Municipality Size and Asymmetric Cost Behaviour: Empirical Evidence from Finland

Abstract

We study cost stickiness, i.e. asymmetric cost behaviour, of municipal administrative expenses when compared to changes in municipal revenues. We use unique Finnish data with 292 municipalities during 2015–2023, a period that includes a major legislative shift of operations in 2023 when most welfare services (corresponding approximately half of the prior revenues of municipalities) were transferred from municipalities to newly established wellbeing services counties. We find that generally municipal administrative costs are cost-sticky regarding revenues and that during the major shift of operations in 2023 the cost stickiness phenomenon was even amplified. Further, cost stickiness largely relates to small municipality sizes, and small municipalities demonstrate significantly higher per capita administrative costs. The findings, as a practical implication, support local government amalgamations.

Introduction

The phenomenon of 'sticky costs', first identified among public firms (Anderson et al., 2003), suggests that organisations do not reduce costs symmetrically when revenues decline (Banker and Byzalov, 2014). Several reasons for cost stickiness have been proposed, including legal reasons, social expectations, or behavioural reasons (Guenther et al., 2014). More recent research has extended the analysis of sticky costs to the public sector. Among local governments, studies have found evidence of both cost stickiness (Cohen et al., 2017; Bradbury and Scott, 2018) and anti-stickiness (Karatzimas et al., 2022; Karatzimas et al., 2024). However, these studies have largely overlooked the significant variation in the size of local governments, which may influence cost responsiveness.

Municipality size could be a key factor in explaining cost stickiness. On one hand, larger municipalities might be better equipped to adjust their costs; for instance, they may have experience in coordination and budget prioritisation (Avellaneda and Corrêa Gomes, 2014). Although overall spending per capita may not vary significantly with size, studies on municipal amalgamations suggest that larger entities tend to have lower administrative costs (Allers and Geertsema, 2016) and can spread these costs across a broader range of functions, suggesting economies of scale (Stigler, 1958). Additionally, larger municipalities may possess slack resources, enabling greater flexibility in responding to revenue fluctuations (Balakrishnan et al., 2004; Hendrick, 2006).

On the other hand, large municipalities may face higher adjustment costs (Karatzimas et al., 2024). Further, Drew et al. (2016) noticed that economies of scale first increase but turn into diseconomies of scale in Australian local governments with populations over 98,000. Smaller

municipalities might also respond more nimbly to citizen demands or fiscal changes due to their lighter decision-making structures (Andrews et al., 2020).

Given this variation, a natural question arises: *Is municipality size associated with cost stickiness?* We explore this question particularly in the context of Finland's 2023 reform of healthcare and social service provision. Under this reform, the responsibility for these services was transferred from municipalities to newly established wellbeing services counties (WSCs), funded by the national government. As a result, approximately half of local government budgets were reallocated to the national level, i.e. fiscal revenues declined by approximately 50 %. This major event allows a unique opportunity to study local government cost stickiness.

For comparison, we also consider it helpful to look at the cost-stickiness phenomenon over a longer period, including years characterised by both small and large revenue changes, in the European context. Therefore, this study uses data from all 292 municipalities in Mainland Finland from 2015 to 2023, resulting in a relatively large data set (useful N= 2086). We apply the methodology proposed by Anderson et al. (2023) to model cost stickiness, using administrative costs as the dependent variable. While we find no evidence of cost stickiness—or size-related cost stickiness—in the years leading up to the reform, our results suggest municipalities could not reduce administrative costs in line with their downsized budgets. Notably, we observe a significant size effect: smaller municipalities typically have higher administrative costs per capita and experience significantly smaller reductions in their administrative costs following the reform.

The remainder of the paper is structured as follows. The second section describes the institutional setting. The third section reviews the relevant literature and develops the research hypotheses. The fourth section outlines the data and methodology. The last sections present the results and conclude the paper.

Institutional setting

There are 308 municipalities in Finland, 292 of which are in Mainland Finland and 16 in the region of Åland. This study examines municipalities in Mainland Finland with the same self-government status and similar functions. The revenues of municipalities consist of tax revenues, central government transfers to municipalities and operating revenues from services. In addition, municipalities may have extraordinary income that has been excluded from this study.

Finnish municipalities have a self-government. Each municipality shall have a municipal council, a municipal executive, a chief executive or a mayor and a municipal audit committee (Municipalities Act, Sections 14, 30, 41 and 44). Municipal counsellors and deputy counsellors are elected in municipal elections held every four years. Municipalities are free to decide on the organisation of their functions and services and how they organise the administration and support functions serving the entire municipality. These tasks can be carried out as their own activities, outsourced services, or in cooperation with other municipalities.

The administrative costs of a municipality consist of the organisation of general administration and support services for the entire municipality. Administrative costs do not include costs that can be allocated directly or indirectly to various services. The cost accounting handbook of The State Treasury of Finland (Aura) instructs the following municipal functions to be included in general administration services:

- municipal democracy services (e.g. municipal council, municipal executive, chief executive and centralised preparatory tasks for these activities)
- activities guiding and advising the entire municipality's activities and strategy
- services that support the strategic, broad-based and long-term development and planning of the municipality as well as information gathering and processing that support them
- preparedness and contingency planning
- centralised case management, information management, archiving, archive information service and notification of decisions in accordance with the information management plan
- audit boards, internal audit and audit activities
- taxation costs
- cooperation, for example with other municipalities and wellbeing services counties (State Treasury of Finland, 2024).

From the beginning of 2023, health and social services and rescue services were transferred from municipalities to wellbeing services counties. Daycare, education, and cultural activities remained after the reform as the key tasks of municipalities. In addition, municipalities take care of community construction and technology in their area. The City of Helsinki also

manages the duties that elsewhere in Mainland Finland were transferred to the wellbeing services counties.

In the reform, approximately half of the municipal revenues corresponding to the expenditure of the transferred services were reallocated to the wellbeing services counties. Although the revenues and expenditures were the same at the national level, the amounts of reallocated revenues and expenditures varied by municipality. The personnel needed to perform the services were also transferred to the wellbeing services counties. The intention was also to transfer the personnel of different support tasks, where at least half of the tasks were related to the transferred services.

Municipalities apply the Accounting Act when drawing up their financial statements. The wellbeing services county and municipality subcommittee of the Finnish Accounting Board issues instructions and statements on applying the Accounting Act. The reporting of municipal financial data and, for example, the grouping of costs are based on legislation and binding instructions issued under it. The financial statements and reported financial data of municipalities are audited by chartered public finance auditors. (Municipalities Act, Sections 112, 120a, 122 and 123)

Cost stickiness

The phenomenon of asymmetric cost behaviour is also called cost stickiness or cost remanence (Guenther et al., 2014). It means that the costs expected to be variable are not symmetrically variable, but the magnitude of the increase in expenses associated with an increase in economic activity (often measured with revenues) is greater than the magnitude of the decrease in expenses, when the economic activity decreases proportionally (see Anderson et al., 2003; Balakrishnan et al., 2004; Karatzimas et al., 2022).

Sticky costs typically relate to selling, general and administrative (SG&A) expenses. The reasons for this relate to business outlooks, stakeholder expectations, agency problems and other self-interested or behavioural aspects, transaction or other adjustment costs (like severance pay or battles with labor unions), as well as creating slack or idle resources. (Cohen et al., 2017; Karatzimas et al., 2022.)

In the public sector, sales are often not the key cost driver (or a good measure of activity levels) but a large part of the costs, or their changes, relate to mandatory service provision, affected by legislative changes, population size and political aspirations. However, some administrative costs are directly affected by activity volume or tax revenues, and also IT-system-related costs relate to the magnitude of operations. (Cohen et al., 2017; Mättö et al., 2017; Rautiainen, 2009) Further, in municipal context many organisational practices are institutionalized, and are considered as sunk costs or committed resources (Anderson et al., 2003; Arkes & Blumer, 1985). Further, any expense cut might disturb the potential voters, suggesting particular cost-stickiness in spending before an election year (populism or short-termism, see e.g. Cohen et al., 2017; Garri, 2010; Karatzimas et al., 2022).

Karatzimas et al. (2022) study the logarithmic change in municipal expenses (ΔExp) in Spanish municipalities, focusing on the change of revenues (ΔRev) and change in revenues when the direction (d) of change is negative (when revenues decline, d*ΔRev). They find that the change in revenues has a clear positive and statistically significant connection to total expenses but that when the change in revenues additionally is negative the connection is also positive and statistically significant. This result shows that in the Spanish sample the total expenses exhibit anti-sticky behavior, so that the cost response to an activity level decrease is greater than in the case of an activity increase. However, during periods of crises anti-stickiness seems to be amplified and in periods preceding elections the anti-stickiness trend seems to be mitigated. Further, larger municipalities show greater anti-stickiness, even if large municipalities often have wide services and may be demanding to manage in terms of coordination, budgeting or financing (see Avellaneda and Corrêa Gomes, 2015; Karatzimas et al., 2022; Karatzimas et al., 2024). These findings, in our view, warrant further analyses of municipal cost stickiness, also in the Northern European context for comparison, and suggest analysing major organisational or operative changes as well as the municipality size.

All costs are not always equally sticky, however, but it has been noted that administrative costs in non-profits can be stickier than for example SG&A costs in private firms (Marudas et al., 2016). Further, anti-sticky behaviour has been witnessed regarding administrative expenses in Greek local governments, even if not regarding the core operating service expenses, which are

considered critical or politically important (Cohen et al., 2017). On the other hand, with evidence from New Zealand, municipal operating costs have been found "super-sticky", i.e. they even increase when revenues decrease (Bradbury and Scott, 2018).

In Finnish context, Mättö et al. (2017) noted that predominance of fixed salaries, restrictions on contract termination, and slow capacity adjustments are typical for public sector organisations, suggesting that many costs are immune to activity volume shifts. However, recent developments in AI (Koliousis et al., 2024) or service outsourcing (Flinkman et al., 2024) may change the way municipality costs stick. The literature considered suggest that various cost categories may deserve analysis, but for local government cost stickiness analyses the focus needs to be in the administrative expenses (administrative costs as dependent variable, instead of e.g. the operating costs which are not necessarily driven by fiscal revenues).

Further, there may be culture, trust- or country-specific issues relating to cost stickiness (see e.g. Hartlieb et al., 2020). In European context, many recent developments seem to warrant further attention to municipal cost stickiness, including economic and political uncertainty, the impact of crises, such as Covid-19 and the Ukraine situation. For example, during crises, some savings might be needed and better agreed by political parties (see Sargiacomo, 2015), but also local, national or global quantitative easing might be applied, leading to inflation and salary increases. Yet, the long-term impacts of quantitative easing to markets and people remain somewhat unsure or unclear (Joyce et al., 2010).

However, when there is a major change in organisational practices, such as if a new organisation is built to take care of some of the services, there might not be similar burden of past years and practices, and the drivers of those costs might be better captured, possibly encouraging symmetry in the cost behaviour. Further, the size of a municipality may affect cost stickiness and the possibilities of service provision or scaling the administration up or down. Our hypotheses are:

H1: Municipal administrative costs are cost-sticky in relation to revenues

H2: During major operative changes the cost stickiness is reduced

H3: Cost stickiness relates to small municipality size

In the Finnish municipality context involving both small and bigger municipalities, in 2010–2023, there is an exceptional chance to study cost stickiness generally, in election years, during the Covid-19 crisis and concerning a drastic change in the organisational form, when most social and basic health care services were transferred from municipalities to wellbeing services counties.

Data

This study uses a sample of Finnish municipalities from 2016 to 2023. The sample period allows us to examine cost stickiness in general, during election years, during the Covid-19 crisis, and in the context of a major organisational change in 2023, when most social and basic health care services were transferred from municipalities to wellbeing services counties (WSCs).

To analyse cost stickiness in this context, data on municipal revenues and expenditures were collected from Statistics Finland and the State Treasury of Finland. On the revenue side, we use the variable 'Total municipal revenues' (Rev). This choice follows earlier research on municipalities (Cohen et al. 2017; Karatzimas et al. 2022) and corresponds to the commonly used 'Sales revenues' variable in studies of private firms. Unlike Karatzimas et al. (2022), this study focuses on 'Administrative expenses' (Exp) rather than total, investment, and service provision expenses. In addition, we use the variable 'Population' to reflect the size of each municipality. We use inflation-adjusted values to capture better trends that are not solely caused by general increases in the cost level. Inflation adjustments are based on Finland's Harmonised Index of Consumer Prices (HICP) annual averages, with data sourced from Eurostat.

Table 1

Panel A

	Mean	Median	25 % Quantile	75 % Quantile
Revenue[1]	136,128	46,751	23,856	110,713
Administrative expenses[1]	2,176	964	607	1,882
Population	18,868	6,480	2,996	15,306

[1] In thousands EUR

Panel B

Size Class	Number of Municipalities as of 2023
1	38
2	91
3	67
4	43
5	32
6	21
Total	292

Table 1 displays basic summary statistics for our sample. In Panel B, the size classes represent the size categories of municipalities based on their population size. Class 1 includes municipalities with 2,000 or less inhabitants, class 2 includes municipalities with 2,001-5,000 inhabitants, class 3 includes municipalities with 5,001-10,000 inhabitants, class 4 includes municipalities with 10,001-20,000 inhabitants, class 5 includes municipalities with 20,001-50,000 inhabitants, and class 6 includes municipalities with over 50,000 inhabitants.

A structured data filtering process was applied to ensure the results' reliability.

First, observations with missing values in key variables, such as population size, log change in administrative expenses, or log change in revenues, were excluded to ensure a complete and consistent dataset.

Next, observations were filtered based on extreme annual percentage changes in administrative expenses. Specifically, any observation with an absolute change greater than 50 per cent was excluded if it was neighbouring to another year with a similarly large change. This rule removes systematic anomalies likely due to accounting adjustments or classification errors rather than real shifts in spending.

To account for the scale of revenue changes when evaluating cost adjustments, a signed perpendicular distance was calculated from each observation to the 45-degree reference line in log-change space. This reference line represents a theoretical one-to-one change between revenues and administrative costs. The signed distance captures how closely each municipality's cost adjustment behaviour aligns with proportional adjustment to revenue changes. A positive distance indicates that administrative costs increased more than revenues or declined less than revenues, depending on the direction of the revenue change. A negative distance indicates that administrative costs increased less than revenues or declined more than revenues. This interpretation allows the metric to reflect both cost stickiness and flexibility in a scale-aware manner.

Observations falling in the upper or lower 2.5 per cent of the distance distribution were removed. This method avoids arbitrary thresholds and instead evaluates the plausibility of cost adjustments in relation to the scale of the revenue shock. For example, a 50 per cent increase in administrative costs may appear large in absolute terms but may be reasonable if revenues also increased substantially. However, the same cost increase during a period of sharp revenue decline signals a clear deviation from proportional adjustment. Using distance from the theoretical benchmark accounts for these differences in context and provides a consistent basis for identifying extreme behaviour.

Finally, revenue changes were inspected separately to determine whether additional filtering was necessary. Visual inspection and distributional checks revealed no clear outliers or implausible values in revenue changes, so no additional filtering was applied to the revenue variable.

The resulting filtered panel dataset covers 2,086 observations (down from unfiltered 2,332) of 292 municipalities. The panel is unbalanced, with 140 municipalities missing at least one observation year, mainly due to the filtering process.

Sticky cost methodology

The study applies the methodology developed by Anderson et al. (2003) to examine the presence of cost stickiness. This approach estimates how expenses change in response to current revenue changes, allowing us to assess whether costs increase more when revenues rise than when they decrease. The OLS specification (1) is:

$$\Delta Exp_{i,t} = \alpha_0 + \alpha_1 \Delta Rev_{i,t} + \alpha_2 d_{i,t} \Delta Rev_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $\Delta Exp_{i,t}$ is the annual log change in administrative expenses of municipality i in year t, $\Delta Rev_{i,t}$ is the annual log change in total revenues of municipality i in year t, $d_{i,t}$ is the indicator

for the direction of total revenues of municipality i in year t with $d_{i,t} = 1$ in case of revenue decrease.

We also include an extended model (2):

$$\begin{aligned}\Delta Exp_{i,t} = {} & \beta_0 + \beta_1 \Delta Rev_{i,t} + \beta_2 d_{i,t} \times \Delta Rev_{i,t} + \beta_3 \Delta Rev_{i,t} \times \ln(Pop_{i,t}) \\ & + \beta_4 \Delta Rev_{i,t} \times d_{election} + \beta_5 \Delta Rev_{i,t} \times d_{covid-19} \\ & + \beta_6 d_{i,t} \times \Delta Rev_{i,t} \times \ln(Pop_{i,t}) + \beta_7 d_{i,t} \times \Delta Rev_{i,t} \times d_{election} \\ & + \beta_8 d_{i,t} \times \Delta Rev_{i,t} \times d_{covid-19} + \beta_9 d_{i,t} \times \Delta Rev_{i,t} \times d_{2023} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where the control variables are the log population $\ln(Pop_{i,t})$, and dummy variables for the years leading to local elections $d_{election}$, Covid-19 years $d_{Covid-19}$ (2020-2022), and the 2023 reform d_{2023}. All controls except d_{2023} is interacted with $\Delta Rev_{i,t}$ and $d_{i,t} \times \Delta Rev_{i,t}$ to obtain the asymmetries in cost behaviour. The reason why d_{2023} is not interacted with $\Delta Rev_{i,t}$ alone is because there is only one observation where revenue increased in the year 2023.

Each model's standard errors are clustered at the municipal level. Models with municipal and year fixed effects are also reported.

Sticky cost analysis results

Table 1: Regression Results

The Dependent Variable is the Log-Change in Administrative Expenses				
	(1)	(2)	(3)	(4)
$\Delta Rev_{i,t}$	-0.102	0.075	1.913*	-0.277
	(0.133)	(0.191)	(0.988)	(1.226)
$d_{i,t} \times \Delta Rev_{i,t}$	0.304**	0.044	-2.370**	-0.191
	(0.139)	(0.212)	(1.016)	(1.262)
$\Delta Rev_{i,t} \times \ln(Pop_{i,t})$			-0.168*	0.027
			(0.101)	(0.127)
$\Delta Rev_{i,t} \times d_{election}$			-1.217***	0.517
			(0.348)	(0.405)
$\Delta Rev_{i,t} \times d_{Covid-19}$			0.515	-0.005
			(0.345)	(0.458)
$d_{i,t} \times \Delta Rev_{i,t} \times \ln(Pop_{i,t})$			0.211**	0.005
			(0.101)	(0.131)
$d_{i,t} \times \Delta Rev_{i,t} \times d_{election}$			2.069***	-0.766
			(0.558)	(0.912)
$d_{i,t} \times \Delta Rev_{i,t} \times d_{Covid-19}$			0.001	0.418
			(0.402)	(0.529)
$d_{i,t} \times \Delta Rev_{i,t} \times d_{2023}$			0.274**	0.433***
			(0.116)	(0.159)
N	2086	2086	2086	2086
R^2	0.064	0.205	0.080	0.210
$R^2_{adj.}$	0.063	0.071	0.076	0.074
Municipality Fixed Effects		X		X
Year Fixed Effects		X		X

* p < 0.1, ** p < 0.05, *** p < 0.01

Table 1 presents regression results testing for cost stickiness in Finnish municipalities. The estimations apply two versions of the sticky cost model: Model 1 includes no controls beyond the revenue change and its interaction with the revenue decrease dummy, while Model 2 incorporates controls for log population, election years, the Covid-19 period, and the 2023 reform, all interacted with revenue change (except the 2023 dummy) and the revenue decrease dummy. Odd-numbered columns report OLS estimates without fixed effects, and even-numbered columns include municipality and year fixed effects.

Column (1), estimating Model 1 without fixed effects, shows a negative but insignificant coefficient on revenue change and a significant positive coefficient on the interaction term for revenue decrease. This suggests that administrative costs do not change significantly when revenue increases but do decrease to some extent when revenue decreases. $(\beta_1 + \beta_2) = 0.202$ implies approximately a 0.2 % decrease in administrative costs when revenue decreases by 1 %. However, the model's explanatory power is limited, with an adjusted R-squared of 0.063. Column (2) includes fixed effects, and the R-squared increases to 0.071, suggesting that unobserved heterogeneity across municipalities and years explains at least part of the variation. Notably, once fixed effects are added, neither the revenue change nor the interaction term remains statistically significant. This suggests the initial result may be driven by omitted variables rather than true asymmetry.

Column (3), which estimates Model 2 without fixed effects, includes both two-way and three-way interaction terms to examine how the responsiveness of administrative costs to revenue changes varies across municipality size and time periods. In this specification, the coefficients on revenue change and its interaction with the revenue decrease dummy capture the cost response during the benchmark period from 2016 to 2019 for a municipality with a log population of zero. The coefficient on revenue change is positive and marginally significant (1.913, p-value < 0.1), while the interaction with revenue decrease is significantly negative (-2.370, p-value < 0.05). Taken together, these imply that when revenues decreased by 1 per cent, administrative expenses increased by approximately 0.46 per cent in the benchmark case.

The two-way interactions help reveal how upward cost responsiveness varies across contexts. The interaction between revenue change and log population is negative (-0.168, p-value < 0.1), indicating that larger municipalities increase administrative costs less when revenues rise. The interaction with the year before municipal elections is strongly negative (-1.217, p-value < 0.01), showing that upward cost responses are muted ahead of elections, contrary to common assumptions. The interaction for the COVID-19 period (0.515) is not statistically significant.

Crucially, the three-way interactions explain variation in cost stickiness. The interaction with log population (0.211, p-value < 0.05) shows that larger municipalities are less sticky. They reduce administrative costs more when revenues decline compared to smaller ones. This supports the expectation that scale enhances fiscal flexibility. The interaction for the year before elections is also significantly positive (2.069, p-value < 0.01), indicating that cost stickiness decreases in pre-election years. Contrary to typical assumptions that elections lead to rigid spending, this finding suggests municipalities may be under greater pressure to demonstrate cost control when revenues fall. The Covid-19 triple interaction is near zero (0.001) and insignificant, implying no meaningful change in stickiness during the pandemic. The interaction with the 2023 reform year is positive and significant (0.274, p-value < 0.05), showing that stickiness was lower during the structural reform, likely due to administrative restructuring and one-time policy pressure to cut costs.

In summary, Column (3) shows that in the baseline, administrative costs rise even when revenues fall, but this stickiness is mitigated in larger municipalities, the year before elections,

and during the 2023 reform. These findings highlight that cost stickiness is not uniform but depends on size, timing, and institutional context.

However, after introducing fixed effects to the model in Column (4), almost all significance is lost, meaning that unobserved heterogeneity may still play a role. Only the three-way interaction with 2023 remains significant. This warrants a closer investigation of changes specific to the year 2023.

2023 Reform

To better understand how municipalities adjusted administrative expenses during the structural reform in 2023, we conducted a closer examination of cost behaviour in that year. The reform involved a major reorganisation of responsibilities, as most social and basic health care services were transferred from municipalities to established wellbeing services counties. This transition substantially altered municipal revenue streams, making 2023 a distinct setting to observe how local governments adapt administrative costs in response to a large external shock.

One factor that may help explain variation in adjustment behaviour is municipality size. Smaller municipalities often operate with minimal administrative structures. According to the Finnish Municipalities Act (410/2015), municipalities are legally required to perform a limited set of core tasks, and in many cases, essential administrative functions are handled by a single employee or a tiny team. As a result, when revenues decline, there is often little scope to reduce administrative costs without compromising basic operations. Likewise, when revenues increase, small municipalities may experience disproportionately large cost pressures, as even small expansions in services or compliance obligations can require additional staffing or infrastructure investment.

In contrast, larger municipalities tend to have more organisational flexibility. Their administrative systems are typically more differentiated, enabling them to reallocate tasks internally or make partial staff reductions when revenues fall. They are also more likely to absorb moderate increases in demand without immediate increases in spending. This adaptive capacity is linked to the concept of slack resources, which refers to excess capacity or budgetary buffers that allow organisations to delay or soften cost adjustments. Balakrishnan, Petersen, and Soderstrom (2004) show that cost stickiness in the private sector is moderated by capacity utilization, with greater slack enabling more responsive cost behaviour. Similarly, Hendrick (2006) demonstrates that in the public sector, financial slack plays a key role in helping local governments smooth expenditures e.g. during fiscal shocks.

Graphical evidence

Figure 1

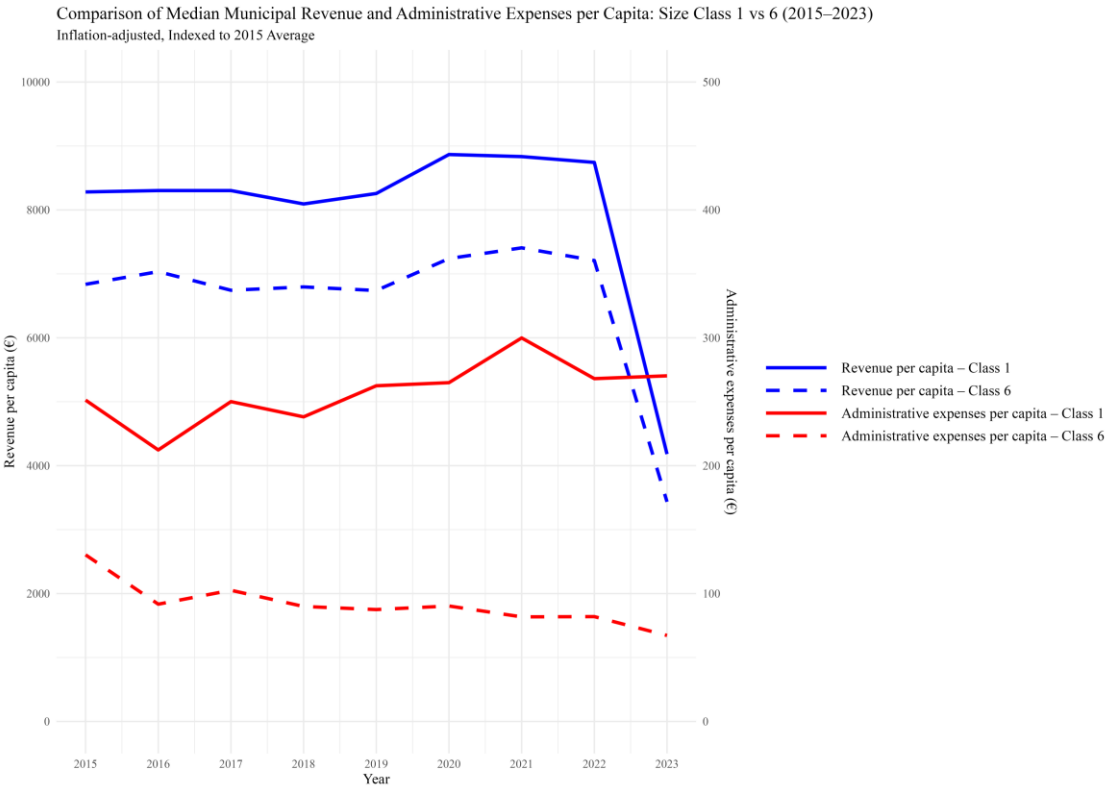


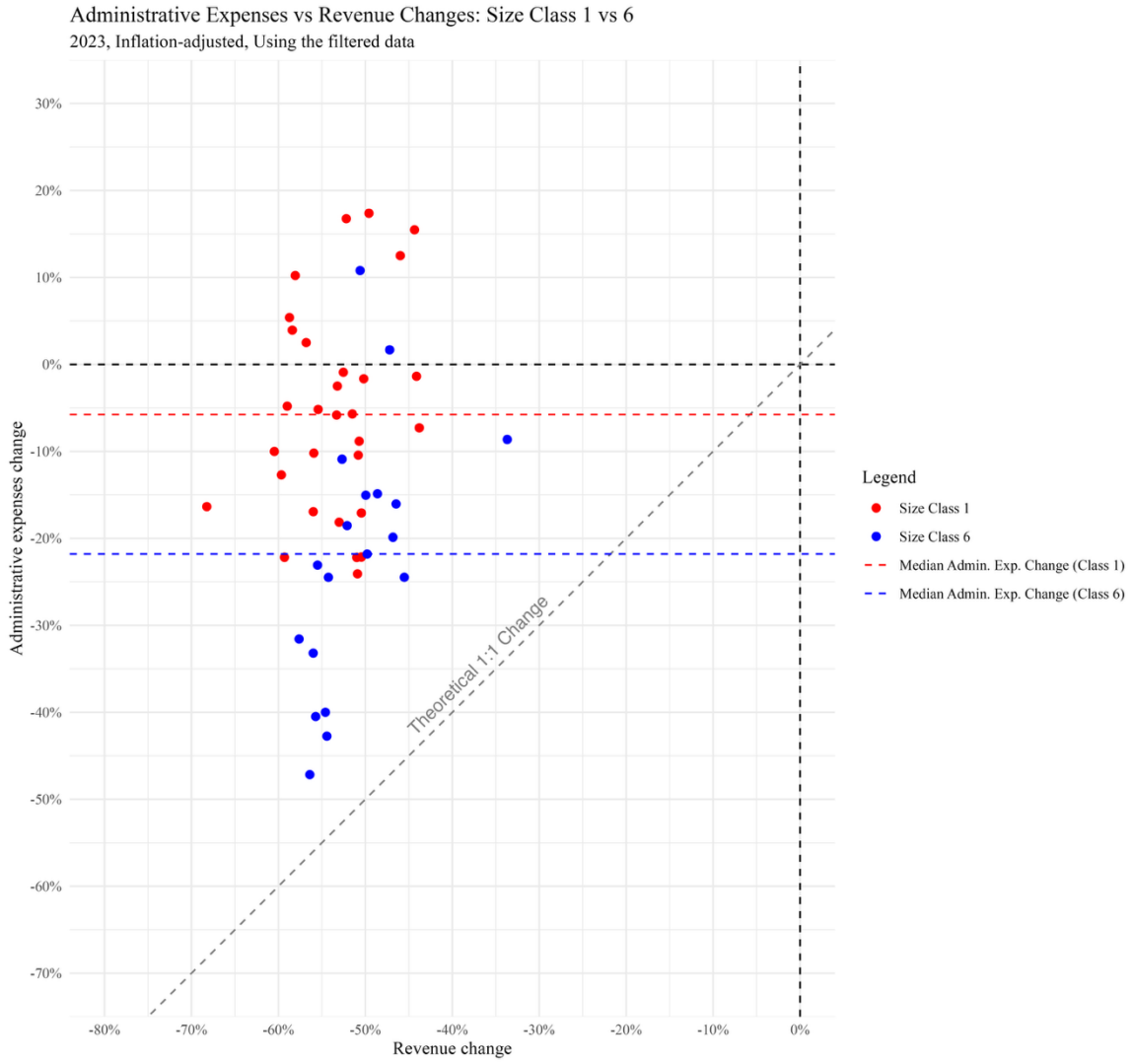
Figure 1 shows the development of median per capita revenues and administrative expenses for the smallest municipalities (Size Class 1: ≤ 2,000 inhabitants) and the largest municipalities (Size Class 6: > 50,000 inhabitants) from 2015 to 2023. Larger municipalities consistently report lower per capita administrative expenses than smaller ones, reflecting economies of scale in administrative functions. Despite managing broader service portfolios, larger municipalities can spread fixed costs across a larger population, resulting in more efficient per capita spending. Smaller municipalities, by contrast, face indivisible administrative tasks and minimum staffing needs, which keep their per capita costs relatively high. The 2023 reform is clearly visible on the revenue side, with both groups showing a sharp drop due to the transfer of service responsibilities to the new wellbeing service counties. However, on the cost side, only the largest municipalities show a noticeable decline in administrative expenses. In contrast, the smallest municipalities exhibit little or no reduction, indicating limited flexibility in adjusting their cost structures.

Figure 2 displays a scatterplot that illustrates the changes in administrative expenses and total revenues for Finnish municipalities in 2023. Again, the analysis focuses on two size classes: small municipalities with 2,000 or fewer inhabitants and large municipalities with more than 50,000 inhabitants. Each point in the plot represents a municipality, with the horizontal axis depicting the change in total revenues and the vertical axis depicting the change in administrative expenses. The variables are expressed as percentage changes.

The figure includes a reference line with a slope of one, representing the theoretical case where administrative expenses adjust in exact proportion to revenue changes. In the context of the 2023 reform, this would imply that municipalities could transfer administrative responsibilities and associated costs to the new wellbeing service counties at the same rate as the corresponding funding was removed.

The empirical pattern indicates that most municipalities are located above the reference line, signifying administrative expenses declined less than revenues. This outcome reflects the presence of cost stickiness. Although small and large municipalities exhibit this behaviour, the deviation from the reference line is considerably more pronounced among small municipalities. This suggests that smaller municipalities faced greater difficulties

Figure 2



in adjusting their administrative structures following the reform. A likely explanation is that these municipalities operate with minimal administrative personnel and lack the flexibility to reorganise functions efficiently when revenues decline.

In contrast, large municipalities are also positioned above the reference line, but their distance from it is notably smaller. This indicates a comparatively better capacity to align administrative expenses with revenue reductions.

Cluster analysis

To quantify how closely a municipality's behaviour in 2023 aligns with proportional cost adjustment, we use the same methodology as in data filtering to calculate the signed perpendicular distance from the point:

$$(\Delta Rev_{i,t}, \Delta Exp_{i,t})$$

to the 45° reference line $y = x$, which represents a one-to-one change in revenues and administrative expenses.

The signed distance is defined as:

$$\delta_{i,t} = \frac{\Delta Exp_{i,t} - \Delta Rev_{i,t}}{\sqrt{2}}$$

In case of revenue decline, only one municipality reported increased revenue in 2023, positive $\delta_{i,t}$ implies that administrative expenses declined less than revenues (indicating cost stickiness), while a negative value suggests expenses decreased more than revenues (indicating cost flexibility or over-adjustment).

A one-dimensional cluster analysis becomes possible by using $\delta_{i,t}$ as the sole input variable. This allows municipalities to be grouped based solely on their deviation from the theoretical 1:1 cost adjustment line, without directly incorporating revenue or expense levels. This approach aims to identify distinct behavioural patterns in how municipalities adjusted administrative expenses in response to the 2023 revenue shock.

Using k-means clustering with k = 3 (backed by elbow and silhouette methods for optimal k), municipalities are classified into four groups based on their proximity to the proportional adjustment benchmark. The clusters are ordered and labelled to reflect increasing levels of stickiness: Low, Moderate, and High. This approach enables a more granular interpretation of cost adjustment behaviour than a binary classification.

To investigate whether adjustment capacity is associated with municipality size, the resulting clusters are compared against predefined size classes.

Figure 3

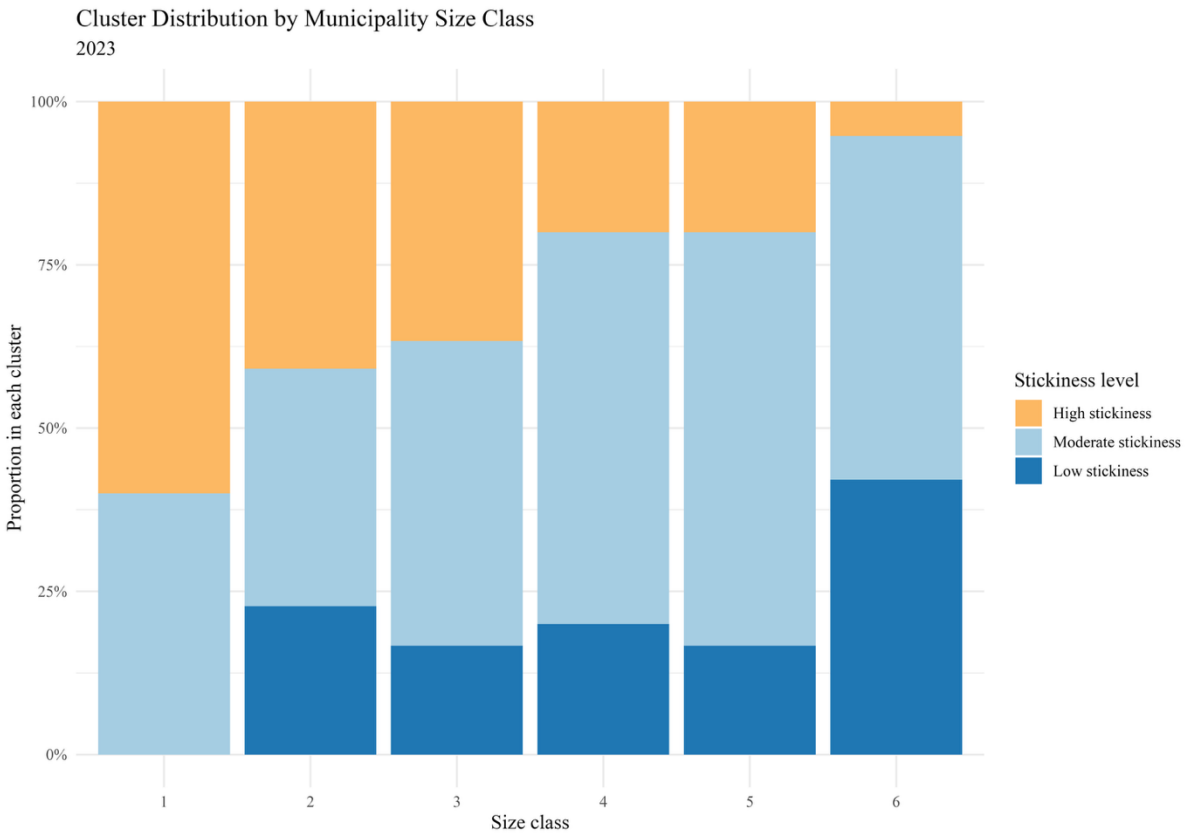


Figure 3 presents the distribution of municipalities across three cost stickiness clusters, grouped by size class. The clusters are defined based on the signed distance from the theoretical 1:1 cost adjustment line and are labelled according to increasing levels of stickiness: low, moderate, and high.

The results reveal a clear and consistent pattern: smaller municipalities tend to exhibit higher levels of cost stickiness, while larger municipalities are more frequently found in the low and moderate stickiness groups. Size classes 1 to 3, representing the smallest municipalities, show a notably higher proportion of units in the high stickiness cluster. In particular, around 60 per cent of municipalities in size class 1 fall into the high stickiness category.

In contrast, the larger municipalities, represented by size classes 4, 5 and 6, are predominantly found in the low and moderate stickiness clusters (see also Appendix, Figure A1). Size class 6 contains the highest share of municipalities in the low stickiness category, suggesting that these municipalities can better align administrative cost reductions with revenue declines.

The shift from high to low and moderate stickiness follows a gradual but consistent trend across the size spectrum. This pattern supports the idea that larger municipalities are better positioned to adjust their administrative costs when facing external fiscal shocks, such as those brought about by the 2023 reform. This is consistent with prior expectations, as smaller municipalities often operate with limited administrative capacity and fewer structural options to reorganise personnel or tasks, making their cost structures more rigid in the face of change.

2023 Regressions

We estimate a simplified model focusing exclusively on that year to better understand how municipalities of different sizes adjusted their administrative costs during the 2023 reform. Unlike earlier specifications, this model does not include three-way interactions. This is because, in 2023, nearly all municipalities experienced a decline in revenue following the transfer of social and health care responsibilities to wellbeing services counties. Only one municipality reported an increase in total revenue, and this single outlier was excluded from the analysis to ensure consistent interpretation of revenue shocks across the sample. In addition, another municipality is excluded from the analysis due to a large non-recurring item that renders it non-representative of the sample. The OLS specification for Model 3 is:

$$\Delta Exp_{i,t} = \gamma_0 + \gamma_1 \Delta Rev_{i,t} + \gamma_2 \Delta Rev_{i,t} \times d_{\text{size class 2}} + \gamma_3 \Delta Rev_{i,t} \times d_{\text{size class 3}} + \gamma_4 \Delta Rev_{i,t} \times d_{\text{size class 4}} + \gamma_5 \Delta Rev_{i,t} \times d_{\text{size class 5}} + \gamma_6 \Delta Rev_{i,t} \times d_{\text{size class 6}} + \varepsilon_{i,t} \quad (3)$$

Table 2

The Dependent Variable is the Log-Change in Administrative Expenses	
Intercept	0.079 (0.056)
$\Delta Rev_{i,t}$	0.186** (0.073)
$\Delta Rev_{i,t} \times d_{size\ class\ 2}$	0.094** (0.041)
$\Delta Rev_{i,t} \times d_{size\ class\ 3}$	0.111*** (0.039)
$\Delta Rev_{i,t} \times d_{size\ class\ 4}$	0.157*** (0.046)
$\Delta Rev_{i,t} \times d_{size\ class\ 5}$	0.115** (0.055)
$\Delta Rev_{i,t} \times d_{size\ class\ 6}$	0.311*** (0.062)
N	245
R^2	0.124
$R^2_{adj.}$	0.102

* p < 0.1, ** p < 0.05, *** p < 0.01

The regression model examines whether the responsiveness of administrative costs to revenue changes differs systematically by municipality size. The specification includes a main effect

for the revenue change and its interaction with dummy variables for size classes 2 through 6, using size class 1 (municipalities with 2,000 or fewer residents) as the reference category. This allows us to assess whether larger municipalities adjusted their administrative spending more flexibly during the reform year.

The results are presented in Table 2. Heteroskedasticity robust standard errors are presented in parentheses. The main coefficient on revenue change (0.186, p-value < 0.05) represents the cost response for the smallest municipalities in size class 1. The positive and significant interaction for size class 6 (0.311, p-value < 0.01) indicates that the largest municipalities were able to cut their administrative expenses 0.311 percentage points more for every one percentage drop in revenue than the smallest municipalities. Small municipalities where the costs increased the most are typically located near bigger cities and in Northern Finland, where rural conditions and long distances may slightly influence cost structure (see Appendix, Figure A2). However, the positive and statistically significant coefficients for intermediate size classes provide clear support for the idea that cost stickiness decreases with municipality size.

Conclusions

Following earlier studies (e.g. Karatzimas et al., 2022), we studied cost stickiness, i.e. asymmetric cost behaviour, in municipal administrative expenses in relation to changes in municipal revenues. We use unique Finnish data from 292 municipalities during 2015–2023, including a major legislative shift of operations in 2023 when most welfare services and work positions were transferred to newly established wellbeing services counties and were directly out of municipal budgets.

Our main interest was in the effect of municipality size on cost stickiness, and we posed three hypotheses: *H1: Municipal administrative costs are cost-sticky in relation to revenues* (supported); *H2: During major operative changes the cost stickiness is reduced* (rejected); *H3: Cost stickiness relates to small municipality size* (supported).

We find that, generally, municipal administrative costs are cost-sticky with regard to revenues. This finding confronts Cohen et al. (2017), where anti-sticky behaviour has been witnessed regarding administrative expenses in Greek local governments (even if not regarding core operating expenses). However, unlike expected, during the major operative change in 2023 the cost stickiness phenomenon was even amplified. This refines e.g. the results of Karatzimas et al (2022) who found in a Spanish sample that anti-stickiness seems to be amplified during periods of crises. Yet, in our case, the planned re-structuring or reform of organising wellbeing services was not a sudden crisis but allowed time for planning and even sub-optimizing, possibly relating to political disputes and safeguarding slack as well as to administrative fixed contract positions. Moreover, corroborating Karatzimas et al. (2022) we found as our main contribution that cost stickiness indeed relates to small municipality sizes, and that small municipalities demonstrate significantly higher per capita administrative costs. The findings, as a practical implication, support local government amalgamations.

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Legislation

Municipalities Act (410/2015)

Appendix

Figure A1 (log-scale)

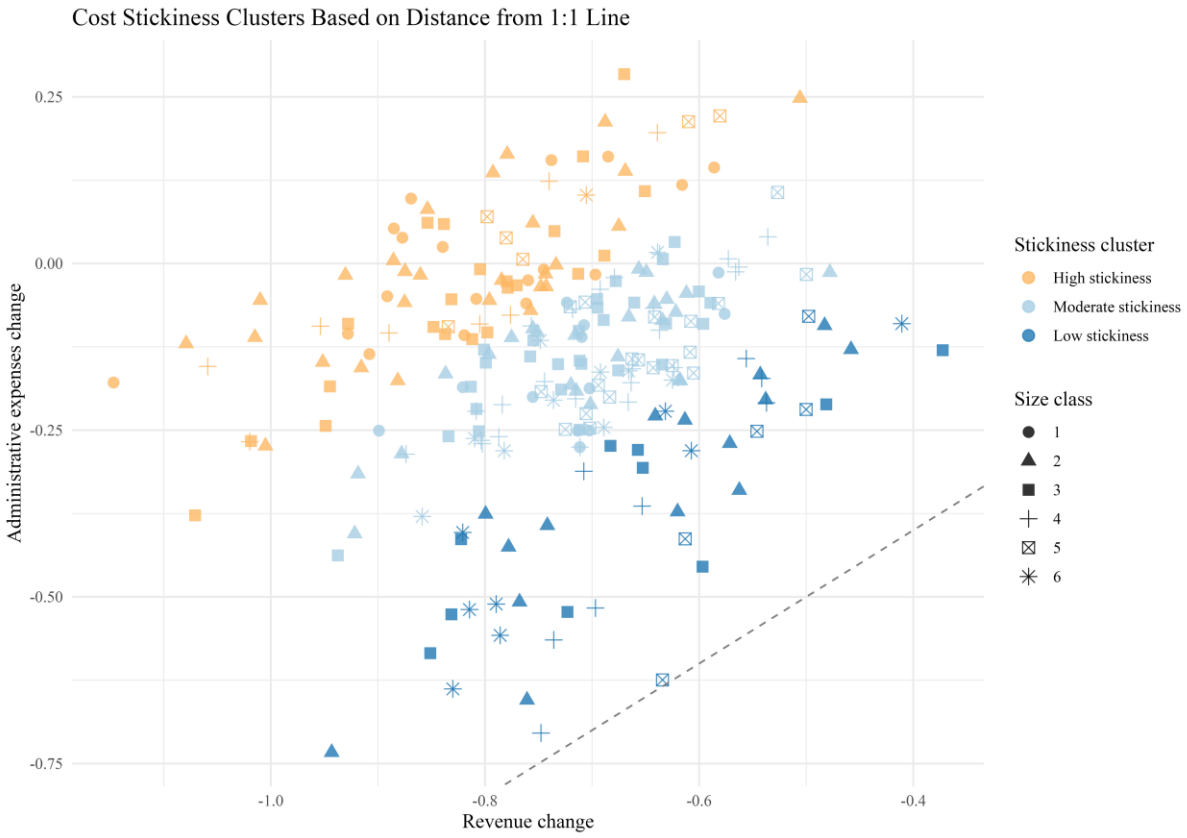
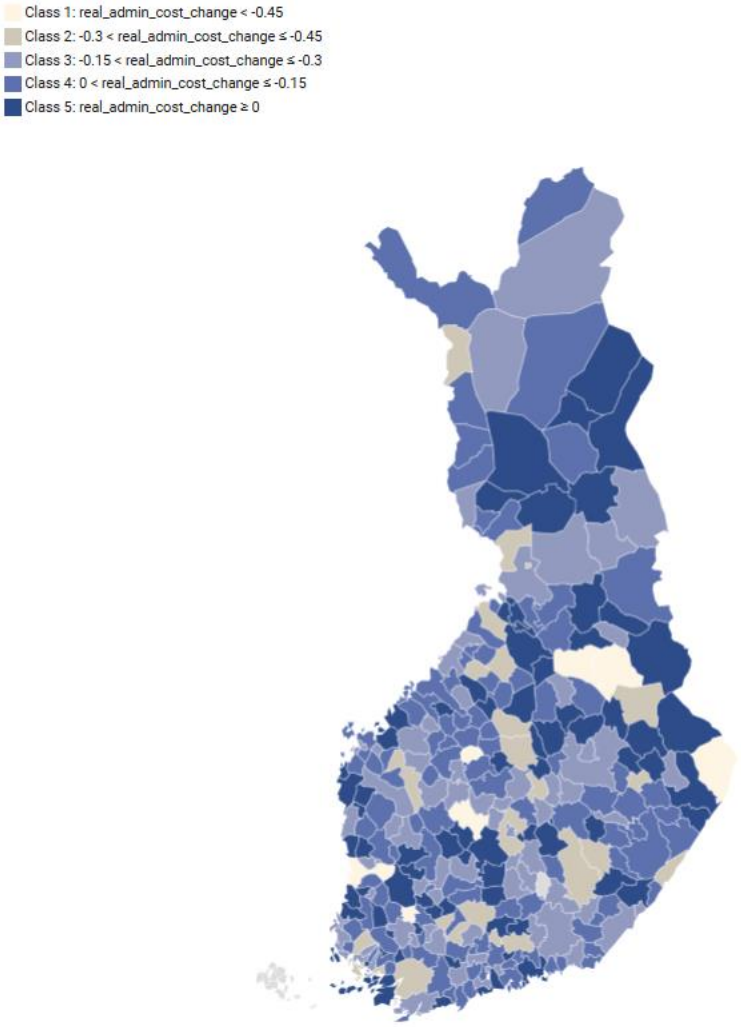


Figure A2



The map illustrates the real change in administrative costs across Finnish municipalities during the 2023 reform, categorized into five classes based on the magnitude of cost reduction or increase. Municipalities with the largest cost reductions (Class 1) are shown in the lightest shade, while those with no reduction or an increase (Class 5) appear in the darkest shade.