,554)
$DDR_{i,t}$	68,520	-6,903	21,466**	24,948***	7,859
	(45,699)	(16,731)	(8,446)	(5,938)	(19,043)
$ET_{i,t}$	-1,232**	-447.1**	-256.8***	-262.2***	-118.3
	(449.1)	(181.2)	(48.26)	(42.36)	(167.0)
$TOTW_{i,t}$	0.405**	2.094*	1.544***	3.215***	5.936
	(0.126)	(1.056)	(0.411)	(0.919)	(13.43)
α	93,715**	30,527**	18,730***	19,172***	11,831
	(31,739)	(13,173)	(3,643)	(3,227)	(12,703)
N Observations	35	309	975	1,159	87
N Municipalities	6	38	133	127	20
R^2	0.831	0.228	0.414	0.419	0.327

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.3 displays the results, including dummies for marginal effects and population density. A negative correlation is found for each regression pertaining to the income equalization variable, while the cost equalization variable is insignificant. The first regression shows the results for municipalities with negative marginal effects and commuter municipalities near a large city (A2). This combination of dummies represents the highest population density category combined with the lowest marginal effect category, which still allows for a large enough sample size. The fourth regression, however, represents the opposite combination with the highest marginal effect and the lowest population density, i.e., small cities (C). Therefore, comparing regression 1 with regression 4 highlights the most contrasting outcomes between the municipalities. As presented in the table, negative correlations are found for each regression. The coefficient in the fourth regression is slightly larger than in the first, indicating that small cities, despite having positive marginal effects, still have a slightly more negative correlation to the tax capacity than larger cities with a negative marginal effect.[2]

Furthermore, the second regression pertains to a population density dummy for commuting municipalities near large cities (A2) with a positive marginal effect. Comparing its coefficient to the one of the first regression reveals a smaller, albeit still negative, coefficient. This suggests that having a positive marginal effect, as opposed to a negative one, is associated with a lesser negative correlation with tax capacity on average for this category of municipalities. This is in line with the hypothesis in this paper. Further, when comparing regressions 3 and 4, estimating different marginal effects for small cities (C), the results show that a lower marginal effect is less negatively correlated with tax capacity on average for municipalities within the same group of population density. In contrast to the previous result with commuter municipalities, this is not in line with the hypothesis.

[3]

[2]Table 10 in the Appendix presents the result with a one-year lag

[3]Table 8 in the Appendix presents empirical evidence for tax capacity with the marginal effects and population density dummy with a one-year lag.

Table 5.3: Tax Capacity with the Population Density Dummy and Marginal Effects Dummy

	(1)	(2)	(3)	(4)
$\Delta Y_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$
$\psi = POPDd_{i,t}$	A2	A2	C	C
$\psi = MGE_{i,t}$	$< 0\%$	$5 - 10\%$	$0 - 5\%$	$15 - 20\%$
$IE_{i,t}$	-3.206***	-2.961***	-2.263***	-3.834***
	(0.524)	(0.675)	(0.299)	(0.790)
$CE_{i,t}$	-0.222	-0.439	0.497	0.457
	(0.392)	(0.471)	(0.303)	(0.595)
$EDU_{i,t}$	1,379***	406.3	1,717**	-612.0
	(333.5)	(313.9)	(661.5)	(574.9)
$POPG_{i,t}$	-311.5	379.0**	-929.7***	-942.0***
	(379.5)	(141.8)	(205.5)	(294.7)
$FB_{i,t}$	349.6***	846.2***	545.7***	818.6**
	(111.8)	(183.7)	(148.6)	(295.0)
$TAX_{i,t}$	582.3	8,882***	100.7	-3,101
	(1,684)	(1,625)	(1,124)	(2,559)
$DDR_{i,t}$	-36,656	-10,289	51,074***	-19,293
	(25,442)	(37,024)	(11,186)	(28,018)
$ET_{i,t}$	-1,166***	-1,082***	-738.2***	-495.1*
	(202.3)	(164.9)	(140.1)	(274.8)
$TOTW_{i,t}$	0.613***	1.993	4.630*	20.51
	(0.117)	(1.755)	(2.355)	(24.10)
α	90,037***	76,655***	52,616***	28,427
	(15,849)	(12,366)	(10,112)	(18,245)
N Observations	215	146	146	70
N Municipalities	14	16	14	15
R^2	0.483	0.578	0.446	0.468

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In summary, the results pertaining to GRP are unreliable because of the varying correlation between positive and negative estimates, as well as the low R^2 value. The results for tax capacity, while aligned with the corresponding hypotheses for some results, show that income equalization overall has a negative correlation to tax capacity in the short run. By including dummies, some variations between different categories of municipalities have been shown. However, it is important to note that due to endogeneity concerns, the estimates may be unreliable, which consequently undermines their overall reliability.

5.2 Results Pertaining to Spending Patterns and Moral Hazard Issues

This section presents empirical evidence pertaining to expenses and investment costs. The baseline results for aggregated costs are presented in Table 5.4. In addition, the table includes regressions with a dummy for givers and takers. The baseline regression presents a positive correlation between the cost equalization variable and aggregate costs, while the income equalization variable is insignificant. However, the coefficient is small, 0.359, and the corresponding R^2 value is low. Still, the result aligns with the hypothesis that the equalization system contributes to increased spending. However, it is important to note that higher spending due to the system does not necessarily imply wasteful spending. That is examined in the disaggregated costs below. However, the correlation establishes that there is a relationship between the system and aggregated costs.

What is more, the second and third regressions in Table 5.4 include the givers and takers dummies, respectively. A positive correlation is found for givers, suggesting that they increase aggregate costs due to cost equalization. This result is not in line with the hypothesis. In contrast, a negative correlation can be found for takers from the income equalization variable. However, note the low R^2 value.

Table 5.4: Aggregated Costs Baseline and Aggregated Cost With Givers and Takers Dummy

	(1)	(2)	(3)
$\Delta Y_{i,t}$	$C_{i,t}$	$C_{i,t}$	$C_{i,t}$
$GTd_{i,t}$	X	Givers	Takers
$IE_{i,t}$	-0.100	0.379	-0.345*
	(0.185)	(0.401)	(0.207)
$CE_{i,t}$	0.359***	0.374**	0.221
	(0.106)	(0.179)	(0.147)
$POPG_{i,t}$	-867.8***	-779.1***	-923.9***
	(73.19)	(122.7)	(87.42)
$FB_{i,t}$	118.0**	-3.250	155.4***
	(45.89)	(93.19)	(57.00)
$DDR_{i,t}$	13,359*	18,142	12,341
	(7,185)	(14,367)	(9,177)
$ET_{i,t}$	150.6***	143.1*	198.3***
	(48.93)	(78.15)	(66.37)
$GRP_{i,t}$	7.834	11.13	1.745
	(4.765)	(6.949)	(1.865)
α	-13,430***	-11,099*	-17,876***
	(3,822)	(6,273)	(5,034)
N Observations	1,431	611	820
N Municipality	159	103	128
R^2	0.203	0.110	0.304

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Further, as presented in Table 5.5, which includes the population density dummy, a positive correlation is observed for the groups of moderately large cities (B) and smaller cities (C). However, both coefficients are small, with values of 0.519 and 0.262, respectively. Still, this correlation is further examined in Table 11 (Appendix) by also including a dummy for givers and takers. Only takers are included in this table due to insufficient observations for givers. Judging by the table, a positive correlation is found for takers in the groups of moderately large cities (B). Moreover, a negative correlation is found for takers in small cities (C). Note the low R^2 value for this regression, which suggests low explanatory power.

Table 5.5: Aggregated Costs and Population Density Dummy

	(1)	(2)	(3)	(4)
$\Delta Y_{i,t}$	$C_{i,t}$	$C_{i,t}$	$C_{i,t}$	$C_{i,t}$
$\psi = POPDDd_{i,t}$	A1	A2	B	C
$IE_{i,t}$	1.622	-0.001	-0.282	-0.065
	(1.335)	(0.212)	(0.287)	(0.346)
$CE_{i,t}$	-1.154	0.326	0.519**	0.262**
	(0.500)	(0.197)	(0.214)	(0.129)
$POPG_{i,t}$	-748.2	-706.4**	-917.0***	-955.4***
	(353.8)	(253.3)	(99.18)	(114.4)
$FB_{i,t}$	905.0	51.81	28.16	178.6**
	(878.4)	(202.1)	(79.09)	(83.65)
$DDR_{i,t}$	234,611*	11,650	28,337**	7,929
	(30,638)	(27,252)	(13,154)	(10,367)
$ET_{i,t}$	-854.1	338.0	242.8***	-9.748
	(690.2)	(225.4)	(69.03)	(79.54)
$GRP_{i,t}$	45.94*	-3.331	7.502*	8.634
	(7.027)	(3.949)	(4.172)	(5.362)
α	34,368	-27,846*	-19,331***	-1,829
	(23,405)	(15,574)	(5,362)	(6,634)
N Observations	18	189	576	648
N Municipalities	2	21	64	72
R^2	0.655	0.188	0.329	0.171

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Moving on, how the system effects expenses is examined on a disaggregated level in Table 5.6. The table includes the following dependent variables: infrastructure, and expenses for operational activity. For infrastructure, takers have a positive correlation for both income and cost equalization. This suggests that municipalities receiving funds from the system invest in infrastructure. However, note the low R^2 value for this regression, suggesting low explanatory power. Also, no correlation can be found between givers and infrastructure. For expenditures for the main activity, no correlation is established for either takers or givers. Further efforts are made to examine costs and investments. In Table 12 (Appendix), the dependent variables expenditures on main activity and business promotion are examined. However, no correlations are found for the variables.

Table 5.6: Disaggregated Costs with Givers and Takers Dummy

	(1)	(2)	(3)	(4)
$\Delta Y_{i,t}$	$I_{i,t}$	$I_{i,t}$	$EXPOA_{i,t}$	$EXPOA_{i,t}$
$\psi = GT_{i,t}$	Givers	Takers	Givers	Takers
$IE_{i,t}$	0.001	5.941**	0.001	-5.041
	(0.001)	(2.411)	(0.001)	(8.801)
$CE_{i,t}$	-0.001	3.061**	-8.141	7.201
	(0.001)	(1.550)	(0.001)	(6.730)
$POPG_{i,t}$	0.782	-0.0239*	0.511	-0.614***
	(0.684)	(0.014)	(0.744)	(0.048)
$FB_{i,t}$	0.397	-0.024***	0.531	-0.086***
	(0.463)	(0.007)	(0.474)	(0.019)
$DDR_{i,t}$	52.73	0.749	53.90	-0.025
	(57.11)	(0.922)	(59.15)	(3.457)
$ET_{i,t}$	-0.818	-0.011	-0.583	0.205***
	(0.558)	(0.008)	(0.583)	(0.028)
$GRP_{i,t}$	0.009	-2.650	0.0106	0.002
	(0.009)	(0.0005)	(0.010)	(0.001)
α	60.14	1.251**	39.00	-14.86***
	(38.59)	(0.627)	(41.08)	(2.152)
N Observations	119	2,491	119	2,491
N Municipalities	15	279	15	279
R^2	0.053	0.015	0.048	0.184

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table 5.7, efforts to examine moral hazard are made by showing arena investments with the population density dummy. This is done since investment expenses on arenas should reflect investments not belonging to a municipality's core operation. By including a dummy for population density, it is possible to compare spending patterns between various categories of municipalities. Interestingly, regression 3 shows that the system is positively correlated with expenses for arena investments on average for small cities (C). The same results were not found for commuting municipalities near a large city (A2) and moderately large cities (B). However, the low R^2 value indicates the low explanatory power of these results.

Table 5.7: Arena Investments and Population Density Dummy

	(1)	(2)	(3)
$\Delta Y_{i,t}$	$AR_{i,t}$	$AR_{i,t}$	$AR_{i,t}$
$\psi = POPDDd_{i,t}$	A2	B	C
$IE_{i,t}$	1.241	0.036	0.104
	(0.880)	(0.575)	(0.259)
$CE_{i,t}$	-0.676	-0.438	0.368**
	(0.786)	(0.289)	(0.147)
$POPG_{i,t}$	-231.1	-635.9**	121.1
	(369.3)	(313.2)	(110.6)
$FB_{i,t}$	-5.537	-69.02	-49.80
	(171.6)	(102.1)	(61.75)
$DDR_{i,t}$	38,013	16,095	-777.7
	(37,534)	(12,244)	(4,636)
$ET_{i,t}$	-617.5**	-263.0	79.95
	(231.0)	(216.4)	(93.94)
$GRP_{i,t}$	6.766	1.751	-8.630***
	(11.70)	(9.638)	(2.635)
α	50,854***	21,986	-5,634
	(17,422)	(17,309)	(7,589)
N Observations	387	990	1,206
N Municipalities	43	110	134
R^2	0.030	0.017	0.012

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In summary, the results pertaining to aggregate and disaggregated costs suggest that there is a correlation between the system and expenses. For aggregated costs, givers have a positive correlation while takers have a negative correlation, which is not in line with the hypotheses. In addition, a positive correlation is found for aggregated costs and the population density dummies for groups B and C. Moreover, the system is positively correlated to investments in infrastructure for receivers. In addition, the results suggest that small cities increase arena investments due to the system.

5.3 Sensitivity Analysis

In this section, a sensitivity analysis is made to evaluate the findings. This is done by examining employment and the tax rate. This is necessary due to the challenges in estimating GRP and tax capacity. Since the income equalization system is based on tax capacity, and employment is not, employment does not have the same dependence. Yet, while some dependence still exists, the endogeneity concern is reduced for this variable. Further, the tax rate is examined as a a measure of efficiency for the municipalities, which is explained by Karreskog and Trygg Kupersmidt [2016] and examined in previous studies for Canada Smart [2007], and for Germany Buettner and Krause [2021].

In the baseline regression, when using employment as the dependent variable, no correlation is found. Additionally, the estimates show no significance when including the dummy variable for takers and givers. In contrast to the findings for tax capacity, which revealed a negative correlation for both givers and takers. Furthermore, including the dummy for marginal effects yields ambiguous results. No correlation is found among municipalities with negative marginal effects, as well as those with marginal effects ranging between 10 and 15 percent and 15 to 21 percent. Yet, a positive correlation is found in the 0 to 5 percent group, while a negative correlation is observed in the 5 to 10 percent group. These findings deviate from the results obtained for tax capacity, which had a negative correlation when no lags were included. What is more, when analyzing the variable using the population density dummy, no correlation is found for any of the groups. Additionally, no correlation is found in the regressions that combine the takers and givers dummy with marginal effects. Finally, the results of including dummies for population density and marginal effects yield no significant results. Note that the R^2 for the regression with employment as dependent variable in general is low.

In the study conducted by Smart [2007], the correlation between tax rate and the system was examined, showing that equalization systems may cause increases in local taxes. For Sweden, these tax increases could cause efficiency losses, as described by Karreskog and Trygg Kupersmidt [2016]. This efficiency loss could be amplified because of the income tax credit. When this paper examines the tax rate, no correlation is found. However, this does not imply the absence of a correlation between the system and economic growth and efficiency. Instead, it highlights the challenges of accurately estimating such a correlation.

6

Discussion and Conclusion

This chapter discusses the findings in this paper by relating them to the caveats in the data and previous literature. The discussion is separated into three sections, which are organized in the following way: the first section discusses the results of the equalization system, efficiency, and economic growth. The second discusses municipal expenditure patterns in relation to moral hazard. The final section provides an explanation of how the equalization system could be modified based on the findings of this paper.

6.1 Equalization System, Efficiency and Economic Growth

This section discusses findings pertaining to efficiency, economic growth, and the equalization system. That is, the results for GRP, tax capacity, employment, and tax rate are discussed. The results obtained for GRP are subject to questioning due to the inherent difficulty in measuring this variable since it is influenced by multiple factors. In addition, the observed R^2 value is low for all regressions pertaining to this variable. Therefore, GRP does not yield reliable results that can be used to discuss meaningful implications of the system. However, the established positive correlation found in this paper indicates that there is a relationship between GRP and tax capacity.

Further, the findings indicate a negative correlation between the equalization system and tax capacity. However, due to the endogeneity issues regarding tax capacity, the results are unreliable. If endogeneity had not been an issue, they would have overall aligned with the hypotheses in this paper. That is, there is a negative correlation between the equalization system and tax capacity. By including dummies for givers and takers and for marginal effects, it can be shown that givers with a negative

marginal effect have a larger negative correlation on average than takers from the system. In addition, Riksrevisionen [2020] found that reduced contributions to the system could have a positive impact for municipalities that contributed to the system. This is in line with the negative correlation found in this paper.

Further, while Smart [2007] and Buettner and Krause [2021] establish significant correlations pertaining to local tax rates, the data for Sweden used in this paper show no significance. In addition, following the sensitivity analysis, no correlation was found for employment. However, it is important to note that the absence of strong evidence in this paper, as well as the previous studies from Riksrevisionen [2020] should not be interpreted as indicating that there is no correlation between the system and efficiency and economic growth for Swedish municipalities. Instead, further research is necessary to investigate the system and its implications for economic efficiency. Suggestions on how to conduct such studies are presented in the chapter on future research.

To summarize, while data caveats exist for this study, a correlation between the system and GRP and tax capacity is established when including no lags and dummies. In addition, despite the fact that this paper does not establish a significant correlation for local tax rates, previous studies by Smart [2007] and Buettner and Krause [2021] find a correlation for Canada and Germany, respectively. This suggests that more studies for Swedish municipalities should be made. Lastly, this paper shows no conclusive evidence between the system and employment. Given the uncertainty of the estimates presented in this paper, it is not possible to provide a definitive answer to the research question: What is the correlation between the equalization system and municipalities' motivations for efficiency and economic growth?

6.2 Costs and Spending Patterns for Municipalities

This section discusses the results related to spending patterns and investment expenses. The findings in this paper indicate that there is a correlation between aggregated costs and the system. When examining the baseline regression, a positive correlation is found for cost equalization and aggregated cost. Nevertheless, when examining aggregate costs for givers and takers, a positive correlation is found for givers for cost equalization, while takers have a negative correlation for income equalization and costs.

The results contradicts the hypothesis based in moral hazard, that takers use fund more inefficiently and hence increase costs more than municipalities contributing to the system.

Furthermore, the regressions when including dummies show ambiguous results. By including only a dummy for population density, moderately large and small cities have a positive correlation, but when adding a dummy for giver and taker, this positive correlation still holds for the moderately large cities, while smaller cities have a negative correlation instead. So, from the result, it is shown that if a small city is a receiver from the system, it reduces its cost on an aggregated level, which is not in line with the hypothesis according to moral hazard and principal agent issues. Nonetheless, it is important to highlight that the R^2 value for this variable is exceptionally low and that some municipalities are missing.

Moreover, an analysis of disaggregated spending and investment expenses is conducted to assess whether unnecessary or necessary spending increases or decreases due to the system. Necessary spending refers to costs allocated towards investments in infrastructure or business promotion. On the other hand, unnecessary spending refers to expenditures on arena investments in areas with low population density, as such projects are not deemed essential for the successful operation of municipalities. This reasoning follows arguments proposed by Sanandaji [2013]. Evidence is found indicating that takers of the system invest in infrastructure, which could contradict the presence of moral hazard. However, when examining arena investments, evidence suggesting moral hazard issues is found. This is because a positive correlation is observed for municipalities in small cities or rural areas, representing the lowest population density group. Nonetheless, it is important to note that the R^2 values are very low, indicating limited explanatory power. Therefore, the implications of this result should be taken with caution.

In summary, the findings in this paper indicate some tendencies of correlation between the system and spending patterns. However, contrary to the hypothesis, reduced spending is observed among takers from the system. This holds even for municipalities that are takers and included in the small city grouping. Interestingly, the results obtained for arenas instead have a positive correlation for small cities, indicating that overall costs do not increase, but costs not belonging to the core operation do. Given these conflicting outcomes and the low R^2 values, it is difficult to draw a conclusive answer to the research question: How does the equalization system correlate with municipalities' incentives for efficiency and economic growth?

6.3 Key Modifications for Improving the System

This section offers suggestions for improving the system based on previous research and some of the findings presented in this paper. In order to establish equality and effectiveness between municipalities, the OECD [2022] claims that income equalization should be determined based on prospective revenue as opposed to actual revenue. Considering the reasoning of Karreskog and Trygg Kupersmidt (2016), implementing this suggestion could have less distortionary implications for economic growth and efficiency.

Further, based on the results concerning marginal effects, it is suggested that the amount received or contributed to the system should be based on demographic factors within the municipality. By basing the system on demographic factors, such as education level and age structure, the amount is based on the main factors that cause variations in tax capacity, according to Karreskog and Trygg Kupersmidt [2016]. The higher correlation found for the higher-education variable and tax capacity in this paper suggests that Karreskog and Trygg Kupersmidt [2016] is correct. Thus, instead of having a system that might give negative incentives for increasing economic growth the system could instead be based on demographic factors which municipalities cannot change.

Additionally, institutional safeguards like independent oversight committees and spending restrictions should be applied to help ensure the effectiveness of equalizing transfers. One approach is to improve monitoring and accountability mechanisms, such as by implementing performance-based grants[OECD, 2022]. Another approach is to reduce the information asymmetry between the central government and local governments by increasing transparency and communication channels [Oates, 2005]. In accordance with the findings made by Stehn and Fedelino [2009] of pro-cyclical spending patterns, implementing performance based grants is necessary to ensure efficient spending of resources. That is, as argued by Sanandaji [2013] a way of forcing municipalities to prioritize core operations instead of prestigious projects like arena investments when the population density is low.

7

Future Research

This section presents several research proposals that are driven by the data limitations identified in this paper. Therefore, a suggestion for future research is to use a more appropriate method for small sample sizes. The inclusion of dummy variables, while essential for examining the correlation for different types of municipalities, significantly reduces the sample sizes. Consequently, this paper has excluded several estimates, particularly concerning the population density dummy for group A1, due to this issue.

In order to examine causal inference effectively, it is ideal to identify a natural experiment. This type of experiment takes advantage of pre-existing conditions or events that create a situation resembling a controlled experiment, allowing for the study of causal relationships between variables. By doing so, the issue of endogeneity, particularly concerning tax capacity in this paper, could be addressed. Unfortunately, data for such a natural experiment is currently unavailable for Sweden. However, if a similar opportunity arises in another country resembling Sweden, the conclusions drawn from that study might be applicable across countries as well.

Moreover, if data on value added were collected, it would provide insights into municipalities' rankings based on entrepreneurs' overall assessment. This assessment could include factors such as the business climate, the availability of valuable information, and competence within the service sector. Although such data exists in Kolada, it is only available for a limited time frame of 1 to 2 years, which prevents long-term studies on the equalization system. Gathering value added data through surveys covering each municipality would enable further investigations into efficiency.

References

T. Aronsson and M. Wikström. Lokal beskattning och ekonomiska incitament, 2021. URL https://snsse.cdn.triggerfish.cloud/uploads/2021/12/lokal-beskattning-och-ekonomiska-incitament.

T. Baskaran, P. Feld, and J. Schnellenbach. Fiscal federalism, decentralization, and economic growth: A meta-analysis. *Economic Inquiry*, 54(3):1445–1463, 2016. URL https://doi.org/10.1111/ecin.12331.

T. Buettner and M. Krause. Fiscal equalization as a driver of tax increases: empirical evidence from germany. *International Tax and Public Finance*, 28(1):90–112, 2021. URL https://EconPapers.repec.org/RePEc:kap:itaxpf:v:28:y:2021:i:1:d:10.1007_s10797-020-09610-9.

H. T. Burret, L. P. Feld, and C. A. Schaltegger. Fiscal federalism and economic performance new evidence from switzerland. *European Journal of Political Economy*, 2021. ISSN 0176-2680. URL https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselp&AN=eds-live&scope=site.

Ekonomifakta. Kommunerna som förlorar – när fler jobbar, 2018. URL https://www.ekonomifakta.se/Artiklar/2018/oktober/kommunerna-som-forlorar-pengar-nar-invanarna-arbetar-mer/.

Ekonomifakta. Kommunala utjämningssystemet, 2023. URL https://www.ekonomifakta.se/Fakta/Offentlig-ekonomi/kommunal-ekonomi/kommunala-utjamningssystemet/.

F. Hayek. The use of knowledge in society. *The American Economic Review.*, 35 (4):519–530, 1945. URL http://www.jstor.org/stable/1809376.

D. M. Hedge, M. J. Scicchitano, and P. Metz. The principal-agent model and regulatory federalism. *The Western Political Quarterly*, 44(4):1055–1080, 1991. URL https://doi.org/10.2307/448807.

G. Karreskog and I. Trygg Kupersmidt. Kommunalråd utan ansvar. *Timbro*, 2016. URL https://timbro.se/app/uploads/2016/10/kommunalrad_utan_ansvar.

Malmö Stad. Malmö och utjämningssystemet, 2023. URL https://malmo.se/Om-Malmo-stad/Malmo-stads-budget/Malmo-och-utjamningssystemet.html.

S. Moussé and I. F. Razafimahefa. Fiscal decentralization and the efficiency of public service delivery. *IMF Working Papers*, 15(59), 2015. ISSN 978-1-4843-5111-6. URL https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsimf&AN=edsimf.WPIEA2015059&site=eds-live&scope=site.

W. A. Niskanen. Bureaucrats and politicians. *The Journal of Law Economics*, 18 (3):617–643, 1975. URL http://www.jstor.org/stable/725050.

W. E. Oates. Toward a second-generation theory of fiscal federalism. *International Tax and Public Finance*, 12(4):349 – 373, 2005. ISSN 0927-5940. URL https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edssjs&AN=edssjs.11B658E4&site=eds-live&scope=site.

OECD. Fiscal federalism 2022 : Making decentralisation work, 2022. URL https://www.oecd-ilibrary.org/sites/6140255f-en/index.html?itemId=/content/component/6140255f-en.

H. Park. Practical guides to panel data modeling: a step-by-step analysis using stata. *International University of Japan*, 12: 1–52, 2011. URL PublicManagementandPolicyAnalysisProgram, GraduateSchoolofInternationalRelations.

T. Persson and G. Tabellini. Federal fiscal constitutions: Risk sharing and moral hazard. *Econometrica*, 64(3):623–646, 1973. URL https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsjsr&AN=edsjsr.10.2307.2171864&site=eds-live&scope=site.

Regeringskansliet. Kommittédirektiv En ändamålsenlig kommunalekonomisk utjämning, 2022. URL https://www.regeringen.se/contentassets/c85c44882a7c49f9a9304a2ac0978336/en-andamalsenlig-kommunalekonomisk-utjamning-dir.-202236.pdf.

Riksrevisionen. Tillväxthämmande incitament i den kommunala inkomstutjämningen?, 2020. URL https://www.riksrevisionen.

se/download/18.5877d0cf1714e46c43fa327c/1587380990443/RiR%202020_11%20Anpassad.pdf?fbclid=IwAR1V4YN_XMEZi5EeDioWsCC_WYzYbnvuNVitgt9EqR0x1lIxsMVJpnh56zA.

SACO. Skattekraft och skattesats - var sak på sin plats?, 2008. URL https://www.saco.se/globalassets/saco/dokument/rapporter/2008_skattekraft-och-skattesats.pdf.

N. Sanandaji. *The Krympande eller växande städer? : framgångsrecepten för urban och regional utveckling runtom i landet Book*. Sanandaji AB, 2013.

SKR. Vanliga frågor om utjämningssystemet, 2022. URL https://skr.se/skr/ekonomijuridik/ekonomi/utjamningssystem/vanligafragoromutjamningssystemet.11892.html.

M. Smart. Raising taxes through equalization (augmenter les impôts par le truchement de la péréquation). *The Canadian Journal of Economics / Revue canadienne d'Economique*, 40(4):1188 – 1212, 2007. ISSN 00084085. URL https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsjsr&AN=edsjsr.4620652&site=eds-live&scope=site.

SOU. Starkare kommuner med kapacitet att klara välfärdsuppdraget, 2020. URL https://www.regeringen.se/contentassets/39c4816961934a4ca8bd627868fd4423/starkare-kommuner--med-kapacitet-att-klara-valfardsuppdraget-sou-20208.pdf.

Statistiska Centralbyrån. Kommunalekonomisk utjämning, 2023. URL https://www.scb.se/contentassets/d93ddb5be2504691ba3912701fc1e32a/beskrivning-av-kommunalekonomisk-utjamning-2023_utfall.pdf.

S. J. Stehn and A. Fedelino. Fiscal incentive effects of the german equalization system. *IMF Working Papers*, 09(124), 2009. ISSN 978-1-4518-7271-2. URL https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsimf&AN=edsimf.WPIEA2009124&site=eds-live&scope=site.

Sveriges Kommuner och Regioner. Vanliga frågor om utjämningssystemet, 2023. URL https://skr.se/skr/ekonomijuridik/ekonomi/utjamningssystem/vanligafragoromutjamningssystemet.11892.html.

F. Zhao, C. Feng, X. Li, and Y. Chen. Local government competition and regional innovation efficiency: From the perspective of china-style fiscal federalism. *Science and Public Policy*, 48(4):488–489, 2021. ISSN 03023427. URL

https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.2-52.0-85117147707&site=eds-live&scope=site.

Table 1: Modifications of The Equalization System, Year 2005 to 2022

Year	Modification
2005 Compensation Rate	A reduction of the compensation rate for municipalities paying a fee to the income equalization system. Net Givers are now allowed to retain 15 instead of 5 percent of increases in their own tax capacity.
2007 Earn Income Tax Credit	A reform implemented to encourage more people to work by reducing the tax burden for people who were working and paying income tax. The deduction is financed by the central government, indicating that an increase in the municipality tax rate is followed by an increase in the job tax deduction for the resident. The amount of deduction depends on several factor but is on average higher for people with lower incomes.
2014-2016 Compensation Rate	An additional reduction of the compensation rate for municipalities paying a fee to the income equalization system. Net givers are now allowed to retain 60 percent instead of 85 percent of increases in their own tax capacity. The reform only lasted for two years and affected six municipalities.
2007 Modifications to Cost Equalization	A new system for calculating cost equalization was constructed to better consider municipalities' different needs and conditions. Among other things, municipalities with more residents now receive more money since a larger amount of the cost equalization is based on population. Overall, the total amount of equalization payments increased.
2016 Investment Grant	Municipalities that make large investments can receive an investment grant for various types of investments, such as new roads, bridges, schools, health centers, or other types of public buildings. However, the grant usually covers a part of the investment, making municipalities bear a part of the investment costs themselves.

Table 2: Summary, Description and Source of Data.

Variable	Description	Source and Year
Tax Capacity	The tax base is computed as the taxable amount in Swedish kronor per capita at the start of the taxable year. In calculating the tax base for year t, the taxable amount based on the tax assessment for year t-1 is applied to the incomes of year t-2.	SCB, 2005-2022
Gross Regional Product	Gross Regional Product (GRP) is the regional counterpart of Gross National Product (GNP) assessed from the production side: the total value of all products and services produced in a region, divided by the number of inhabitants in the municipality	Kolada, 2012-2020
Cost	Gross cost minus internal and external revenues for all current municipal activities, both actual operations and business operations, divided by the municipality's population. Due to lack of data, this variable does not include all municipalities.	Kolada, 2005-2022
Income Equalization	Income equalization, subsidies and fees divided by the total population on November 1 of the previous year.	Kolada, 2005-2022
Cost Equalization	Cost equalization, subsidies/fees divided by total population on November 1 of the previous year.	Kolada, 2005-2022
Tax Rate	Municipal tax rates, excluding funeral fees and county council tax.	SCB, 2005-2022
Population Growth	The change in population by percentage since the previous year, refers to the 31st of December.	Kolada, 2005-2022
Highly Educated	Population aged 25-64 having a higher education, divided by total population aged 25-64. Higher education is defined as at least three years of post-secondary education or research education.	Kolada, 2005-2021
Foreign Born	The percentage of people born outside of Sweden divided by the total population on December 31st.	Kolada, 2005-2022
Population density	The classification consists of nine groupings separated into three major groups, with municipalities grouped based on characteristics such as urban size, closeness to bigger urban regions, and commuting patterns. The information is derived from several databases managed by Statistics Sweden (SCB).	SKR, 2005-2022

Table 3: Summary, Description and Source of Data.

Variable	Description	Source and Year
Demographic Dependency Ratio	The demographic dependency ratio is derived by multiplying the number of people aged 0 to 19 by the number of people aged 65 and up by the number of people aged 20 to 64. A value greater than one indicates that the elderly and younger populations outnumber the working-age population.	Kolada, 2005-2022
Employment Total	The number of people aged 20–64 who are employed is divided by the number of people aged 20–64 on December 31st. Employed people are registered residents of the municipality who earned employment income in November, as well as individuals who earned revenue through active business operations.	Kolada, 2005-2022
Total Wage	Total wage refers to people who work in municipalities regardless of where they live. Individuals with unknown control information who cannot be linked to individuals registered in Sweden are included in the overall wage sum. This could include improperly provided personal identification numbers or individuals living abroad, for example. As a result, the gender-segregated data does not add up to the total.	Kolada, 2005-2022
Expenditures for Main Activity	This variable is measured as the gross cost minus internal revenues and sales to other municipalities and regions for the municipality's ongoing actual activities (mainly tax-financed) divided by the number of residents in the municipality. The actual activities included in this measure cover the following areas: Work areas and premises, port operations, commercial operations, housing operations, air traffic, bus, car, and rail transportation, maritime traffic, electricity and gas supply, district heating, water supply and sewage management as well as waste management.	SCB, 2011-2022
Expenditures for Opertaional Activities	This variable is measured in the same way as expenditures for the main activity. However, this variable incorporates business operations as well.	SCB, 2011-2022

Table 4: Summary, Description and Source of Data.

Variable	Description	Source and Year
Expenditures for Business Promotion	The total amount spent on commercial activities for business promotion divided by the gross cost minus internal revenues and sales to other municipalities and regions for the whole amount of commercial activities is referred to as the purchase of activities. All purchases of activities from third-party suppliers, such as associations and other foundations, other corporations, municipally-owned enterprises, the state, individuals, other municipalities, municipal associations, and regions, are included. This variable is divided by the total population in the municipality.	SCB, 2011-2022.
Infrastructure	This variable is measured as the gross cost minus internal revenues and sales to other municipalities and regions for infrastructure, protection, rescue services, etc., divided by the number of residents in the municipality. The costs refer to the following activities: planning, housing improvement, business promotion, tourism activities, consumer and energy advice, streets, roads, parking, parks, environmental and health protection, alcohol permits, and rescue services.	SCB, 2011-2022
Arena Investments	Investment expenses for sports facilities divided by the number of residents as of December 31st. Investment expenses include purchases of land and technical facilities, acquisitions of machinery and equipment, and contracts with contractors and consultants. It does not include investments made by municipal companies.	SCB, 2011-2022

Table 5: GRP Baseline

$\Delta Y_{i,t}$	(1) $GRP_{i,t}$	(2) $GRP_{i,t}$	(3) $GRP_{i,t}$	(4) $GRP_{i,t}$	(5) $GRP_{i,t}$
$IE_{i,t}$	0.007***				
	(0.002)				
$CE_{i,t}$	-0.002				
	(0.001)				
$EDU_{i,t}$	-2.757	-3.159*	-3.444*	-3.280*	-3.280
	(1.872)	(1.864)	(1.966)	(1.976)	(2.000)
$POPG_{i,t}$	-0.467	-0.048	-0.220	-0.295	-0.418
	(0.739)	(0.804)	(0.855)	(0.791)	(0.841)
$FB_{i,t}$	-1.597***	-1.464***	-1.056***	-0.717***	-0.754***
	(0.366)	(0.399)	(0.308)	(0.267)	(0.240)
$TAX_{i,t}$	-5.451**	-5.185**	-4.402**	-4.667**	-5.007**
	(2.299)	(2.230)	(2.186)	(2.175)	(2.196)
$DDR_{i,t}$	5.619	-5.873	2.296	8.569	0.925
	(45.683)	(44.234)	(45.532)	(48.701)	(49.674)
$ET_{i,t}$	1.682***	1.296**	1.266*	1.366**	1.809***
	(0.536)	(0.617)	(0.652)	(0.634)	(0.586)
$TOTW_{i,t}$	0.007**	0.007**	0.007**	0.006**	0.006*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$IE_{i,t-1}$		0.006**			
		(0.003)			
$CE_{i,t-1}$		0.001			
		(0.001)			
$IE_{i,t-2}$			0.003		
			(0.002)		
$CE_{i,t-2}$			0.002*		
			(0.001)		
$IE_{i,t-3}$				0.001	
				(0.001)	
$CE_{i,t-3}$				0.003**	
				(0.001)	
$IE_{i,t-4}$					0.001
					(0.001)
$CE_{i,t-4}$					-0.001
					(0.001)
α	-110.358**	-81.185	-84.540	-97.580*	-132.753***
	(43.741)	(51.397)	(53.204)	(50.081)	(45.662)
N Observations	2,610	2,610	2,610	2,610	2,610
N Municipalities	290	290	290	290	290
R^2	0.042	0.033	0.027	0.026	0.024

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Tax Capacity with Givers and Takers Dummy

	(1)	(2)
$\Delta Y_{i,t}$	$TC_{i,t}$	$TC_{i,t}$
$\psi = GT_{i,t}$	Givers	Takers
$IE_{i,t}$	-3.364***	-2.963***
	(0.600)	(0.131)
$CE_{i,t}$	-2.089	-0.073
	(1.545)	(0.095)
$EDU_{i,t}$	1,944***	342.4**
	(315.4)	(173.6)
$POPG_{i,t}$	-1,635***	-738.0***
	(412.4)	(72.03)
$FB_{i,t}$	247.9	118.2***
	(181.5)	(15.95)
$TAX_{i,t}$	-2,774	355.7
	(2,489)	(494.5)
$DDE_{i,t}$	69,399**	16,375***
	(27,787)	(4,987)
$ET_{i,t}$	-999.5**	-226.7***
	(377.1)	(27.31)
$TOTW_{i,t}$	0.415***	1.775***
	(0.092)	(0.514)
α	78,042**	16,356***
	(26,976)	(2,078)
N Observations	50	2,584
N Municipalities	9	234
R^2	0.796	0.362

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Tax Capacity with Marginal Effects

	(1)	(2)	(3)	(4)	(5)
$\Delta Y_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$
$\psi = MGEd_{i,t}$	$< 0\%$	$0 - 5\%$	$5 - 10$ %	$10 - 15\%$	$15 - 21\%$
$IE_{i,t}$	-3.237***	-2.203***	-2.956***	-3.071***	-3.162***
	(0.497)	(0.311)	(0.153)	(0.140)	(0.727)
$CE_{i,t}$	-0.0198	0.378	-0.0954	0.0814	-0.134
	(0.393)	(0.278)	(0.130)	(0.102)	(0.359)
$EDU_{i,t}$	1,190***	-12.78	435.7***	896.4***	1,457
	(325.5)	(295.3)	(151.1)	(176.2)	(923.6)
$POPG_{i,t}$	-313.9	-308.6**	-714.8***	-843.1***	-917.4***
	(321.2)	(147.0)	(80.44)	(90.88)	(187.2)
$FB_{i,t}$	329.6***	304.2***	130.9***	177.3***	234.7
	(106.4)	(56.27)	(25.59)	(28.54)	(166.3)
$TAX_{i,t}$	741.5	2,923*	1,924***	147.9	-69.43
	(1,442)	(1,608)	(662.1)	(641.9)	(3,013)
$DDR_{i,t}$	-34,252	12,460	24,601***	28,286***	19,117
	(20,501)	(10,580)	(7,529)	(5,274)	(17,044)
$ET_{i,t}$	-988.9***	-637.5***	-233.3***	-303.3***	-392.1*
	(229.1)	(122.9)	(32.31)	(38.46)	(203.1)
$TOTW_{i,t}$	0.317**	2.953***	0.995**	2.529***	13.11
	(0.132)	(0.956)	(0.389)	(0.701)	(13.48)
α	75,136***	45,872***	16,808***	22,323***	28,087*
	(17,555)	(9,065)	(2,377)	(2,910)	(14,798)
N Observations	259	655	1,995	1,888	116
N Municipalities	17	58	183	156	24
R^2	0.451	0.247	0.338	0.381	0.354

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Tax Capacity with Marginal Effects and A One Year Lag

	(1)	(2)	(3)	(4)	(5)
$\Delta Y_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$
$\psi = MGEd_{i,t}$	$< 0\%$	$0 - 5\%$	$5 - 10$ %	$10 - 15\%$	$15 - 21\%$
$IE_{i,t-1}$	-3.266***	-0.046	-0.597***	-0.407**	0.173
	(0.602)	(0.237)	(0.179)	(0.171)	(0.498)
$CE_{i,t-1}$	-1.173**	-0.312	-0.280*	-0.335**	0.417
	(0.545)	(0.339)	(0.144)	(0.133)	(0.282)
$EDU_{i,t}$	2,148***	121.9	716.6***	1,240***	1,653
	(493.3)	(387.6)	(200.4)	(250.8)	(1,015)
$POPG_{i,t}$	-533.4	-342.3*	-761.4***	-684.4***	-668.4**
	(308.6)	(183.0)	(87.56)	(129.2)	(249.7)
$FB_{i,t}$	418.9***	295.2***	60.78*	93.61**	129.5
	(120.2)	(62.05)	(31.15)	(36.34)	(145.7)
$TAX_{i,t}$	3,216	3,077	1,428*	-153.4	2,347
	(2,311)	(1,848)	(800.2)	(760.0)	(2,961)
$DDR_{i,t}$	-51,464**	25,041*	12,817	13,723*	-23,993
	(22,226)	(14,266)	(9,902)	(7,009)	(20,447)
$ET_{i,t}$	-770.3**	-610.5***	-176.8***	-249.8***	-23.54
	(311.7)	(146.1)	(38.41)	(52.11)	(209.5)
$TOTW_{i,t}$	0.276	1.889*	1.202***	1.830**	-3.666
	(0.161)	(0.991)	(0.364)	(0.739)	(12.21)
α	56,354**	44,003***	13,369***	19,120***	364.1
	(24,130)	(10,853)	(2,845)	(4,013)	(15,559)
N Observations	247	614	1,858	1,793	112
N Municipalities	17	58	181	156	23
R^2	0.468	0.114	0.098	0.084	0.133

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Tax Capacity with Population Density Dummy

	(1)	(2)	(3)	(4)
$\Delta Y_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$
$\psi = POPDd_{i,t}$	A1	A2	B	C
$IE_{i,t}$	-5.234	-2.802***	-2.681***	-3.139***
	(2.327)	(0.377)	(0.162)	(0.123)
$CE_{i,t}$	1.641	0.011	0.029	0.043
	(1.870)	(0.227)	(0.133)	(0.083)
$EDU_{i,t}$	1,307***	843.5***	576.6***	861.8***
	(109.9)	(225.1)	(171.1)	(187.3)
$POPG_{i,t}$	-442.9	-115.4	-652.4***	-833.9***
	(915.9)	(174.4)	(94.57)	(71.20)
$FB_{i,t}$	1,016**	337.0***	120.6***	140.7***
	(148.6)	(64.97)	(23.03)	(16.77)
$TAX_{i,t}$	-973.2	3,861***	1,847***	525.8
	(3,893)	(1,198)	(438.5)	(463.4)
$DDR_{i,t}$	129,918	-13,297	23,838***	32,124***
	(189,623)	(11,553)	(6,483)	(5,576)
$ET_{i,t}$	-1,270***	-865.2***	-247.0***	-301.0***
	(121.5)	(105.5)	(30.90)	(28.49)
$TOTW_{i,t}$	0.244*	0.735***	3.000***	5.249***
	(0.067)	(0.178)	(0.355)	(0.886)
α	65,801***	65,209***	18,299***	21,963***
	(5,257)	(7,864)	(2,281)	(2,159)
N Observations	51	731	1,870	2,278
N Municipalities	3	43	110	134
R^2	0.714	0.374	0.302	0.422

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Tax Capacity with the Population Density Dummy and Marginal Effects Dummy with A One Year Lag

	(1)	(2)	(3)	(4)
$\Delta Y_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$	$TC_{i,t}$
$\psi = POPDd_{i,t}$	A2	A2	C	C
$\psi = MGEd_{i,t}$	$< 0\%$	$5 - 10\%$	$0 - 5\%$	$15 - 21\%$
$IE_{i,t-1}$	-3.267***	-1.780**	-0.232	-0.583
	(0.605)	(0.756)	(0.429)	(0.620)
$CE_{i,t-1}$	-1.512***	-0.831	0.360	0.858**
	(0.492)	(0.594)	(0.420)	(0.370)
$EDU_{i,t}$	2,348***	8.430	1,864***	-437.6
	(522.3)	(369.7)	(561.8)	(900.4)
$POPG_{i,t}$	-525.5	295.4	-1,156***	-954.2**
	(347.8)	(228.9)	(302.8)	(352.7)
$FB_{i,t}$	447.9***	983.5***	421.6**	627.7
	(119.2)	(168.1)	(189.4)	(502.2)
$TAX_{i,t}$	3,109	8,071***	-1,297	267.9
	(2,552)	(1,941)	(1,833)	(2,812)
$DDR_{i,t}$	-50,283*	40,408	21,059	-66,363**
	(27,576)	(39,797)	(14,690)	(27,122)
$ET_{i,t}$	-924.8**	-1,186***	-629.3***	77.38
	(366.0)	(252.1)	(146.2)	(320.9)
$TOTW_{i,t}$	0.572***	2.950	1.179	-19.98
	(0.141)	(2.177)	(2.682)	(24.72)
α	69,170**	83,700***	45,528***	-13,912
	(29,090)	(19,304)	(10,294)	(20,308)
N Observations	206	134	137	67
N Municipalities	14	15	14	14
R^2	0.522	0.546	0.272	0.236

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Aggregated Costs with Givers and Takers Dummy and Population Density Dummy

	(1)	(2)	(3)
$\Delta Y_{i,t}$	$C_{i,t}$	$C_{i,t}$	$C_{i,t}$
$\psi = GTd_{i,t}$	Takers	Takers	Takers
$\psi = POPDd_{i,t}$	A2	B	C
$IE_{i,t}$	0.016	-0.291	-0.720**
	(0.228)	(0.448)	(0.289)
$CE_{i,t}$	0.487*	0.495	0.0211
	(0.255)	(0.391)	(0.155)
$POPG_{i,t}$	-537.2	-972.8***	-1,027***
	(397.1)	(128.0)	(118.4)
$FB_{i,t}$	56.01	-7.929	314.0***
	(233.2)	(133.9)	(78.83)
$DDR_{i,t}$	2,741	31,720	2,127
	(34,340)	(23,017)	(10,522)
$ET_{i,t}$	168.4	359.6***	52.78
	(270.0)	(116.6)	(104.1)
$GRP_{i,t}$	-3.874	5.463	2.027
	(6.671)	(6.959)	(2.190)
α	-14,193	-28,097***	-8,995
	(18,467)	(8,998)	(8,074)
N Observations	127	306	378
N Municipalities	18	51	58
R^2	0.097	0.318	0.372

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Disaggregated Costs for Operational Activities and Business Promotion with Givers and Takers Dummy

	(1)	(2)	(3)	(4)
$\Delta Y_{i,t}$	$EXPMA_{i,t}$	$EXPMA_{i,t}$	$EXPBP_{i,t}$	$EXPBP_{i,t}$
$\psi = GTd_{i,t}$	Givers	Takers	Givers	Takers
$IE_{i,t}$	0.001	-3.001	-0.006	-0.004
	(0.001)	(9.002)	(0.004)	(0.007)
$CE_{i,t}$	-5.621	9.811	-0.012	-0.006
	(0.001)	(7.361)	(0.007)	(0.006)
$POPG_{i,t}$	0.483	-0.610***	-2.881	-0.395
	(0.728)	(0.049)	(5.112)	(4.081)
$FB_{i,t}$	0.540	-0.078***	-1.859	5.347**
	(0.484)	(0.022)	(3.796)	(2.285)
$DDR_{i,t}$	54.380	0.906	84.620	-1,201***
	(59.42)	(3.762)	(252.9)	(407.1)
$ET_{i,t}$	-0.559	0.213***	-0.309	-0.134
	(0.575)	(0.029)	(6.759)	(3.413)
$GRP_{i,t}$	0.009	0.009	0.098***	0.084
	(0.009)	(0.001)	(0.027)	(0.095)
α	36.88	-15.60***	118.5	189.3
	(40.27)	(2.204)	(569.0)	(269.7)
N Observations	119	2,491	119	2,490
N Municipalities	15	279	15	279
R^2	0.046	0.167	0.051	0.011

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13: Structural Breakpoints GRP

i=290	t=9	95 percent confidence interval
2	2013	2013 — 2013
4	2015	2015 — 2015
5	2016	2016 — 2016
7	2018	2018 — 2018
8	2019	2019 — 2019

$SSR = 286127.10$

Table 14: Structural Breakpoints Tax Capacity

i=290	t=9	95 percent confidence interval
4	2008	2007 — 2009
6	2010	2009 — 2011
8	2012	2011 — 2013
12	2016	2015 — 2017
14	2018	2017 — 2019

$SSR = 4.82e + 09$