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KĀRLIS VILERTS KLĀVS ZUTIS KONSTANTĪNS BEŅKOVSKIS

FACTORS DETERMINING MUNICIPAL SPENDING DIFFERENCES IN LATVIA





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ABBREVIATIONS

ATR – administrative territorial reform CSB – Central Statistical Bureau of Latvia COFOG – Classification of the Functions of Government EC – European Commission EU – European Union GDP – gross domestic product MES – Ministry of Education and Science of the Republic of Latvia OECD – Organisation for Economic Co-operation and Development FELGF – Fund for the Equalisation of Local Government Finances RDIM – Regional development indicators module of the State Regional Development Agency TDI – territorial development index MEPRD – Ministry of Environmental Protection and Regional Development of the Republic of Latvia MW – Ministry of Welfare of the Republic of Latvia SAO – State Audit Office of the Republic of Latvia (*Valsts kontrole*) TRL – Treasury of the Republic of Latvia (*Valsts kase*) UN – United Nations

ABSTRACT

In recent years, local government spending has drawn a lot of attention from policy makers and researchers alike. Scientific literature does not give a clear preference either to centralisation or decentralisation of the provision of public services. The present paper employs econometric methods to obtain evidence pointing to a negative correlation between the size of Latvia's municipalities (*novads*) in terms of population and municipal spending per capita. Namely, the smaller the municipality, the higher the per capita costs of providing local government services. This is an especially important conclusion, considering Latvia's demographical trends resulting in a particularly notable reduction in the population, municipalities will be unable to continue fulfilling their functions at the current scope without additional financing. Estimates also suggest that concentration of local government services in administrative territorial units that are larger in terms of population could result in significant savings that could be spent to improve either the supply or quality of services provided by municipalities.

Keywords: municipalities, local government spending, number of population, demographic trends

JEL codes: R12, R23, R58

The views expressed in this paper are exclusively those of its authors who are employees of Latvijas Banka's Monetary Policy Department and do not necessarily reflect the official position of Latvijas Banka. The authors assume sole responsibility for any errors and omissions.

1. INTRODUCTION

Local governments play a significant role in the everyday life of people in Latvia. They provide a wide range of public services by performing functions of administrative nature (e.g. registration of civil status, issuance of permits) as well as ensuring availability of education and supporting business. The importance of local governments is underscored by the size of their budgets: local government spending constitutes roughly 1/4 of total consolidated general government budget expenditure.

Although the current administrative territorial division was established quite recently (in 2009), it is fairly uneven in terms of population. The population of larger municipalities exceeds that of smaller ones by more than 20 times. Moreover, the demographic trends suggest that these differences in the size of population will continue to increase.¹ Given that the range of functions within the responsibility of local governments does not depend on their size², this disparity could result in both differing costs and quality of services in the long term. It is also one of the reasons behind the frequently expressed proposals to revise the administrative territorial division to create larger and more homogeneous municipalities.

From the point of view of economic theory, organisation of public administration in small territorial units has its advantages: given that the local administration is better aware of the needs of the local population, it can tailor its services accordingly (Oates (1972)). Nevertheless, having excessively small municipalities is not necessarily cost-efficient as the service provision costs may turn out to be quite high because of large fixed costs and administrative expenses (Bikker and van der Linde (2016))³. Therefore, when looking at the administrative territorial division from the economic viewpoint, finding balance between local democracy and cost-efficiency is essential. Namely, it is important to understand whether maintaining small local governments does not unreasonably increase the cost of providing public services.

There are many examples in literature where the impact of the size of population (and other factors) on local government spending and its efficiency is estimated.⁴ Although this research covers most of the EU countries, the results are not conclusive. Several papers mention that the unit costs of services for big local governments tend to be lower because a wider spectrum of services provided reduces the burden of fixed costs (Balaguer-Coll et al. (2010) and Bikker and van der Linde (2016)). Big local governments also find it less difficult to hire highly-qualified staff knowing how to use the local government's resources more effectively (Prud'homme (1995)). At the same time, several other papers have come to exactly opposite conclusion that sometimes smaller local governments can be more efficient than their larger counterparts(Geys and Moesen (2008), Loikkanen and Susiluoto (2006) and Šťastná and Gregor (2011)).⁵ There are several reasons why research results tend to differ, including different functions of local governments in each country and definitions of

¹ See Appendix 1 for demographic forecasting methodology and the results.

 $^{^{2}}$ Namely, all local governments have to be able to provide a broad spectrum of services regardless of the size of theirs population.

³ Other reasons why excessive decentralisation of public administration may not be optimal are discussed in Prud'homme's paper (1995).

⁴ See Appendix 2, for a summary of research papers.

⁵ The reasons may vary. For example, Nakazawa (2014) points out that having a single facility (school, care facility etc.) may be enough to ensure access to services in small municipalities, while larger municipalities often require a complex network of institutions involving additional establishment and running costs.

the size of local governments. Because of these reasons, the findings and conclusions of other research papers are not directly applicable to the situation in Latvia.

Latvia is one of the rare exceptions where no quantitative analysis is publicly available and the local government spending is evaluated only based on a sample of individual municipalities and/or their provided services.⁶ So far, the factors determining the differences in per capita spending of municipalities have not been analysed either. Therefore, the objective of the present paper is to identify those factors employing econometric methods, inter alia estimating whether the per capita spending differs in municipalities of different size.

This paper uses information on 110 Latvia's municipalities from 2014 to 2017, analysing the non-capital expenditure on three functions: general public services, education and social protection. The employed methods of econometric analysis distinguish between the effect of the size of population and the effects stemming from other factors like the spectrum and scope of services provided. Robustness of the obtained results was tested by changing the sample population (municipalities covered by analysis) and the time period.

Overall, the results obtained suggest that there is a negative correlation between the per capita spending of Latvia's municipalities and their population. Controlling for other factors, it is apparent that the per capita spending of municipalities with smaller population is higher than that of large municipalities. This conclusion applies to all examined spending categories and does not change significantly even when different sets of factors, municipalities as well as different time horizons are used. As Latvia's population can be expected to shrink further over the next decades, the service provision costs faced by municipalities will increase progressively along with the growing proportion of small municipalities. Although the present paper does not analyse any specific proposals for the administrative territorial reform, population ageing and its consequences highlight the issue of cost-efficiency of the currently rather fragmented municipal governance model and its optimisation solutions.

The paper is structured as follows. Section 2 outlines the demographic and economic characteristics of Latvia's municipalities as well as the potential future development trends. Section 3 describes the data and econometric methods used in the analysis. The results of the empirical analysis are discussed in Section 4. Section 5 describes the significance of the obtained results for Latvia.

2. DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS OF LATVIA'S MUNICIPALITIES

Local governments are major public service providers in Latvia. According to Latvia's legislation, several public administration functions fall within the competence of local governments, including organising the provision of utilities, housing and community amenity improvements, ensuring availability of education, social assistance and health care services, establishing land utilisation and development procedures etc.⁷

⁶ For example, when evaluating the construction supervision costs in several municipalities, the SAO (Valsts kontrole (SAO; 2017)) concluded that sustaining a dedicated building authority in small municipalities costs at least three times more than sharing it with other municipalities.

⁷ See the Law on Local Governments (https://likumi.lv/ta/en/en/id/57255-on-local-governments).

In order to implement their statutory functions, local governments approve budgets and their expenditure constitutes a rather significant part of total general government spending (see Chart 1). In 2017, it was approximately 3 billion euro (10% of GDP) or 27% of the general government expenditure, surpassing not only Lithuania and Estonia but also the EU average (23%, 24% and 22% respectively). Local governments are also major employers (see Chart 2). About 40% of public sector employees and 13% of all employed persons work in local governments and local government institutions (State Chancellery (Valsts kanceleja; 2017)).

Chart 1

Local government spending constitutes a rather significant part of the general government expenditure **Local government expenditure in EU countries in 2017** (% of GDP)



▲ % of total budget expenditure (right-hand scale)

Source: Eurostat.

Chart 2 Local governments are also major employers **Number of employed persons in 2016** (thousands)



Source: State Chancellery (2017).

The current administrative territorial division is effective since 2009 when 119 local governments (9 cities and 110 municipalities) were established as a result of the administrative territorial reform (ATR).⁸ Although the average population in Latvia's local governments is bigger than in many other EU countries (see Chart 3), it is smaller than in Lithuania and Estonia as well as in other countries where local governments are entrusted with a wide spectrum of public administration functions (OECD (2019)). Moreover, the average population in Latvia's local governments tends to shrink: since 2010, it has decreased by 1500 persons (see Chart 4).

Chart 3

The average population in Latvia's local governments is bigger than in many other EU countries, yet the local government functions differ significantly across countries

Average population of local governments in EU countries in 2018 (thousands)



Source: EC.

⁸ 109 municipalities were established as a result of the reform, while Mērsrags Municipality was separated from Roja Municipality as of 2011.

Chart 4 Population has a tendency to shrink **Average population in Latvia's local governments and its projections** (2010–2040; thousands)



Sources: CSB; * - Latvijas Banka's estimates.

Although the number of local governments decreased four times as a result of the ATR, Latvia's system of local governments remains highly heterogeneous in terms of population (see Chart 5). Moreover, there are also significant differences even when excluding cities and looking at municipalities only. Largest municipalities have a population of over 20 000, whereas the smallest ones have only slightly above 1000 inhabitants (see Chart 6). In addition, looking at the demographic trends, it is obvious that the disparities across local governments in terms of population are going to increase.

Chart 5

Latvia's system of local governments is highly heterogeneous in terms of population Latvia's municipalities by size of population at the beginning of 2018



Chart 6

Population of larger municipalities significantly exceeds that of smaller municipalities Largest and smallest Latvia's municipalities in terms of population at the beginning of 2018

	Municipality	Population
1.	Ogre Municipality	33 083
2.	Talsi Municipality	28 071
3.	Tukums Municipality	27 901
4.	Rēzekne Municipality	25 274
5.	Bauska Municipality	23 061
106.	Naukšēni Municipality	1731
107.	Rucava Municipality	1538
108.	Mērsrags Municipality	1478
109.	Alsunga Municipality	1322
110.	Baltinava Municipality	1000

Source: CSB.

Almost half of the municipalities do not meet the legislative criteria⁹ requiring that a municipality should have at least 4000 residents, a village with at least 2000 permanent residents should be located within the territory of a municipality and the territory of a municipality should be geographically undivided. At the beginning of 2018, there were 39 municipalities with a population below 4000, 55 municipalities without a village or town with over 2000 permanent residents. Moreover, the territory of 2 municipalities is geographically divided.¹⁰ The number of municipalities failing to meet the criteria also continues to grow. Following the ATR, at the beginning of 2010 52 municipalities were failing to meet at least one of the criteria, whereas at the beginning of 2018 already 60 municipalities were non-compliant. The number of municipalities with permanent residents below 4000 as well as the number of municipalities without a village or a town with at least 2000 inhabitants has also grown. Almost 1/4 of all municipalities failed to meet both criteria. Given a further decline in population, the number of non-compliant municipalities is expected to increase over the next 20 years. We have estimated (see more detail in Appendix 1) that in 2040 already 47 municipalities (43%) will have a population below 4000, including 14 municipalities will have a population below 2000 (see Chart 7). Using the EC's external migration assumptions in our analysis, the results are even gloomier (see Chart 8).

In addition to demographic differences, municipalities differ also in terms of economic activity. This is well illustrated by the territorial development index (TDI) which is calculated based on variables such as unemployment rate, ratio of persons at risk of poverty, personal income tax per capita etc.¹¹ On average, TDIs are the highest in municipalities located in Riga Region, suggesting that the economic activity is concentrated around the capital, with Latgale showing the poorest results (see Chart 9). Moreover, small municipalities (with population below 4000) tend to have significantly lower TDIs than medium-size municipalities (4000–10 000 inhabitants)

⁹ The establishment and records of administrative territories in Latvia are governed by the Law on Administrative Territories and Populated Areas (*https://likumi.lv/ta/en/en/id/185993-law-on-administrative-territories-and-populated-areas*).

¹⁰ Two cities (Valmiera and Jēkabpils) where the population is below 25 000 also fail to meet the criteria.

¹¹ See more detailed information at http://www.vraa.gov.lv/lv/publikacijas/attistibas_indekss/.

and larger municipalities (with population over 10 000). And this can be observed both on a national scale as well as within the boundaries of individual regions.

Chart 7

The number of small municipalities will continue to grow **Latvia's municipalities by population in 2018 and 2040**



Sources: CSB and Latvijas Banka's estimates.

Chart 8

This process would be accelerated if the EC's external migration assumptions materialised. Latvia's municipalities by population in 2018 and 2040



Sources: CSB, Latvijas Banka's estimates and EC.





Sources: CSB and MEPRD.

Business activity is also distributed unevenly across municipalities, with the highest concentration observed in regional centres and municipalities with larger-sized population. State Revenue Service statistics show that the number of corporate income tax payers per 1000 inhabitants is the highest in cities and big municipalities, exceeding the respective number of the small municipalities by nearly 1/3 (see Chart 10).

Chart 10

Business is concentrated in cities and large municipalities

Number of corporate income tax payers per 1000 inhabitants in Latvia's municipalities in 2016



Sources: CSB and State Revenue Service.

Moreover, uneven investment activity across municipalities suggests that the economic disparities are unlikely to fade in the near term. According to the statistics of the Register of Enterprises of the Republic of Latvia, in every third municipality the average annual amount of foreign direct investment per capita does not even reach 1 euro (see Chart 11). These are mostly population-wise small municipalities. The average amount of foreign direct investment per capita in small municipalities is also significantly (almost 10 times) lower than in medium-sized municipalities.

Chart 11

Uneven investment activity suggests that the disparities in terms of economic activity across municipalities will increase

Foreign direct investment per capita in Latvia's municipalities

(2014-2018; annual average; euro)



Sources: CSB and Register of Enterprises of the Republic of Latvia.

In the long term, the significant differences in the business environment could be further strengthened by demographic problems. Population of municipalities with low economic activity is shrinking faster than elsewhere (see Chart 12). Moreover, this happens on account of migration as well as birth and mortality rates. Low economic activity and shortage of jobs make municipalities less attractive to young families. This is, to a certain extent, reflected by the population's age distribution: in economically less active municipalities, the share of population below working age¹² is significantly lower than elsewhere (see Chart 13).

Chart 12

Population of low economic activity municipalities is shrinking faster Changes in population of Latvia's municipalities (2014–2018; annual average; %) and TDI (2017)



Sources: CSB and MEPRD.

¹² Individuals aged 15-64 years are classified as working age.

Chart 13

The share of population below working age in low economic activity municipalities is smaller **Share of population below working age in Latvia's municipalities** (%) **and TDI** (2017)



Sources: CSB and MEPRD.

Latvia's population can be expected to shrink further over the next decades and this tendency will be observed in almost every municipality (see Chart 14). The age distribution will also change, posing significant challenges in formulation of the central and local government budgets. First, with the share of working age population shrinking, revenue from taxes is bound to decrease. Second, the growing share of retirement age population will put pressure on the expenditure associated with population ageing, including the spending on social benefits and health care.

Chart 14

Latvia's population will decrease and age **Number and age structure of Latvia's population and projections** (2012–2040; millions)



Sources: CSB and Latvia Banka's estimates. Note. Starting from 2019, Latvijas Banka's projections. Currently, there are significant differences in tax revenue per capita across municipalities: according to 2017 statistics, it ranges from 319 euro in Zilupe Municipality to 1298 euro in Garkalne Municipality (see Chart 15). Moreover, in small municipalities tax revenue per capita tends to be, on average, 10%–20% lower than in medium-sized and large municipalities. As municipalities are supposed to provide a roughly identical array of services, their per capita spending is less heterogenous. Therefore, the grant from the Fund for the Equalisation of Local Government Finances (FELGF¹³; see Chart 16) constitutes an essential part of the revenue of small municipalities. Looking into the future, the demographic trends are likely to increase the financial dependence of small municipalities on FELGF grants.¹⁴

Chart 15

Differences in economic activity are also reflected in municipality budgets **Tax revenue per capita in Latvia's municipalities** (2017; euro)





Sources: CSB and TRL.

¹³ https://likumi.lv/ta/en/en/id/274742-law-on-the-equalisation-of-local-government-finances.

¹⁴ Equalisation of local government finances is an important solidarity element of public administration promoting equal living standards in various regions. An excessive reliance on grants, however, may impair the independence of municipalities in planning their long-term development. Evidence from previously-conducted research also suggests that municipalities with a high proportion of grants in their budget revenue tend to be less efficient (Šťastná and Gregor (2011)), i.e. they tend to have higher costs of providing certain services than other municipalities. Moreover, Belgian experience shows that inefficiency increases in case of unconditional grants (de Borger and Kerstens (1996) and Geys and Moesen (2008)).

Chart 16 FELGF grants play an important role in budgets of small municipalities **Share of FELGF grant in budget revenue of Latvia's municipalities by region** (2017; %)



Sources: CSB and TRL.

The overall conclusion is that the current administrative territorial division in Latvia is highly heterogeneous. Apart from significant disparities across municipalities in terms of population there are also differences in terms of economic activity and budget capacity. With Latvia's population shrinking further and ageing, the number of small municipalities will increase and inter-municipal disparities will build up progressively. Such demographic changes can complicate the formulation of local government budgets as well as impair the ability to hire adequate staff for implementation of local government functions (see Chart 17). This may have a negative effect on the quality of services provided and the ability of municipalities to support the development of their territories in the long term.

Chart 17

Low working age population may pose challenges to a number of municipal governments **Municipalities by the size of their working age population**

(2018, 2030 and 2040; %)



Sources: CSB and Latvijas Banka's estimates.

3. DATA AND ECONOMETRIC METHODS USED IN ANALYSIS

3.1 Per capita spending in Latvia's municipalities

According to the TRL data, municipalities spent an average of 1319 euro per capita in 2017¹⁵. Yet there are huge differences across municipalities, as their spending per capita ranges from 911 euro to 2101 euro (see panel (a) of Chart 18). Investment expenditure constitutes about 1/5 of all spending from municipality budgets, while non-capital expenditure (directly attributable to the implementation of local government functions) takes up the largest part of budget expenditure. Although the spectrum of services provided by municipalities is broadly the same, non-capital expenditure per capita also ranges significantly from 718 euro to 1457 euro (see panel (b) of Chart 18).

Chart 18 **Budget expenditure per capita in Latvia's municipalities** (2017; euro)



¹⁵ Excluding contributions to the FELGF.

Almost 1/2 of the total non-capital expenditure of municipal budgets is related to education (see Chart 19). A significant part is also attributable to maintenance of municipal territories and housing (12%), general government services (11%), social protection (10%) as well as recreation, culture and religion (10%).

Chart 19

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Non-capital expenditure of Latvia's municipalities by government function (2017; %)
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Sources: CSB and TRL.

Municipality spending per capita also differs when looking at individual government functions. For example, in 2017 non-capital expenditure on education ranged from 305 euro to 838 euro, whereas social protection spending varied from 32 euro to 417 euro (see Chart 20).





Sources: CSB and TRL.

It is apparent that non-capital expenditure per capita is, on average, larger in smaller municipalities if compared to medium-sized and large municipalities (see Appendix 3). Moreover, this is a valid observation not only for non-capital expenditure in general, but also for individual government functions. Since there could be other factors affecting the per capita spending of each municipality, the above

relationship, however, does not provide conclusive evidence on how the population size affects municipality spending. There are numerous reasons why spending per capita may differ across municipalities, including:

- Different scope of provided services. For example, the number of benefits is quite naturally larger in municipalities with a larger proportion of socially vulnerable people. Hence, their social protection spending per capita is also larger.

– Different spectrum of provided services. The Law on Local Governments¹⁶ lists the functions that have to be implemented by all local government, yet no restrictions to providing other services are imposed. For example, municipalities voluntarily providing municipal police services are likely to have higher spending per capita on public order and safety than other municipalities.

– Different geographical location. So far, there have been several papers concluding that the further a municipality is located from a regional centre, the larger its expenditure (Afonso and Fernades (2008) in Portugal; Loikkanen and Susiluoto (2006) in Finland; Šťastná and Gregor (2011) in Czechia). To a certain extent, this could be related to poorer access to the infrastructure of the regional centre which increases the municipal expenditure in remote territories (for example, on account of larger transportation costs).¹⁷

Nevertheless, population size can affect a municipality's spending per capita. Unit costs of services provided by population-wise small municipalities may be quite high, as they include a relatively large proportion of the fixed and administrative costs. Therefore, in order to separate the effect of the population from that of other factors, econometric methods are used in empirical analysis.

3.2 Econometric specification

To identify the factors affecting municipal spending per capita in Latvia, we used information about 110 Latvia's municipalities over the time period of 2014–2017 and the following equation:

$$lnY_{p,c,t} = \mu + \rho(lnPoP_{p,t}) + \pi_{a,c}R_{a,c,p,t} + \alpha_j D_{j,p,t} + \beta_m G_{m,p,t} + \gamma F_{p,t} + \theta_t + \varepsilon_{p,t}$$
(1)

where the dependent variable $(lnY_{p,c,t})$ is the log of the non-capital expenditure per capita of municipality p for the respective function c^{18} in year t. Although researchers sometimes also base their analysis on total municipal spending (see, for example, Afonso and Fernandes (2008)), in most cases preference is given to non-capital expenditure as it reflects the service provision costs of municipalities more accurately and is less volatile than capital expenditure.¹⁹ ($\varepsilon_{p,t}$) is regression error, whereas (μ) is the constant. Variable ($lnPoP_{p,t}$) is the log of the municipality's population with the respective regression coefficient (ρ), reflecting the change in the municipality's noncapital expenditure conditional on 1% increase in population.

As municipal spending can be influenced also by other factors, the following control

¹⁶ https://likumi.lv/ta/en/en/id/57255-on-local-governments.

¹⁷ Moreover, municipalities located close to the regional centres have to compete more actively to attract more inhabitants that could increase their production efficiency (Revelli and Tovmo (2007)).

¹⁸ In accordance with COFOG. Contributions to the FELGF are excluded from expenditure on general public service provision.

¹⁹ Moreover, a major part of capital expenditure is attributable to EU funds.

variables are also included:

 $-(R_{a,c,p,t}$ with the respective regression coefficients $\pi_{a,c})$ – performance indicators characterising the respective function (number of students in educational establishments, number of registered births, deaths and marriages, number of social benefit recipients etc.);

– $(D_{j,p,t}$ with the respective regression coefficients α_j) – other demographic and administrative factors (share of population below and above working age; population density and number of rural territories (*pagasts*));²⁰

 $-(G_{m,p,t}$ with the respective regression coefficients $\beta_m)$ – geographical indicators (distance to the closest city; municipality's proximity to Latvia's border; region etc.); $-(F_{p,t}$ with the respective regression coefficient γ) – the share of FELGF grant in budget revenue;²¹

 $-(\theta_t)$ – time fixed effects.

Our analysis of spending is limited to those local government functions for which sufficiently abundant information about their performance indicators is available and where the spectrum of provided services is relatively homogenous: general public services (COFOG 1), education (COFOG 9) and social protection (COFOG 10). As to other local government functions, limited information is available about the scope of the services and hence an accurate estimation of the effect of the size of population on spending is impossible.²² Although the analysis is based on only 3 out of 10 local government functions, the associated expenditure constitutes about 70% of the total non-capital expenditure of municipalities.

The choice of performance indicators is largely dependent on data availability. In the areas of education and social protection, a wide selection of indicators is available quite accurately reflecting the volume of services associated with the respective function. For example, the following indicators are available with regard to education: number of pre-primary schools and general educational establishments, number of students in those establishments as well as the presence of vocational education establishments. For social protection, the following indicators are used: number of families receiving benefits (means-tested or not) as well as whether home care and long-term social care services have been provided in the particular year. General public service expenditure is mostly attributable to administrative services provided to all inhabitants of a municipal territory; hence no individual performance indicators

²⁰ Research shows that cost efficiency is dependent on both the size of municipality's population as well as the population density (de Borger and Kerstens (1996)). For example, using information on 278 Portuguese municipalities, Afonso and Fernandes (2008) conclude that organising and providing local government services in densely populated territories requires relatively less resources. A positive relationship between cost efficiency and population density of a territory has been detected also in other countries, e.g. in Finland (Loikkanen and Susiluoto (2006)).

²¹ Previous research has also highlighted the importance of the fiscal factors (earmarked grants). On several occasions, researchers have concluded that municipalities with a high share of grants in their budget revenue tend to have lower cost efficiency (Šťastná and Gregor (2011)). For example, de Borger and Kerstens (1996) identified a negative correlation between cost efficiency and the size of grants in Belgium and associated it with ineffective allocation of grants, i.e. most subsidies are granted without any specific conditions as to their spending and any ex post evaluation. Loikkanen and Susiluoto (2006) came to similar conclusions with regard to Finland.

²² Limited data availability is a serious challenge in Latvia's case. The SAO has remarked on several occasions (Valsts kontrole (SAO; 2015)) that municipalities neither collect information on performance indicators nor keep records of their service provision costs.

have been selected.²³ Appendix 4 lists the costs and performance indicators used in the analysis and outlines their features.

In order to take into account wage and cost disparities across Latvia's municipalities, non-capital expenditure was adjusted by the average wage index of municipality employees.²⁴ At the same time, to check the robustness of the obtained results, analysis was also performed on unadjusted expenditure. Several robustness checks were also conducted by changing the sample and time period.

4. RESULTS: FACTORS DETERMINING SPENDING DIFFERENCES ACROSS LATVIA'S MUNICIPALITIES

This section outlines the main results of the econometric analysis. There is a separate subsection for the results of each of the selected local government functions: general public services, education and social protection. The section concludes with a description of robustness checks performed on the results.

4.1 General government services

Table 1 summarises the results of equation (1) reflecting the factors affecting the per capita spending of Latvia's municipalities on general public services.

Overall, the results suggest that there is a statistically significant negative correlation between municipality's population and its per capita non-capital spending on general public services. Namely, the larger the population of a municipality, the lower the municipality's per capita non-capital expenditure on providing general public services. Excluding other factors that could have a potential effect on the amount of spending (Column (1)), the coefficient value suggests that, given a population increase of 1%, non-capital expenditure would decrease by 0.20%. The estimation remains quite robust also when other demographic and administrative factors (Column (2)), geographical factors (Column (3)) and FELGF grants (Column (4)) are taken into account.

Other factor coefficients suggest that municipalities with a larger number of rural territories have overall higher per capita non-capital spending on general public services. This could reflect a larger administrative burden to ensure that municipal services can be accessed in a variety of populated areas. The estimated coefficients also show that, with increasing population density, the non-capital expenditure declines. This relationship has been previously observed also elsewhere in the world: for example, in Portugal (Afonso and Fernandes (2008)) and Finland (Loikkanen and Susiluoto (2006)). Individual observations suggest that per capita non-capital spending on general public services is higher in municipalities with a large share of retirement age population. This could be explained by having to invest more administrative resources to provide municipal services to the elderly. FELGF grants also have an effect on the amount of per capita spending. The estimated coefficient suggests that, a 1 percentage point increase in the share of FELGF grant in total budget

²³ Nevertheless, considering that services to elderly population could require more administrative resources, the regression includes the fraction of the above-working-age population.

 $^{^{24}}$ Index where 1 = the national average. The larger the average wage of municipality employees, the higher the index value.

revenue, would increase non-capital expenditure on general public services by approximately 0.5%–0.75%, thus questioning the spending efficiency of the FELGF grant. The obtained results also suggest that: (a) with the distance to the closest city growing, non-capital expenditure per capita of municipalities decreases; (b) overall spending tends to be higher in municipalities located at the national border; and (c) a number of indicators have no statistically significant effect on per capita non-capital spending on general government services.²⁵

Table 1

Factors affecting the per capita spending of Latvia's municipalities on maintaining general public services

(2014 - 2017)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population (ln)	-0.204***	-0.189***	-0.196***	-0.185***	-	-0.150***	_
Number of registered births, deaths and marriages per capita (ln)		0.226	0.217	0.185	0.210	0.148	0.170
Share of below-working- age population (%)		-1.075	-1.417	-0.913	-1.198	-0.038	-0.226
Share of above-working- age population (%)		1.438***	1.522**	1.229*	0.927	0.073	-0.265
Number of rural territories		0.022***	0.023***	0.019***	0.008	0.014**	0.006
Population density (pop./km ² ; ln)		-0.092***	-0.091***	-0.074**	-0.108***	-0.057**	-0.084***
Distance to closest city (min; ln)			-0.069***	-0.065**	-0.056**	-0.071***	-0.063**
Land border (1/0)			0.024	-0.025	-0.029	-0.081*	-0.082*
Border (1/0)			0.042	0.082**	0.096**	0.081***	0.137***
Riga Region (1/0)			0.038	0.057	0.033	0.087**	0.071
Share of FELGF grant in budget revenue (%)				0.705***	0.752***	0.481*	0.503**
Population (thousands)					-0.030***		-0.022***
Population ² (thousands)					0.000003***		0.000001**
Time fixed effects	Included	Included	Included	Included	Included	Included	Included
Number of observations	440	440	440	440	440	440	440
R^2	0.221	0.468	0.480	0.492	0.477	0.260	0.263

Notes. *** – significant with a 99% probability; ** – significant with a 95% probability; * – significant with a 90% probability. In Columns (1)–(4), the dependant variable has been adjusted by the average wage differences in municipalities; in Columns (6) and (7), the dependant variable is represented in nominal terms. The following designations are used with the variables: (ln) - log; (1/0) - binary variable. Estimates obtained using robust standard errors.

Regression with squared population (Column (5)) leads to a conclusion that the effect of the size of population on per capita non-capital spending of municipalities on general public services is not necessarily linear. Namely, despite the fact that municipal non-capital spending per capita is shrinking along with the growing population, the amount of saving declines with each additional resident (and even becomes negative when a specific number of residents is reached).²⁶ Results are robust

²⁵ Namely, number of registered births, deaths and marriages per capita; fraction of below-working-age population; binary variable of Riga Region.

²⁶ Nakazawa (2014) came to similar conclusions concerning Japan.

even when the municipal spending is not adjusted by the average wage index of staff (Columns (6) and (7)).

Overall, the results provide quite convincing evidence regarding the effect of population on municipal spending on general public services. Namely, a 1% population increase results in a non-capital expenditure per capita decrease of approximately 0.15%–0.20%.

4.2 Education

A summary of the estimations of equation (1) with regard to education is provided in Table 2.

The conclusion that there is a statistically significant negative relationship between per capita non-capital expenditure and size of population in a municipality holds true also in the context of education. Namely, with the population of a municipality growing, per capita non-capital expenditure on education decreases.

Although in the case of the education expenditure the population coefficient is more volatile than in the case of spending on general public services, it is statistically significant in all cases. Coefficient value is the lowest in the regression specification excluding other factors affecting expenditure (Column (1)). However, the coefficient value in absolute terms increases significantly (to 0.164), when differences in educational establishments and the number of their students as well as in other administrative indicators (Column (2)) are taken into account. Namely, with population increasing by 1%, non-capital education expenditure of a municipality would on average decrease by 0.16%. This relationship remains robust even when geographical factors (Column (3)) and FELGF grant (Column (4)) are taken into account.

Evaluating the coefficients of other variables, it can be concluded that the per capita non-capital expenditure of municipalities in the field of education grows along with the increase in the number of educational establishments and their students. The positive and statistically significant coefficient of the number of rural territories again confirms that providing services at a larger number of locations increases the municipal costs. The geographical location of municipalities can also have an effect on the non-capital expenditure of municipalities. For example, per capita non-capital expenditure on education in the municipalities of Riga Region is on average smaller than elsewhere.

Table 2Factors affecting the per capita non-capital expenditure on education in Latvia's municipalities(2014–2017)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population (ln)	-0.036**	-0.164***	-0.130***	-0.129***	_	-0.082***	-
Number of students in pre-primary educational establishments per capita (ln)		0.172***	0.198***	0.213***	0.202***	0.222***	0.218***
Number of students in general educational establishments per capita (ln)		0.423***	0.394***	0.392***	0.394***	0.425***	0.434***
Number of pre-primary educational establishments (0/1)		0.015	-0.008	-0.013	-0.017	-0.65*	-0.070*
Number of general educational establishments per capita (ln)		0.090***	0.074***	0.074***	0.082***	0.041**	0.040**
Are there any students in vocational educational establishment programmes (0/1)		0.149***	0.151***	0.151***	0.154***	0.165***	0.165***
Are there any educational establishments implementing vocational education		0.007	0.000	0.000	0.020	0.007	0.007
programmes (0/1)		0.027	0.022	0.022	0.020	-0.007	-0.007
Number of rural territories		0.020***	0.013***	0.013***	0.010**	0.00/**	0.008**
Population density (pop./km ⁻ ; in)		-0.001	0.014	0.018	0.017	0.033*	0.035*
Distance to closest city (min; in) L_{end} hander (1/0)			0.050*	0.030*	0.051**	-0.002	0.001
Land border $(1/0)$			0.05/**	0.050*	0.051*	0.010	0.019
Border $(1/0)$			-0.005	0.004	0.010	0.021	0.020
Riga Region (1/0)			-0.113***	-0.108***	-0.118***	-0.050**	-0.052**
snare of FELGF grant in budget				0 1 1 7	0.0110	-0.260*	_0 288**
Population (thousands)				0.117	-0.030***	0.200	-0.017***
Population ² (thousands)					0.0007***		0.0003**
Time fixed effects	Included	Included	Included	Included	Included	Included	Included
Number of observations	440	440	440	440	440	440	440
R^2	0.074	0.589	0.620	0.620	0.618	0.649	0.649

Notes. *** – significant with a 99% probability; ** – significant with a 95% probability; * – significant with a 90% probability. In Columns (1)–(4), the dependant variable has been adjusted by the average wage differences in municipalities; in Columns (6) and (7), the dependant variable is represented in nominal terms. The following designations are used with the variables: (ln) - log; (1/0) - binary variable. Estimates obtained using robust standard errors.

Like in the case of general public services, there is evidence that the effect of the size of population on per capita non-capital education expenditure of municipalities is not necessarily linear. Results remain robust even when the municipality's spending is not adjusted by the average wage index of staff (Columns (6) and (7)).

4.3 Social protection

A summary of the estimations of equation (1) with regard to social protection spending is provided in Table 3.

Table 3 **Factors affecting the per capita non-capital expenditure on social protection in Latvia's municipalities** (2014–2017)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population (ln)	-0.087***	-0.105*	-0.100*	-0.103*	_	-0.065	_
Number of means-tested benefits granted per capita							
(ln)		0.230***	0.170**	0.186***	0.183***	0.160***	0.158***
Are there any home care social services provided (1/0)		0.176***	0.153**	0.154**	0.159***	0.145***	0.149***
Are there any long-term social care services provided		0.002	0.051	0.070	0.072	0.002	0.074
Number of benefits granted		0.082	0.071	0.070	0.062	0.082	0.074
capita (ln)		0.006	0.003	0.005	0.004	0.008	0.008
and deaths per capita (ln)		0.445*	0.401*	0.401*	0.421*	0.377	0.380*
Share of below working age population (%)		-2.183	-2.512	-2.610	-2.592	-1.971	-1.872
Share of above working age population (%)		3.609***	5.100***	5.153***	5.002***	3.895**	3.858**
Number of rural territories		0.018**	0.017***	0.018**	0.022***	0.012*	0.019**
Population density							
(pop./km ² ; ln)		0.075	0.078*	0.075*	0.086*	0.092**	0.111***
(min: ln)			-0 104*	-0 104**	_0 1 01**	-0 114**	_0 111**
Land border (1/0)			0.256***	0.265***	0.268***	0.217**	0.222**
Border (1/0)			-0.260***	-0.268***	-0.267***	-0.227***	-0.233***
Riga Region (1/0)			0.014	0.009	0.003	0.041	0.043
Share of FELGF grant in budget revenue (%)				-0.158	-0.191	-0.358	-0.418
Population (thousands)					-0.028**		-0.020**
Population ^{2} (thousands)					0.00001		0.00001**
Time fixed effects	Included	Included	Included	Included	Included	Included	Included
Number of observations	440	440	440	440	440	440	440
R^2	0.287	0.296	0.325	0.414	0.310	0.213	0.217

Notes. *** – significant with a 99% probability; ** – significant with a 95% probability; * – significant with a 90% probability. In Columns (1)–(4), the dependant variable has been adjusted by the average wage differences in municipalities; in Columns (6) and (7), the dependant variable is represented in nominal terms. The following designations are used with the variables: $(\ln) - \log$; (1/0) -binary variable. Estimates obtained using robust standard errors.

There is a statistically significant negative relationship between per capita non-capital expenditure and population in a municipality in this case as well. Coefficient value ranges from -0.087 to -0.105 (Columns (1)–(4)), thereby confirming that, with population increasing by 1%, per capita non-capital expenditure of a municipality on social protection would decrease by 0.09%-0.11%.

By including other control variables in the regressions, it can be concluded that the non-capital spending on social protection is affected not only by the number of services provided and benefits handed out, but also by the age structure of population. That is, the larger the fraction of over-working-age population, the higher social

protection spending per capita. This could be explained by the fact that elderly people are more exposed to the risk of poverty²⁷ and are subject to more health related problems. Hence they turn to social services for support more often than others. This observation provides additional evidence that, as the population continues to age, municipalities will find it increasingly difficult to provide the required financing for its services. A number of geographical factors are also statistically significant, including the number of rural territories within a municipality; distance to the closest city; whether the municipality is located on the national border; population density.

4.4 Robustness check of the obtained results

In order to check the persistence of the observed relationships, estimations were repeated for different time periods as well as by excluding separate regions from the sample (see Table 4).

Table 4

Impact of the size of population in Latvia's municipalities on their non-capital spending per capita by function and various specifications

(2014–2017)

Row number	Robustness check	General government services	Education	Social protection
(1)	Baseline scenario	-0.185***	-0.129***	-0.103*
(2)	2014–2016	-0.171***	-0.134***	-0.110*
(3)	2015–2017	-0.197***	-0.134***	-0.092
(4)	2014, 2016–2017	-0.193***	-0.121***	-0.109*
(5)	2014–2015, 2017	-0.176***	-0.129***	-0.095
(6)	Excluding Riga Region	-0.333***	-0.177***	-0.213***
(7)	Excluding Kurzeme Region	-0.100**	-0.132***	-0.128*
(8)	Excluding Vidzeme Region	-0.169***	-0.178***	-0.108*
(9)	Excluding Latgale Region	-0.103**	-0.109**	-0.109
(10)	Excluding Zemgale Region	-0.178***	-0.144***	0.008

Notes. *** – significant with a 99% probability; ** – significant with a 95% probability; * – significant with a 90% probability. The dependant variable has been adjusted by the average wage differences in municipalities. Estimates obtained using robust standard errors.

The results of the robustness check suggest that neither the time period selected for analysis (Rows (2)–(5)) nor regional composition (Rows (6)–(10)) has a significant effect on the conclusion regarding the negative relationship between the size of population and per capita non-capital expenditure of municipalities.

The highest coefficient values were obtained in cases when Riga Region municipalities were excluded from the sample. Coefficient estimations suggest that for municipalities outside of the Riga Region, a 1% increase in population results in a non-capital expenditure decrease of 0.18%-0.33%.²⁸

²⁷ https://www.makroekonomika.lv/ka-mazinat-ienakumu-nevienlidzibu-latvija.

²⁸ This could be related to the fact that small municipalities are concentrated outside of Riga Region.

5. DISCUSSION

Based on information about 110 Latvia's municipalities for the time period 2014–2017, rather convincing evidence of a negative relationship between municipal per capita non-capital expenditure and population size was obtained. This relationship can be observed in all of the analysed local government functions and econometric analysis specifications. Coefficient estimates suggest that, with a 1% increase in population, per capita non-capital expenditure of a municipality would decrease by approximately 0.1%-0.2%.

From a point of view of economic theory, there are a number of arguments as to why the non-capital expenditure of municipalities with a smaller population could be higher. This is mostly associated with economies of scale or the increasing average costs observed along with a decreasing amount of services provided (see, for example, Bikker and van der Linde (2016)). A real example of this relationship is provided by the SAO (Valsts kontrole (SAO; 2017)): after comparing the costs of providing the services of building authorities in a number of local governments, it concluded that maintaining a dedicated building authority in small municipalities costs at least three times more than in large municipalities or in small municipalities where a single authority is shared by several local governments.²⁹

Given the persistence of the current demographic trends, Latvia's population will continue to shrink over the next decades and the average population in municipalities will also decrease accordingly. In 2018, the average population of Latvia's municipalities was about 8460 people, whereas by 2040 the average population can be expected to decrease by 15%, to approximately 7200 people (see the left-hand panel of Chart 21). Based on the results yielded by our research, such a population decrease would result in a 2.1% increase in non-capital per capita expenditure. Hence, in the period up to 2040, municipality budgets would additionally require almost 180 million euro to implement the functions we have analysed in the present paper (education, social protection, general public services; see the right-hand panel of Chart 21). Moreover, assuming that the relationship holds also in the case of other local government functions, additional spending needs would be even larger.

In the long term, swelling per capita non-capital expenditure will take up an increasingly larger share of municipality budgets, thereby limiting their ability to invest in territorial development. Even now the share of non-capital budget expenditure of small municipalities tends to be larger than in other municipalities (see Appendix 5).

The growing non-capital expenditure, however, is not the only future challenge faced by the public sector in Latvia (including municipalities) because of the demographic trends. With continued population ageing, the ratio of retirement age population to working age population will increase progressively. This means that the taxes paid by a single working age person will have to finance an increasingly larger volume of public services. Under such circumstances, it is particularly important to look at the current spending efficiency and find solutions for its improvement.

²⁹ A meaningful analysis of the cost efficiency of several other local government services is impossible in the absence of information about the costs of services as well as performance indicators (Valsts kontrole (SAO; 2017)).

Chart 21

Population of Latvia's municipalities (2018–2040; thousands; left-hand panel) **and the potential cumulative effect of increasing non-capital expenditure on municipality budgets** (2030, 2035 and 2040; millions of euro; right-hand panel)



Sources: CSB, TRL and Latvijas Banka's estimates.

Note. Regression coefficients from Tables 1–3 were employed in the estimates. It is assumed that the efficiency improvements in all functions would be equivalent to those estimated in education, social protection and general public services. The average population in municipalities, excluding cities, was used in the estimates. Estimates were based on 2018 prices.

Improvement of the administrative territorial division and concentrating the provision of local government services in larger municipalities could be one of such potential solutions³⁰. Looking at the experience of other countries, attempts at achieving an optimal administrative territorial division have been on the agenda for several decades already. Despite different approaches to reform implementation, countries have mostly opted for a smaller number of municipalities by merging less populated municipalities. Following reforms the number of municipalities has increased only in few cases (see a listing of reforms in the paper by Swianiewicz et al. (2017)). This tendency is also confirmed by information collected by the EC, showing that the number of municipalities in the EU has declined by 18% since 2010, whereas the average population of municipalities has grown by 23%.

Based on the assessments made within the framework of this paper, it is possible to estimate the potential amount of savings that could be achieved by concentrating local government services in administrative territorial units with a larger population. The amount of savings given an average municipality population of 10 thousand, 15 thousand and 20 thousand people has been estimated (see Chart 22).³¹

The potential savings of the municipality budget associated with education, social protection and general public services could be substantial: from 17 million euro to 130 million euro per year. Assuming that a similar relationship between the size of the municipality and its per capita non-capital expenditure also exists with regard to other functions that were not included in our estimates, the potential savings would be even bigger.

³⁰ A conceptually different approach would be to narrow the functions implemented by municipalities and the respective financing by shifting these functions to a higher governance level.

³¹ Average population of municipalities. The costs that would be incurred in the process of forming new municipalities are excluded from estimates. The assumption regarding the size of population has been used for illustration purposes only and does not constitute any specific reform proposal.

Chart 22 **Potential annual savings of non-capital expenditure for municipalities with different average size of population** (millions of sure)





Source: Latvijas Banka's estimates.

Notes. Regression coefficients from Tables 1–3 were employed in estimates. It is assumed that the efficiency improvements in all functions would be equivalent to those estimated in education, social protection and general public services. The average population in municipalities, excluding cities, was used in estimates. Estimates were based on 2018 prices.

In addition to the savings (that could be used, for instance, for welfare improvements), larger municipalities could gain some other advantages, including a higher budget (and human resource) capacity to attract investment and a more stable tax base (enabling them to plan their investment in long-term development). Nevertheless, when developing a new administrative territorial division, a wide variety of factors should be considered that are not limited to municipal spending and its efficiency alone. Search for an optimal size of municipalities should also take into account several issues related to territorial planning like the presence of infrastructure and other features that could affect access to services within the borders of the emerging administrative territorial units. It should also ensure that issues related to good governance are also taken into consideration, so that the estimated potential savings of centralising local government services can be achieved to the fullest extent possible. One also has to keep in mind that organising public administration in excessively large administrative territorial units might lead to the loss of one of the biggest advantages of small municipalities - having a closer contact with their voters, which helps politicians better understand their needs and also promotes higher accountability for the decisions made. Therefore, when developing the administrative territorial division, finding balance between local democracy and cost-efficiency is essential.

APPENDICES

Appendix 1. Methodology of demographic forecasting

To analyse the demographic situation in Latvia's municipalities, we developed forecasts of population in Latvia's municipalities for the time period 2019–2040. Total population $(N_{i,g,a,t})$ in municipality *i* for gender *g* at the age *a* in a time period *t* can be expressed as follows:

$$N_{i,g,a,t} = N_{i,g,a-1,t-1} \left(1 - DR_{i,g,a-1,t-1} + EMR_{g,a-1,t-1} + IMR_{i,g,a-1,t-1} \right)$$
(2)

where $DR_{i,g,a-1,t-1}$ is the mortality rate coefficient of the respective municipality and demographic group, $EMR_{g,a-1,t-1}$ and $IMR_{i,g,a-1,t-1}$ are external migration and internal migration coefficients respectively, and $N_{i,g,a,t}$ is the number of newborns.

Natural changes

Estimates of mortality and fertility rate coefficients are based on the CSB data on population in municipalities and its age distribution as well as the birth and mortality rate coefficients of various age groups (5-year age intervals interpolated to 1-year age groups).

Fertility

The number of newborn males and females $(N_{i,m,0,t} \text{ and } N_{i,f,0,t})$ in municipality *i* in the time period *t* is estimated as follows:

$$N_{i,m,0,t} = 0.5162 \sum_{a} N_{i,f,a,t} BR_{i,f,a,t}$$
(3),

$$N_{i,f,0,t} = 0.4838 \sum_{a} N_{i,f,a,t} B R_{i,f,a,t}$$
(4)

where $\sum_{a} N_{i,f,a,t}$ reflects the number of females in municipality *i* at the age *a* and $BR_{i,f,a,t}$ is the fertility rate coefficient of the respective municipality for women at the age *a*. The fertility rate coefficient is estimated based on an equation approximating fertility by means of a third-degree polynomials that are specific for each municipality³²:

$$-ln\left(\frac{1}{BR_{i,f,a,t}-1}\right) = \left[\sum_{i} \beta_{1i}Pas_{i} + \sum_{i} \beta_{2i}Pas_{i}ln(a) + \sum_{i} \beta_{3i}Pas_{i}ln(a)^{2} + \right. \\ \left. + \sum_{i} \beta_{4i}Pas_{i}ln(a)^{3}\right] + \left[\sum_{r} \gamma_{1r}Reg_{r}ln(t) + \sum_{r} \gamma_{2r}Reg_{r}ln(a)ln(t) + \right. \\ \left. + \sum_{r} \gamma_{3r}Reg_{r}ln(a)^{2}ln(t) + \sum_{r} \gamma_{4r}Reg_{r}ln(a)^{3}ln(t)\right] + \varepsilon_{i,a,t}$$
(5)

where Pas_i is the dummy variable of municipalities, while Reg_r is the dummy variable of a wider region³³. The first part of the right hand side of the equation evaluates the age profile of fertility rate coefficients for each municipality, whereas the second part captures changes in the age profile of the fertility rate coefficients over time within a wider region r. $\varepsilon_{i,a,t}$ is regression error.

³² Logistic transformation was applied in estimates to avoid negative fertility and mortality rate coefficients.

³³ Wider regions are: Vidzeme, Kurzeme, Latgale, Zemgale and Riga Region.

Mortality

Mortality rate coefficients $(DR_{i,g,a,t})$ are estimated using a second-degree polynomial, linear trend, binary variables of municipalities and regions as well as products of all the above:

$$-ln\left(\frac{1}{DR_{i,g,a,t}-1}\right) = \left[\sum_{r}\sum_{a}\beta_{g0r,a}Reg_{r}A_{a}\right] + \left[\sum_{i}\beta_{g1i}Pas_{i} + \sum_{i}\beta_{g2i}Pas_{i}Age_{a}\right] + \left[\sum_{r}\gamma_{g1r}Reg_{r}ln(t) + \sum_{r}\gamma_{g2r}Reg_{r}ln(a)ln(t) + \sum_{r}\gamma_{g3r}Reg_{r}ln(a)^{2}ln(t)\right] + \varepsilon_{i,g,a,t}$$
(6)

where Age_a is the dummy variable for age groups (0–4 years, 5–9 years, 10–14 years etc.). The first part of the right-hand side of the equation evaluates the age profile of mortality rate coefficients within a wider region. The second part specifies the municipality-specific mortality rate coefficient age distribution. The third part captures changes of the age distribution of mortality rate coefficients over time within wider regions.

Overall, the model results suggest that Latvia's population will decline by 180 thousand as a result of natural changes (excluding migration) by 2040 (see Chart 23). This estimation is similar to the UN projections and slightly more pessimistic than the EC's estimate.³⁴

Chart 23 **Latvia's population and its forecasts** (excluding migration; 2012–2040)



Sources: CSB, Latvijas Banka's estimates, UN and EC. Note. Latvijas Banka's forecasts starting from 2019.

Migration

The estimates of migration coefficients distinguish between internal and external migration. CSB data on population in municipalities and its age distribution as well as information on internal and external migration was used in estimating coefficients also in the case of migration.

³⁴ UN and EC forecasts were developed in 2015.

External migration

When modelling external migration, technical assumptions were employed extrapolating the current trends in external migration. For each gender and age group, they are described with a first-degree autoregressive (AR1) process and are the same for all municipalities:

$$EMR_{g,a,t} = \sum_{i} \beta_{1i} ln(a) EMR_{g,a,t-1} + \sum_{i} \beta_{2i} ln(a)^2 EMR_{g,a,t-1} + \varepsilon_{g,a,t}$$
(7).

In order to check the robustness of the results, the EC estimates of external migration were used as an alternative.

Internal migration

Like in the case of external migration, internal migration also extrapolates the existing trends. Internal migration coefficients have been estimated using a gravitation model that takes into account the age distribution of the population of each region and municipality (see equation (8)). Such an approach to estimation reflects the continuation of the current internal migration trends in the future.³⁵

$$IMR_{i.g,a,t} = \sum_{r} \sum_{a} \beta_{g0r,a} Reg_{r} Age_{a} + \sum_{a} \beta_{g1,a} \ln N_{a,t} + \varepsilon_{i,g,a,t}$$
(8)

Internal migration in Riga Region was estimated as a deviation, ensuring that the overall internal migration of Latvia is equal to zero for each age group in all periods. Migration considered, estimates show that Latvia's population will decrease to about 1.7 million by 2040 (see Chart 24). This estimate is more optimistic in comparison with the UN and EC forecasts mainly on account of a more positive view on the decline of external migration. The forecast becomes more pessimistic when the external migration assumptions of the EC are used.

Chart 24

Latvia's population and its forecasts (including migration; 2012–2040)

Sources: CSB, Latvijas Banka's estimates, UN and EC. Note. Latvijas Banka's forecasts starting from 2019.

³⁵ For example, youth migration to Riga from other municipalities.

Paper	Country	Main conclusions			
Afonso and Fernandes (2008)	Portugal	Cost-efficiency is higher in densely populated municipalities as well as municipalities where the education and income level of the population is higher. Cost-efficiency is higher in municipalities located relatively close to regional centres.			
Balaguer-Coll et al. (2010)	Spain	Cost-efficiency in big municipalities having more functions is higher than in small municipalities.			
Bikker and van der Linde (2016)	Netherlands	Cost-efficiency is higher in big municipalities. Moreover, the optimum size of population from the point of view of cost- efficiency has increased over time.			
Bosch et al. (2001)	Spain	Waste collection efficiency is affected by the number of tourists and distance to waste recycling/storage sites.			
De Borger and Kerstens (1996)	Belgium	Cost-efficiency is lower in municipalities where the population has a higher level of education and income, in municipalities receiving relatively large subsidies and municipalities with low population density.			
Geys and Moesen (2008)	Belgium	Cost-efficiency is higher in small municipalities with low population density and high importance of subsidies in revenue. The socio-economic features of population have no effect on efficiency.			
Loikkanen and Susiluoto (2006)	Finland	Cost-efficiency is lower in municipalities located in the periphery, large municipalities with low population density, municipalities outsourcing a large proportion of services to other municipalities and municipalities with a large share of subsidies in revenue.			
Nakazawa (2014)	Japan	Municipalities with a high degree of centralisation of services are more efficient. The effect of the size of population on cost- efficiency is non-linear: the cost-efficiency of small and very large municipalities is lower than that of medium-sized municipalities.			
Šťastná and Gregor (2011)	Czechia	Cost-efficiency is lower in municipalities located far from regional centres, municipalities with large population, municipalities with low voter turnout as well as municipalities receiving relatively large subsidies.			

Appendix 2. Papers evaluating cost-efficiency of municipalities

Appendix 3. Non-capital expenditure per capita in municipalities (2017; euro)

General public services

Education

Maintenance of territories and housing

Recreation, culture and religion

Indicator	Average	Standard	Minimum	Maximum	Source
		error			
Municipal non-capital expenditure per capita on general public services (euro)	127.6	37.0	50.7	265.2	TRL
Municipal non-capital expenditure per capita on education (euro)	502.3	109.0	303.9	836.4	TRL
Municipal non-capital expenditure per capita on social protection (benefits expenditure excluded;			10.5	202.2	
euro)	57.0	27.9	13.5	202.2	TRL
Are there any home care services provided (1/0)	0.82	0.39	0	1	MW
Are there any long-term social care and rehabilitation institution services provided (1/0)	0.85	0.35	0	1	MW
Number of means-tested benefits granted (families)	378	345	26	1807	MW
Number of non-means-tested social protection benefits granted (families)	46	45	2	311	MW
Number of registered births and deaths	219	184	27	832	CSB
Number of students in pre-primary educational establishments	409	394	35	1823	MES
Number of students in general educational establishments	886	836	114	3886	MES
Are there any pre-primary educational establishments (0/1)	0.89	0.31	0	1	MES
Number of general educational establishments	4	4	1	17	MES
Are there any students in vocational educational					
establishment programmes (1/0)	0.35	0.48	0	1	MES
Are there any educational establishments implementing vocational education programmes (1/0)	0.05	0.21	0	1	MES
Number of registered births, deaths and					
marriages	274	231	33	1060	CSB
Population at the beginning of the year	8549	7229	1036	33 448	CSB
Number of rural territories in municipality	4.6	4.3	1	25	MEPRD
Population density (pop./km ²)	26	37	4	200	CSB
Share of below-working-age population (%)	0.15	0.03	0.11	0.28	CSB
Share of above-working-age population (%)	0.24	0.03	0.11	0.31	CSB
Distance to closest city (min)	46.22	19.55	10	101	SIA "Karšu izdevniecība Jāņa sēta"
Border (1/0)	0.39	0.49	0	1	Latvijas Banka's estimate
Land border (1/0)	0.28	0.45	0	1	Latvijas Banka's estimate
Riga Region (1/0)	0.25	0.44	0	1	Latvijas Banka's estimate
Share of grant in budget revenue	0.13	0.08	0	0.32	TRL. RDIM

Appendix 4. Statistics describing 2017 indicators used in estimations

Note. Variable with denotation (1/0) is a binary variable.

Appendix 5. Share of non-capital expenditure in budget expenditure of Latvia's municipalities (average in 2014–2017; %)

Sources: TRL and Latvijas Banka's estimates.

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Latvijas Banka K. Valdemāra iela 2A, Riga, LV-1050 Tel.: +371 67022300 info@bank.lv http://www.bank.lv https://www.macroeconomics.lv