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PEOPLE, PARTY OR MONEY? DETERMINANTS OF LOCAL GOVERNMENT INFRASTRUCTURE INVESTMENT

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ABSTRACT

Drivers of local public infrastructure investment have preoccupied researchers for decades. In Germany, Europe's largest economy, there is an increasing awareness since deteriorating infrastructure quality seems to become a considerable risk for economic growth. In addition to fiscal restrictions, another aspect is becoming increasingly important for investment activity at the municipal level in times of ageing societies which has been neglected by most studies so far: personnel capacities. We investigate the issue for a sample of local governments in the German state of North Rhine-Westphalia for the period from 2009 to 2023. The results of a dynamic panel corroborate the well-known relevance of the revenue situation as well as a trade-off between social and investment expenditure. What we contribute to existing literature is robust evidence regarding the role of a local governments' capacity to implement investment policies – measured as full-time equivalents in local building departments.

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People, Party or Money? Determinants of Local Government Infrastructure Investment

Christian Raffer[1] and Katja Rietzler[2]

Abstract: Drivers of local public infrastructure investment have preoccupied researchers for decades. In Germany, Europe's largest economy, there is an increasing awareness since deteriorating infrastructure quality seems to become a considerable risk for economic growth. In addition to fiscal restrictions, another aspect is becoming increasingly important for investment activity at the municipal level in times of ageing societies which has been neglected by most studies so far: personnel capacities. We investigate the issue for a sample of local governments in the German state of North Rhine-Westphalia for the period from 2009 to 2023. The results of a dynamic panel corroborate the well-known relevance of the revenue situation as well as a trade-off between social and investment expenditure. What we contribute to existing literature is robust evidence regarding the role of a local governments' capacity to implement investment policies – measured as full-time equivalents in local building departments.

Keywords: Public Finance, Local Governments, Infrastructure, Investment, Dynamic Panel

JEL-Codes: H72, H76, R53

1. Introduction

Governments produce public services with infrastructure as general-purpose input, which the private sector would not provide adequately (Frischmann 2012). In addition, public investment in infrastructure is empirically related to macroeconomic effects like

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increased output, reduced unemployment, or improved standards of living (Abiad, Furceri, and Topalova 2016; Aschauer 1990). Therefore, insufficient investment poses a threat to the quality of public services and social welfare, but also to the wider economic performance. Following Eurostat data, governments in the European Union considerably reduced their investments (as share of GDP) after the financial crisis.[3] Only in 2024, the pre-crisis level of 2008 was reached again. Whereas the academic literature is rich in terms of effects of investment expenditure (see, for example, Ramey 2021),[4] knowledge about drivers of infrastructure investment is still developing (St. Clair 2025) – especially if they lie beyond the availability of financial means. Since in many countries local governments are responsible for large parts of public investment, they deserve particular attention.

Among the 27 EU countries, the average share of local governments in general government gross fixed capital formation was 43 percent in 2023 and particularly high in Nordic countries like Sweden and Finland with more than 50 percent. The German local government share in 2024 was at 35 percent.[5] Narrowing the focus on public gross building investments, German local governments accounted for roughly half of general government gross building investment.[6] Still, survey research indicates that a majority of European local governments view infrastructure investment as inadequate (EIB 2023). That this is closely related to decaying infrastructure quality has been demonstrated for Germany (Raffer and Scheller 2024). Also in the U.S., the poor condition of public infrastructure has been a topic of public discourse for decades (St.

[3] Eurostat: Investment share of GDP by institutional sectors [sdg_08_11].
[4] For the European municipal level, see Kemmerling and Stephan (2002).
[5] Eurostat Annual Government Finance Statistics – summary tables (updated 29 January 2026).
[6] Destatis: Statistischer Bericht VGR Investitionen 3. Vierteljahr 2025 [German Statistical Office: Investment Data, third Quarter 25.

Clair 2025; Chen 2017; Kemp 2017; Holtz-Eakin and Rosen 1993; Hulten and Peterson 1984).

Consequently, much of the existing empirical literature on the drivers of local government investment analyses the situation in the two federal countries Germany and the US. The likely reason for the regional focus on Germany is an ongoing national debate on the worsening quality of (local) public infrastructure (e.g. Gornig et al. 2015). The discussion about an investment backlog has recently flared up in the wake of reforms or the German constitutional debt brake as well as a vast infrastructure fund launched by the government in 2025, which foresees a total of €500 billion of public investment (Dullien, Jürgens, and Watzka 2020; European Commission 2025).

Although surveys show that local government officials in Germany perceive the lack of qualified staff as an obstacle to investment (e.g. Scheller et al. 2021), only a few econometric studies have focused on this non-monetary obstacle. These, however, use independent variables with weak explanatory power or suffer from methodological breaks in the data. We strive to test the hypothesis that the local government's capacity to implement investment policies (implementation capacity) is crucial for actual investment with a more straightforward measure. We use explicit full-time equivalents (FTEs) working in the local departments for construction and housing ("Bauen und Wohnen") as well as spatial planning and development ("räumliche Planung und Entwicklung") as explanatory variable. By estimating a system GMM model with a dataset of North Rhine-Westphalian local governments[7] over a period from 2009 to 2023, we find that a potential shortage of staff does indeed impair public investment. Moreover, we identify expenditure competition between social and investment

[7] For the level and development of FTEs in these departments in North Rhine-Westphalia and Germany, see Figure A1 in the Annex.

expenditure as driving force. Surprisingly, we neither find significant partisan nor neighbouring effects. The results hold over a broad set of different specifications.

This article is structured as follows: In section two, we present previous research relevant for specifying the investment function. Section three describes the institutional setting before we outline our method and data in section four. In section five, we present the results, which we discuss in the light of the literature in section six. Section seven concludes.

2. Previous Research

Research has identified several potential drivers of local government infrastructure investment, with financial conditions and partisan effects being the most thoroughly studied. Potential reasons for fiscal distress at the local level are institutional limitations to taxation or debt capacity induced by fiscal rules and enforced by strict oversight mechanisms (Bremer et al., 2023, Jochimsen and Raffer 2026), a rise of unfunded mandates in systems of fiscal federalism (Plekhanov and Singh 2006) and cyclical revenue fluctuations.

Fiscal policies related to infrastructure investment are often subject to collective choice processes (Hettich and Winer 1999) in which partisan characteristics, council fragmentation or election cycles[8] determine the extent to which local political decision makers respond to a "rent seeking society" (Krueger 2008; Duflo, Fischer, and Chattopadhyay 2005; Miettinen and Poutvaara 2015). Left-wing governments are typically expected to show a stronger preference for income redistribution and a more

[8] For an overview, see Goeminne and Smolders 2014

interventionist role of the state than their right-wing counterparts. Accordingly, left-wing majorities are associated with higher levels of public expenditure (Hibbs 1977).

Apart from that, the literature mentions several theoretical reasons why the investment behaviour of the neighbouring jurisdiction may play a role. Based on economic spillovers, a municipality may reduce its investment activity whenever a neighbour invests in infrastructure from which citizens in both benefit (Bruce et al. 2007). The concept of yardstick competition comes to a different conclusion (Besley and Case 1992). Whenever one municipality lifts infrastructure quality, local citizens may demand the same from their local council which would lead to increasing investment expenditure. Also, infrastructure competition to attract additional economic activity may play a positive role (Taylor 1992). And, finally, some infrastructure projects like local roads do not end at a municipality's border, which requires joint investment.

What remains understudied is local government capacity to implement investment policies — even in its most basic form measured by the availability of qualified personnel. This is not only a gap in the literature but also a pressing issue, particularly in light of the widespread shortage of skilled staff in ageing societies (OECD 2025). Based on their bottleneck role between investment policy formulation and implementation, we expect a positive relation between number of staff in the planning-related local government departments and the local government's investment expenditure. Their enabling role in the creation of public goods has been discussed in the literature (Schiersch and Gornig 2016; Rogger and Schuster 2023; Gornig and Michelsen 2017; Frischmann 2012). However, thorough empirical analyses of this relation are rare.

One exemption is the work of Bremer et al. (2023), who make use of German local government investment data from 1995 to 2018, aggregated at county level. The authors identify fiscal and administrative capacity as well as partisanship in the county council as relevant drivers. Beznoska and Kauder (2020) focus on fiscal variables only. Using a sample of North Rhine-Westphalian municipalities (1995-2015), they identify distributional effects in the sense that expenditure needs in other categories – such as personnel expenditure – as well as revenues determine investment expenditure Gornig and Michelsen (2017) look at local government construction expenditure and personnel in planning departments using data aggregated at state level and run a reduced-form fixed effects regression for the period from 1991 to 2014. They find a strong effect of personnel capacities on local governments' construction expenditures. Riedel et al. (2021) analyse budget data from a sample of West-German small to medium sized municipalities over a period from 1992 to 2006. The authors focus particularly on partisan effects but neglect implementation capacity. Their central finding that left-wing dominated councils spend less on infrastructure is in line with Bremer et al. (2023).

Beyond Germany, Goeminne and Smolders (2014) find for Flemish municipalities that fiscal as well as political-economy variables like election years and government composition/fragmentation are influential. In Flanders the liberals invest less. In addition, neighbouring effects are relevant in their setting. Banaszewska (2018) finds for Polish municipalities that, again, revenues and grants drive local public investment whereas demographic factors as well as the debt level appears to be an obstacle. Following the work of Haraldsvik, Hopland, and Kvamsdal (2024), municipal investment in Norway depends positively on expected population growth, the share of older citizens but also on the share of leftist parties in the local council. The authors include a dummy for so-called ROBEK municipalities, national monitoring programme

for local governments with weak financial positions. Affected municipalities experience an expenditure constraint, which has a strong and negative effect on investment. Analysing Peruvian municipalities, Jimenez et al. (2020) report the availability of funding sources, management capacity variables and election years as significant.

For the U.S., Holtz-Eakin and Rosen (1993) provided an early empirical analysis of the "infrastructure crisis" (p. 61). Main findings are the positive impact of a local government's revenue situation as well as forward-looking municipal planning on capital spending. Poterba (1995) analyses differences in state-local capital spending with a focus on budgeting procedures. More recent analysis comes from Wang and Wu (2018) who investigate capital spending of 100 large U.S. cities over a period from 1992 to 2012. Their findings corroborate the relevance of local revenues and add the negative impact of fiscal constraints. Fisher and Wassmer (2015) obtain similar results. They present the economic situation as well as the ideological orientation of citizens as significant drivers – the more liberal a U.S. state was, the higher were state and local capital expenditures during the 2000s. Similarly, Alm and Dronyk-Trosper (2021) find a negative impact of a Republican president in their analysis of state and local road infrastructure spending from 1953 to 2013. Moreover, the authors highlight a negative relation with welfare expenditures before 1979. In many U.S. studies, demographic factors like the share of the old or young population yield significant point estimates. The work of St. Clair (2025) shows similar results and highlights the particular relevance of federal assistance.

Overall, existing empirical research indicates that local government investment expenditure is determined by financial means and political economy as well as demographic variables. Less can be said about the local government's capacity to implement investment policies. Here lies our main research interest. The few studies

that have investigated this relation suffer from methods or independent variables with limited explanatory power. Whereas Bremer et al. (2023) integrate overall technical personnel employed in local administration irrespective of department and aggregated at district level, Jimenez et al. (2020) use a dummy variable which indicates a local government's need for technical assistance for the formulation and evaluation of public investment projects. Gornig and Michelsen (2017) analyse the role of personnel in local planning departments but aggregate the data at state level and run a rather simple fixed effects regression without any fiscal or political explanatory variables for the period from 1991 to 2014. Moreover, this period is characterised by effects of the German reunification and methodological breaks in personnel data. We strive to complement this research with an approach that combines a more accurate variable for implementation capacity – full-time equivalents in the building-related departments – with micro-level data and a model that accounts for endogeneity. Our research hypothesis is: There is a positive relation of local government capacity to implement investment policies and investment expenditure.

3. The German case and the Role of North Rhine-Westphalia

Germany is a federal state with three levels of government being responsible for different domains of public investment. Municipalities and districts are responsible for local roads, school buildings, kindergartens, sports facilities and other local infrastructure (for an overview see Brüning 2024).

Local government comprises municipalities and administrative districts. Larger cities ("kreisfreie Städte") combine functions of municipality and district whereas smaller municipalities ("kreisangehörige Gemeinden") delegate certain functions to the district level. District functions include public health, food safety, civil protection,

motor vehicle registration, transfers to long-term unemployed persons, youth welfare, local public transport and rubbish disposal. For many of these functions, public infrastructure is the most relevant general-purpose input (Frischmann 2012).

According to the national accounts the close to 11,000 local governments, their associations and extra-budgetary units accounted for 34.7 % of all public gross fixed capital formation in 2024 (see Figure A2, Annex)[9]. For construction investment only, the local share was at 47.8 %. In 2024, more than four fifths of all municipal investment was related to construction (as opposed to investment in machinery or intellectual capital).

Nationally aggregated data masks substantial regional disparities. Municipalities in Bavaria have invested more than twice as much in the construction of local infrastructure per inhabitant as municipalities in North Rhine-Westphalia in each year since 2011, which is the year when the German statistical office began publishing revenue and expenditure data for the whole government sector including off-budget entities. While municipalities in Baden-Württemberg and Bavaria have consistently invested more than the German average, municipalities in North Rhine-Westphalia and the Saarland have consistently exhibited the lowest levels of construction investment (for the year 2024, see Figure A3 in the Annex). Thus, when it comes to explaining the level of public infrastructure investment in Germany, North Rhine-Westphalia (NRW) is an important part of the story.

[9] This share has declined sharply since the early 1990s, when it exceeded 50%. As a consequence of a Eurostat ruling the federal railway's infrastructure corporation was reclassified as federal government entity in 2024, resulting in a data revision for the period beginning with the German railway reform of 1999. This increased the federal share andresulted in a further reduction of the local government share.

Moreover, it is the largest of the 16 German states and accounts for more than one fifth of the German population. In addition, it is one of four states in which local governments are particularly weak in terms of their financial conditions. In the past, they resorted heavily to short-term debt to finance current spending, particularly social transfers. The fiscal problems of North Rhine-Westphalia's municipalities are closely connected to a decade-old industrial restructuring process after the end of the state's coal mining industry. The most heavily indebted municipalities have also been negatively affected by globalisation (Truger 2018).

Rather than tackling the structural issue of municipal debt, the government of North Rhine-Westphalia initiated a bailout programme to help indebted municipalities balance their budgets. The so-called "Stärkungspakt Stadtfinanzen" (Pact to strengthen cities' finances) was compulsory for 34 over-indebted local governments from 2011 onwards. In 2012, another 27 threatened by over-indebtedness could join on a voluntary basis. A third round began in 2017 for another three. The programme ended in 2021 for the first two rounds and in 2022 for the third. Participants received grants from the state budget but were subject to strict consolidation measures (Rappen 2017).

The high level of short-term debt remained an unsolved problem, however. In 2023, the government of North Rhine-Westphalia came up with a debt-restructuring programme, for which it provides 250 million Euro annually over 30 years from 2025 onwards (Ministry of Finance NRW 2024).

Survey research indicates an increasing local government investment backlog in Germany, which amounted to 216 bn. Euro in 2024 (Raffer and Scheller 2025). In 2023, local governments in NRW reported that the largest investment backlogs existed in school buildings, local roads and transportation infrastructure, administrative buildings and public sports facilities (Thöne and Willeken 2024, 18).

4. Data and method

Focussing on local governments in North Rhine-Westphalia has the advantage of institutional homogeneity. It allows for neglecting variables accounting for institutional differences across the states. In addition, we can ignore regional economic differences within Germany. We implement a dynamic panel data model for all but two NRW municipalities and districts,[10] with a dataset comprising 425 entities over a period of 15 years (2009 to 2023). We chose the starting year 2009 since it was the first year in which North Rhine-Westphalian local governments applied accrual accounting.

Based on the outlined theoretical considerations we specified the following baseline investment function:

$$y_{it} = \beta_0 * y_{i,t-1} + \beta_k * X_{kit} + \eta_i + \rho_t + \varepsilon_{it}$$

$$i = 1, \dots, N$$

$$t = 1, \dots, T$$

$$k = 1, \dots, K$$

The dependent variable y is municipal construction expenditure per capita for municipality i in year t. Since fiscal variables like investment expenditure often depend on their previous year's value, we integrate $y_{i,t-1}$ in the set of explanatory variables. The vector X comprises K additional explanatory variables. These are the fiscal variables ($k = 1$) revenues per capita, (2) social expenditure per capita and (3) short-

[10] The two missing municipalities had to be dropped due to missing/incorrect data.

term debt per capita, the political-economy variables (4) political orientation as well as (5) fragmentation of the council, and the implementation capacity variable (6), which we measure with full-time equivalents (FTEs) working in the municipal departments for construction and housing as well as spatial planning and development (for the detailed description of data sources, dummy coding and descriptive statistics, see Annex, Table A1.).[11] All monetary variables are measured in real terms.[12]. Our model includes local government (η_i) and year (ρ_t) fixed effects. The political economy variables as well as the FTEs have been included in their first lags since we assume that a changing personnel structure or political situation takes some time to translate into changes in the level of local government investment expenditure.

Including a lagged dependent variable introduces the "dynamic panel bias" or "Nickell's bias" (Nickell 1981) since $y_{i,t-1}$ is numerically related with the fixed effects in the error term (Roodman 2009). In addition, potential sources of simultaneity bias due to adding further fiscal variables to the right-hand side of the equation or reverse causality bias because of the interplay between number of administrative staff in the building departments and local government investment expenditure are potential causes for endogeneity. To account for this, we implement a system General Methods of Moments (GMM) estimation (Arellano and Bond 1991) in which the explanatory variables are instrumented with their own lags ($t - (2\ to\ 5)$) in levels and differences. We apply standard tests for autocorrelation as well as for the validity of instruments (Hansen 1982). To check for spatial autocorrelation, we calculate Moran's I for each

[11] We tested further potential explanatory variables and neglected these for the sake of simplicity since they produced insignificant results. These were: youth/age share of the population (proxies for expenditure needs), operational expenditures (subset of total expenditures) per capita.

[12] Deflator of public construction investment and GDP-Deflator of North-Rhine Westphalia from (regional) national accounts (Vintage Mai 2025).

available year (Moran 1950). In addition, we implement neighbouring effects for a reduced sample. Moreover, we re-estimate the baseline for sub-periods and several sub-samples as a robustness check.

5. Results

In our baseline models, the coefficients for lagged construction expenditure as well as for administrative capacity and social expenditure are significant at least at the five percent level (see Table 1). On average, one additional member of staff in the construction-related departments of the local administration measured in full-time equivalents (FTE) is related to 88,610.55 Euro higher investment expenditure in the following year. To put it differently: Increasing the number of personnel by one additional employee per 1,000 inhabitants leads to an increase of 88.6 Euro per capita in local public construction expenditure one year later. By contrast, neither revenues nor short-term debt as indicator for the general fiscal situation exhibit statistically significant point estimates. The coefficient for social expenditure in model 1a of -0.094 can be interpreted as follows: In the current year a 100 Euro higher social expenditure per capita is related to investment expenditure per capita, which is by 9.4 Euro lower. Similarly, a 100 Euro higher investment expenditure per capita in the previous year is related to a 41.9 Euro higher investment expenditure per capita in the current year. Investment projects often span from one to the next budget year.

Model 1a passes all chosen specification tests (Table 1). As the estimation approach may be flawed if construction expenditures in the individual municipalities and districts are not independent of each other, we tested for spatial correlation by calculating Moran's I for each year. For most years, we cannot reject the null hypothesis of no spatial correlation at the 5 % level. In Model 1b we extend the baseline estimation by the Hirschmann-Herfindahl (HHI) index to represent the degree of political

fragmentation in the local council and in a second step by a dummy variable which takes the value one if the dominating political party in the local council is leaning left (Model 1c). In several cases, the political orientation of the leading political faction was unclear. We excluded these governments from the analysis, which led to a reduced number of observations. As Table 1 shows, the two political variables do not help to explain construction investment in North Rhine-Westphalia's municipalities and districts.

	Model 1a (15.1)	Model 1b (15.1. Pol 1)	Model 1c (15.1. Pol. 2)
constr. exp. (pc, L1)	**0.480*** **	**0.475*** **	**0.455*** **
	(0.059)	(0.057)	(0.06)
FTE (pc, L1)	**88610.55** **	**88696.21** **	**91294.37** **
	(40535.63)	(40057.7)	(37185.37)
social expend. (pc)	**-0.094** **	-0.0669	**-0.11** **
	(0.038)	(0.045)	(0.053)
revenues (pc)	0.027	0.023	0.026
	(0.019)	(0.019)	(0.023)
short-term debt (pc)	-0.007	-0.006	-0.003
	(0.006)	(0.006)	(0.008)
Herfindahl (L1)		250.46	-9.103
		(171.948)	(151.42)
polit. council (L1)			-15.723
			(17.69)
constant	3.240	-55.96	32.564
	(39.788)	(53.41)	(58.686)
Number of obs.	5950	5950	4984
Number of groups	425	425	356
Number of instr.	39	44	49
Arellano-Bond test AR(1), 1st diff., prob.	0.000	0.000	0.000
Arellano-Bond test AR(2), 1st diff., prob.	0.223	0. 203	0.277
Hansen test, prob.	0.161	0.238	0.392
No. of years, when null of no spatial autocorrelation can be rejected at 5% level	4 out of 14	6 out of 14	7 out of 14

Table 1: System GMM Model including districts for the years 2009 to 2023.

*Year dummies included in all models. * sig. at the 10% level, ** - sig. at the 5 % level, * - sig. at the 1 % level. In model 1c, those local governments were excluded in which the leading party in the local council was not identifiable as belonging to the left/conservative spectrum.*

Hence, in all three models, construction expenditure at the local level is consistently explained by lagged construction expenditure and implementation capacity. Social expenditure is significant in models 1a and 1c. Obviously, it absorbs freely allocable local funds, which consequently are not available for investment.

The estimation results are similar if we eliminate districts from the original sample, which is necessary to estimate the effects of investment in neighbouring municipalities (Table 2). Model 2a is equivalent to the baseline model 1a in Table 2. To deal with the problem of spatial correlation, we add construction expenditure of all neighbouring municipalities. This variable does not contribute to the explanation of construction expenditures, which means the absence of neighbouring effects.

The coefficients of models 2a to 2d excluding districts are similar to those in Models 1a to 1c. Again, neither political fragmentation nor the orientation of the leading political party play any significant role. Hence, construction expenditure in the sub-set of municipalities and districts is explained by lagged construction investment and implementation capacity. In some, but not all specifications, significant point estimates for social expenditure indicate expenditure rivalry in the local budget. In model 2b, also local government revenues show a significant and positive effect.

For models 1a and 2a we carried out additional robustness checks by cutting off the first and the last two years of the sample, respectively (Table A3, Appendix). In the first case, the result for implementation capacity holds. Coefficients are positive and at a level of 221,414.5 Euro for model 1a and 202,509.5 Euro for model 1b. The picture changes, however, if we cut off the most recent two years from the sample – 2022 and 2023. In this case, the point estimate for implementation capacity turns insignificant. That means that the relevance of full-time equivalents in the building-related departments can be attributed to more recent developments. Moreover, fiscal stress

becomes a significant predictor: an increase of short-term debt by one Euro per capita leads to a 0.015 Euro (Model 1a) and 0.013 Euro (Model 2a) decrease of construction expenditure, which is a remarkably small effect. Social expenditure remains significant. Moreover, the level of local government revenues turns significant.

	Model 2a (16.1)	Model 2b (16.2)	Model 2c (16.2. Pol 1)	Model 2d (16.2. Pol. 2)
constr.exp.(pc, L1)	**0.465*** **	**0.470*** **	**0.464*** **	**0.472*** **
	(0.061)	(0.059)	(0.058)	(0.062)
neighb. effects		-0.022	-0.023	-0.029
		(0.019)	(0.019)	(0.023)
FTE (pc., L1)	**78935.81** **	**83736.71** **	**82041.18** **	**57432.68** *
	(38852.68)	(39278.03)	(38984.55)	(34796.1)
social exp. (pc)	**-0.105** **	**-0.102** **	-0,0801	-0.080
	(0.051)	(0.049)	(0.061)	(0.073)
revenues (pc)	0.031	**0.035** *	0.031	0.033
	(0.022)	(0.021)	(0.022)	(0.033)
short-term debt (pc)	-0.005	-0.006	-0.005	-0.006
	(0.007)	(0.007)	(0.007)	(0.009)
Herfindahl (L1)			185.88	110.728
			(176.86)	(159.508)
polit. council (L1)				-8.018
				(17.977)
constant	-37.4	-35.202	-85.477	-1.583
	(41.922)	(41.936)	(54.86)	(81.087)
Number of obs.	5516	5516	5516	4592
Number of groups	394	394	394	328
Number of instr.	39	44	49	54
Arellano-Bond test AR(1), 1st diff., prob.	0.000	0.000	0.000	0.000
Arellano-Bond test AR(2), 1st diff., prob.	0.205	0.200	0.182	0.302
Hansen test, prob.	0.244	0.315	0.376	0.445
No. of years, when null of no spatial autocorrelation can be rejected at 5% level	6 out of 14	9 out of 14	10 out of 14	10 out of 14

Table 2: System GMM Model excluding districts for the years 2009 to 2023.
*Year dummies included in all models. * sig. at the 10% level, ** - sig. at the 5 % level, * - sig. at the 1 % level.*

We re-estimated the baseline models 1a and 2a for two more sub-groups related to financial strength. “Financially strong” local governments are those with comparably low levels of short-term debt per capita (lower half of the distribution). Those with relatively high levels of short-term debt (upper half of the distribution) are considered “financially weak”. When re-estimating these models for the two sub-groups separately, the point estimate for implementation capacity is no longer significant (Table A4, Annex).[13] Among financially weak local governments, the previous year’s construction expenditure remains the only significant explanatory variable. Financially weak local governments seem to pursue only those investment projects, which are strictly necessary. Any variation of additional investment related to implementation capacity or financial means vanishes under financial hardship. In the sub-group of financially strong local governments, point estimates for social transfers are double as high in magnitude as they are for the entire sample (see Models 1a and 2a in Table 1 and Table 2). In addition, point estimates for revenues are relevant.

Furthermore, we disentangled the FTEs in the construction-related departments into its components, one sub-group “Spatial Planning and Development” and one more “Building and Housing”. The results (Table A5, Annex) reveal that those staff members working in of spatial planning and development drive the effect of implementation capacity; staff in the departments related to building and housing are less relevant. Finally, we added two further models in which we estimate the impact of the entire number of staff in the local government. The respective model 1a (but not model 2a) in Table A5 shows a significant estimate for implementation capacity.

[13] If we choose the 25th and the 75th percentile instead of the 50th (median) as cut-off point, the results remain stable.

6. Discussion

Our results are broadly in line with previous research. Like Beznoska and Kauder (2020) we find local government investment being limited by higher levels of social expenditure and (in some models) driven by higher levels of government revenues. Whereas Beznoska and Kauder found that personnel expenditure is negatively related to investments our analysis indicates that this finding may be driven by the rivalry of expenditure categories because, following our results, FTEs in the construction-related departments increase local government construction expenditure. This supports our research hypothesis and is similar to Bremer et al. (2023), who used the total number of public employees on the county level for predicting municipal investments. Our analysis adds to their study by using a sample period until 2023 (instead of 2018) and by using unaggregated municipality-level data. Moreover, we add that human resource provision in the local spatial planning and development department is driving this effect. Since Bremer et al. (2023) use the overall number of employees in the local administration, we can compare the point estimate of our model 1a for the entire administration (Table A5, Annex). We find an increase of construction expenditure by 6.5 Euro when the number of administrative staff increases by one employee (per 1.000 inhabitants). Bremer et al. (2023) report an increase, which varies from 15.3 to 19.5 Euro. The difference is consistent since we focus on local governments in NRW with average investment expenditures being significantly below the German average (see Figure A3, Annex), on which Bremer et al. 2023 put their focus.

Like previous studies we have investigated the political economy of investment. However, our results do not show a significant influence of party majority or fragmentation of the local council. We explain this with our focus on notoriously

underfinanced North Rhine-Westphalian local governments that suffer from a lack of freely disposable resources with which political parties could satisfy their camps.

Although theories of yardstick investment competition make a strong case for neighbouring effects, our analysis does not reveal the like. Local governments in North Rhine-Westphalia are investing independently of each other. Since they are larger in size compared to those in all other German states, joint investment projects are probably negligible compared to overall investment expenditure.

The central results of our study are threefold: First, we provide evidence for the positive impact of staff resources on the capacity to invest. We show that employees in the departments related to spatial planning and development are driving this effect. In addition, developments in more recent years seem to be of particular importance. This underpins the discussion about non-monetary investment obstacles (Scheller et al. 2021; Raffer and Scheller 2024).

Second, we identify a trade-off between social and investment expenditure. On the one hand, unemployment is above the national average in North-Rhine Westfalia and on the other hand raised federal standards for the social inclusion of handicapped persons are increasing local social spending. This might be an explanation for the existing investment backlog (Raffer et al. 2025) and is similar to the historical situation observed in the U.S. in the 1960s/70s, when the Associated General Contractors of America wrote in 1983: “For the last 20 years or so, capital spending on public works […] has been competing with social services spending – and loosing” (Holtz-Eakin and Rosen 1993, 61).

Third, in several model specifications we identify the importance of the local government revenue situation for their level of investment, which is in line with existing research.

Considering all this, Germany currently finds itself in what one might call a "tripple trap of local public investment".[14] Not only have local governments been burdened by additional tasks without sufficient funding. German municipalities are also suffering from a lack of qualified personnel, which limits their capacity to invest. Finally, the weak economic trend[15] reduces local government revenues. All this exerts downward pressure on investments.

7. Conclusion

What drives public investment in financially deprived local governments? In this study, we answer this question by analysing local government data from North Rhine-Westphalia over a period of 15 years with a system GMM model. Our focus was on local government employees in building-related departments who implement investment policies. Whereas higher levels of this implementation capacity support public investment, we identify a trade-off between social and investment expenditure. This is the main result of our analysis. In addition, we provide some evidence for the relevance of the revenue situation. Putting these three drivers to the current German economic and socio demographic reality leads us to the notion of a "tripple trap of local public investment". Local social expenditures have soared, the weak economic trend diminishes tax revenues and the available staff in planning departments does not keep up with investment demands. With thousands of baby boomers entering retirement in the near future, personnel bottlenecks may even become a more serious constraint to

[14] To which one could add the problem of high levels of bureaucratic burden, which has not been part of this analysis as we focus on one institutionally homogeneous state.
[15] In North Rhine-Westphalia, economic growth, measured by the GDP of the state, is considerably below the German average.

local investment. Political economy variables, which are regularly discussed in the academic literature, do not show any significant impact.

This allows to derive policy recommendations. To overcome the lack of public investment in financially weak local governments the provision of additional financial means reduces the rivalry between social and investment expenditure. Also, a reduction of social tasks would do the job. At the same time, implementation capacity needs to improve for example by higher levels of digitalisation and improved working conditions as well as competitive payment for public employees. The large-scale investment fund of 500 bn. Euro initiated by the German central government (of which 100 bn. Euro are dedicated to the state and local level) provides some alleviation for the coming years. However, German local governments need a long-term financing perspective as incentive to raise planning capacity.

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Appendix

Data

Variable	Source	Explanation
Construction expenditure per capita	Statistical Office, NRW	Accounting statistics
Social expenditure per capita	Statistical Office, NRW	Cash statistics
Revenues per capita	Statistical Office, NRW	Accounting statistics
Short-term debt per capita	Statistical Office, NRW	Debt statistics
Full time equivalents per capita	Statistical Office, NRW	Anonymised data, accessible only on site
Herfindahl Index for the local council	Statistical Office, NRW	Own calculation
Government ideology	Statistical Office, NRW	Own coding: 1 if party from leftist spectrum and 0 if party from conservative spectrum has won a relative majority. Missing in cases of parity or of uncategorizable voter associations.
Neighbouring effects	Statistical Office, NRW	Accounting statistics Own calculation: sum of construction expenditure of neighbouring municipalities.

Table A1. Data, additional information

	Obs.	Mean	Std. Dev.	Min	Max
Construction exp. pc	6,375	154.34	133.22	0	2,178.29
Social exp. Pc	6,375	172.99	234.11	0	1,970.08
Revenues pc	6,375	2,588.82	831.27	617.88	13,528.66
Short-term debt pc	6,375	605,85	950.32	0	7,683.35
FTE pc	6,375	0.00047	0.00026	0	0.0021
Herfindahl Index	6,375	0.3147	0.0620	0.1744	0.665
Pol. Council.	6,020	0.2047	0.4035	0	1

Table A2. Descriptive Statistics

Robustness checks

	Model 1a excl. 2009 and 2010	Model 1a excl. 2022 and 2023	Model 2a excl. 2009 and 2010	Model 2a excl. 2022 and 2023
constr.exp. (pc, L1)	**0.503*** **	**0.436*** **	**0.494*** **	**0.440*** **
	(0.062)	(0.069)	(0.62)	**(0.068)**
FTE (pc, L1)	**221414.5** **	61900.67	**202509.5** **	49643.64
	(66918.53)	(51938.43)	(64668.66)	(49409.84)
social exp. (pc)	**-0.110** **	**-0.101*** **	**-0.111***	**-0.107** **
	(0.049)	(0.028)	(0.059)	**(0.035)**
revenues (pc)	0.0096	**0.044*** **	**0.012**	**0.045** **
	(0.027)	(0.013)	(0.028)	**(0.014)**
short-term debt (pc)	-0,0028	**-0.015*** **	-0.0003	**-0.013** **
	(0.009)	(0.006)	(0.0097)	**(0.006)**
constant	-38.443	-11.174	-39.208	-9.943
	(42.277)	(25.75)	(51,316)	(28.166)
Number of obs.	5100	5100	4728	4728
Number of groups	425	425	394	394
Number of instr.	37	37	37	37
Arellano-Bond test AR(1), 1st diff., prob.	0.000	0.000	0.000	0.000
Arellano-Bond test AR(2), 1st diff., prob.	0.029	0.614	0.028	0.635
Hansen test, prob.	0.147	0.508	0.093	0.253
No. of years, when null of no spatial autocorrelation can be rejected at 5% level	4 out of 12	5 out of 12	4 out of 12	5 out of 12

Table A3. Robustness checks with alternative samples
System GMM Model. Year dummies included in all models. . * sig. at the 10% level, ** - sig. at the 5 % level, * - sig. at the 1 % level.

	Model 1a financially strong	Model 1a financially weak	Model 2a financially strong	Model 2a financially weak
constr.exp. (pc, L1)	**0.398*** **	**0.532*** **	**0.340*** **	**0.586*** **
	(0.076)	(0.090)	(0.093)	(0.0997)
FTE (pc, L1)	52327.05	59573.06	-14721.41	59246.08
	(56883.1)	(48029.65)	(84707.76)	(48287.71)
social exp. (pc)	**-0.244** **	-0.091	**-0.523** **	-0.081
	(0.095)	(0.058)	(0.187)	(0.059)
revenues (pc)	**0.077** **	0.034	**0.169** **	0.027
	(0.037)	(0.026)	(0.061)	(0.027)
short-term debt (pc)	-0.032	0.0027	-0.076	0.006
	(0.088)	(0.008)	(0.066)	(0.008)
constant	-86.929	-28.471	-248.586	-13.418
	(61.399)	(63.775)	(112.775)	(66.758)
Number of obs.	2968	2982	2758	2758
Number of groups	212	213	197	197
Number of instr.	39	39	39	39
Arellano-Bond test AR(1), 1st diff., prob.	0.000	0.000	0.000	0.000
Arellano-Bond test AR(2), 1st diff., prob.	0.039	0.804	0.026	0.602
Hansen test, prob.	0.285	0.320	0.135	0.327
No. of years, when null of no spatial autocorrelation can be rejected at 5% level	3 out of 14	4 out of 14	7 out of 14	3 out of 14

Table A4. Robustness check: separate estimation for financially weak and strong municipalities

System GMM Model. Year dummies included in all models. * sig. at the 10% level, ** - sig. at the 5 % level, * - sig. at the 1 % level.

	Model 1a Spatial Planning	Model 2a Spatial Planning	Model 1a Building and Housing	Model 2a Building and Housing	Model 1a Complete Admin.	Model 2a Complete Admin.
constr.exp. (pc, L1)	**0.475*** (0.063)	**0.470*** (0.065)	**0.482*** (0.061)	**0.469*** (0.062)	**0.485*** (0.063)	**0.470*** (0.067)
FTE (pc, L1)	**163415*** (62741)	**146493*** (61714)	47913 (79418)	47273 (78340)	**6456*** (3403)	5900 (3637)
social exp. (pc)	**-0.120*** (0.042)	**-0.122*** (0.058)	**-0.087*** (0.041)	**-0.091*** (0.053)	**-0.117*** (0.044)	**-0.141*** (0.061)
revenues (pc)	**0.040*** (0.020)	**0.039*** (0.023)	0.034 (0.021)	0.034 (0.024)	0.033 (0.020)	**0.042*** (0.023)
short-term debt (pc)	**-0.012*** (0.007)	-0.009 (0.007)	-0.008 (0.007)	-0.004 (0.007)	**-0.012*** (0.007)	-0.007 (0.007)
constant	-35.817 (35.188)	-44.905 (46.940)	-21.146 (32.791)	-23.190 (40.299)	-37.23 (31.25)	-65.310 (42.534)
Number of obs.	5950	5516	5950	5516	5950	5516
Number of groups	425	394	425	394	425	394
Number of instr.	39	39	39	39	39	39
Arellano-Bond test AR(1), 1st diff., prob.	0.000	0.000	0.000	0.000	0.000	0.000
Arellano-Bond test AR(2), 1st diff., prob.	0.260	0.252	0.246	0.223	0.265	0.248
Hansen test, prob.	0.042	0.097	0.081	0.167	0.020	0.052
No. of years, when null of no spatial autocorrelation can be rejected at 5% level	3 out of 14	5 out of 14	4 out of 14	4 out of 14	2 out of 14	4 out of 14

Table A5. Robustness check: separate estimation for different administrative departments. System GMM Model. Year dummies included in all models. * sig. at the 10% level, ** - sig. at the 5 % level, * - sig. at the 1 % level.

Figures

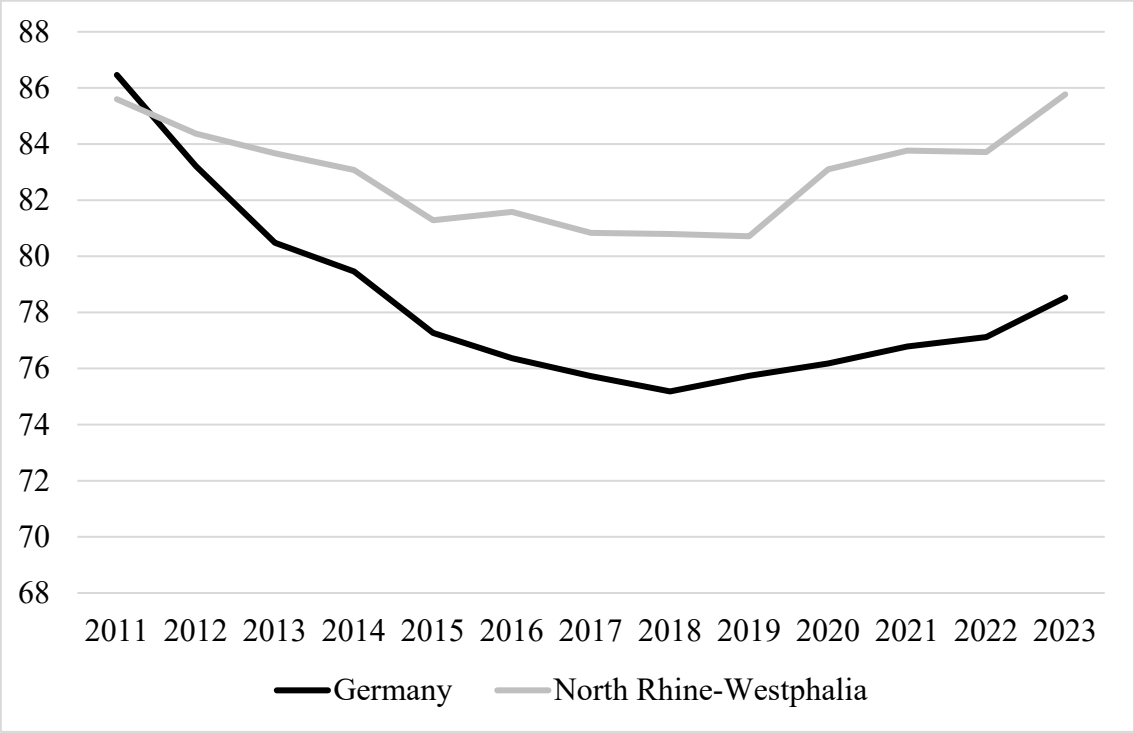

Figure A1: Development of fulltime-equivalents per 100,000 inhabitants in municipal departments "Construction and Housing" and "Spatial planning and development" in Germany (excluding city states Berlin, Bremen, Hamburg) and in North Rhine-Westphalia. Data: Destatis.

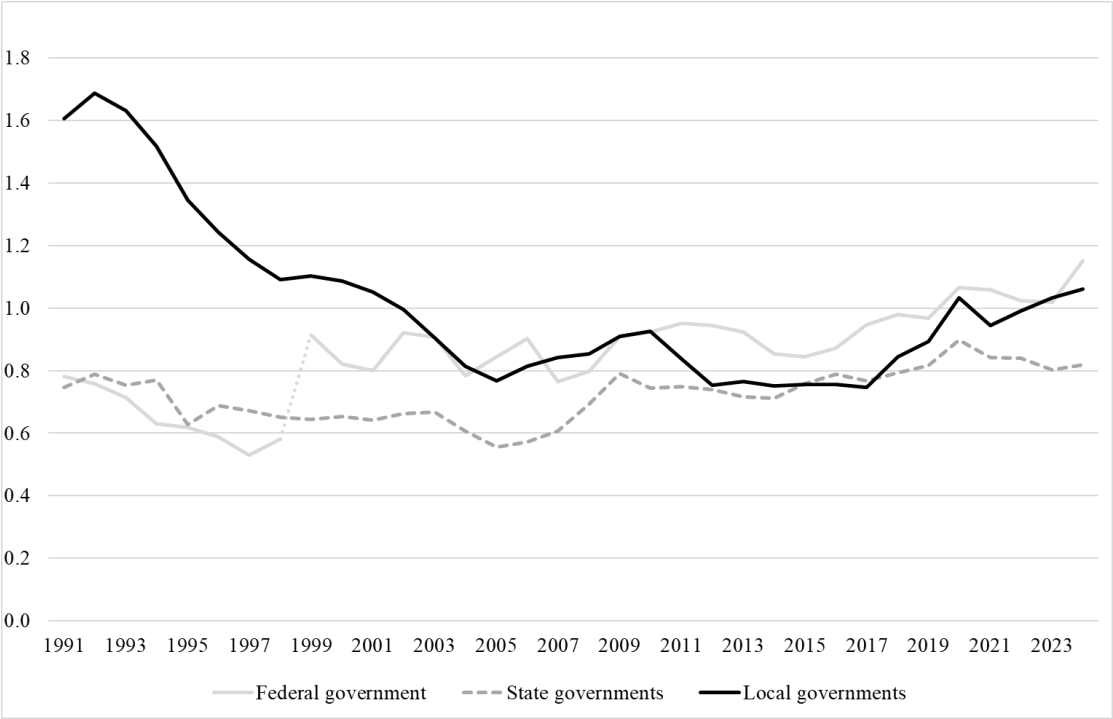

Figure A2. Gross fixed capital formation of government subsectors in % of GDP. Data: Destatis and authors' calculations. Federal government: structural break in the data federal railway infrastructure included from 1999 onwards.

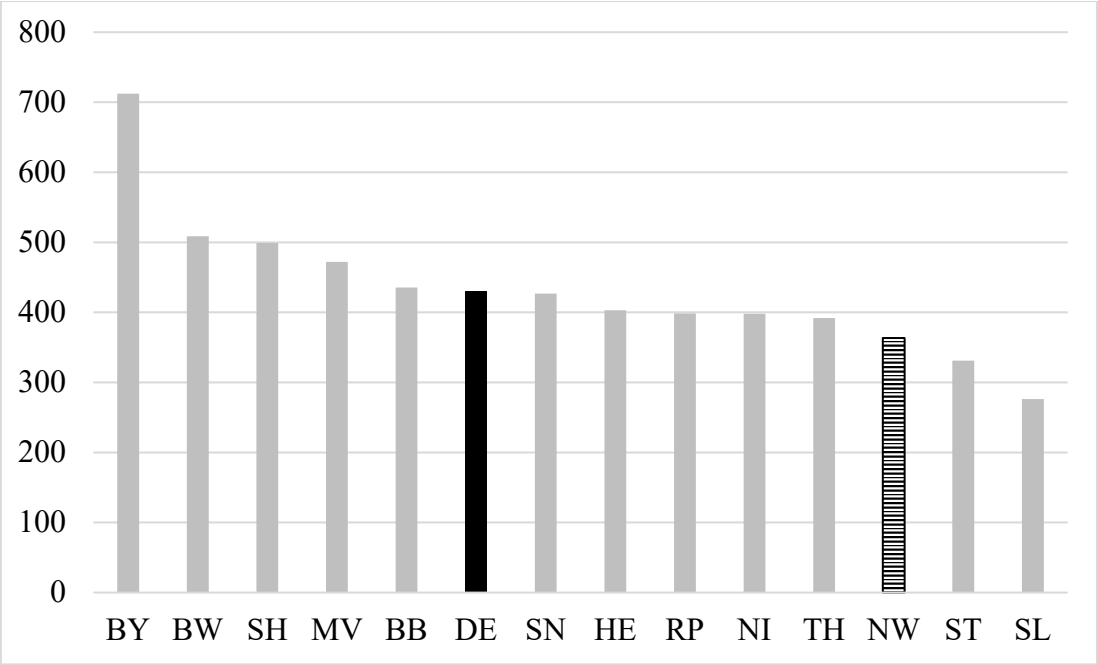

Figure A3: Local government construction investments in Euros per capita in the year 2024.
Including extra-budgetary funds. DE: Germany, NW: North Rhine-Westphalia.
Data: Destatis, authors' calculations.

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