

Public investment



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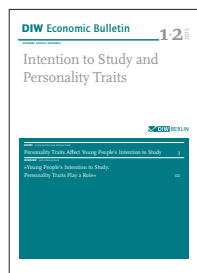
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NEXT ISSUE OF DIW ECONOMIC BULLETIN

The collapse of the Ruble: The impact of oil prices and economic sanctions

Overcoming weaknesses in municipal investment

By Marcel Fratzscher, Ronny Freier, and Martin Gornig

Germany's economic vitality and competitiveness as an industrial nation are based on a modern infrastructure and highly skilled workers. In order to continue providing a high standard of living and good employment opportunities in the future, Germany must begin making the necessary investment now.

This DIW report examines public investment activity in Germany. Beyond federal and state government investments, the analysis focuses on municipal investment in particular. How have the investment behaviors of federal, state, and municipal governments changed over time? How is investment activity distributed regionally among the municipalities? Can investment from municipal companies counteract the decline in investment in the core municipal budgets?

DIW's findings on these issues are documented in three articles in our current *Wochenbericht*. In summary, the studies point to two recommendations for action:

- Germany's municipalities need to be investing more, and the funding of this investment must be more evenly distributed across the regions.
- Municipal planning capacities and municipal companies should be strengthened, which will contribute significantly to overcoming investment weaknesses.

Germany's infrastructure is falling apart

Germany invests too little. The first article in the current *Wochenbericht* documents the decline in investment

activity since the 1990s – especially among the municipalities, whose annual investment expenditures dropped by nearly half between 1992 and 2013. Of particularly grave concern for municipalities is the fact that the actual investments being made are not sufficient to compensate for the deterioration of the infrastructure. The balance of municipalities' net investment (gross expenditure for investment minus depreciation) has been negative since 2003 – cumulatively, over 46 billion euros worth of infrastructure has not been replaced.

Investment inequality on the rise

Municipal investment activity differs greatly from region to region. For example, municipalities in Bavaria spend nearly three times as much per capita on investment as do municipalities in Mecklenburg-Vorpommern. Investment in East Germany is declining dramatically with the reduction of funds in the Solidarity Pact II, but even in some West German states like North Rhine-Westphalia and Saarland, the level of investment is comparatively low. Assuming that Bavaria's level of municipal investment is based on actual need, Germany would have to raise its investment in the public sector by 14.4 billion euros – an increase of about 65 percent – in order to meet the municipal investment needs of all other states.

In addition to examining these discrepancies among the states, the second article explains the major differences among individual districts and district-free cities (*kreisfreie Städte*), both nationwide and within the states. For example, the Munich administrative district spent nearly

700 euros for every inhabitant in 2013 (724 euros per capita) than did the district-free city of Wilhelmshaven in Lower Saxony (35 euros per capita). Furthermore, the report shows that these regional differences have not changed much over the course of several years, and that regional investment levels are highly dependent on social spending: Economically underdeveloped regions with a high level of social expenditure, which are already less attractive to investors, are being further left behind through lack of investment, even in the long term.

Weak municipal budgets, strong municipal companies

A major portion of public investment is made by municipal companies. The third article in the *Wochenbericht* examines the investment activities of the municipal providers of public utilities: water and energy. In contrast to the core municipal budgets, no signs of inadequate investment can be seen here. The comparison of municipal and private providers in the water and energy sectors shows that the investment volume—regardless of the legal status—is similarly high in both groups. The report also shows that there is no clear link between regional population development and the investment behavior of municipal businesses. Municipal companies, which often have a relatively high degree of autonomy and clearly defined roles, are therefore quite a successful model for securing and efficiently implementing public investment.

Municipalities are responsible for many important areas of public services: for example, education (nurseries and schools), water and energy, and local roads. And the future challenges are manifold: The social infrastructure of public utilities and nursing must be continually adapted to a changing society. Last but not least, it is the municipalities who are organizing and managing the influx of refugees. By investing in integration, municipalities are not only shaping these individuals' futures, but their own futures as well.

Based on the studies presented here, DIW Berlin recommends three measures for overcoming weaknesses in municipal investment:

First, policymakers must work on a solution to sustainably ensure a better and more balanced funding of the mu-

nicipalities. The federal government's creation of a special 3.5 billion-euro "Municipal Investment Promotion Fund" (spread out over four years) was a step in the right direction. However, this is ultimately just a drop in the bucket, and such one-offs offer no systematic solutions.

One way to make sustainable improvements to municipalities' financial resources is for the federal government to relieve the communities of their social expenditures. The 1 billion-euro-per-year relief fund that was decided on by the federal government in 2015 is not expected to bring about any radical improvements. This is also the case with the federal government's planned integration aid for people with disabilities, which amounts to roughly 5 billion euros annually, since it is not aimed at the heavily burdened municipalities in particular.

A far more targeted support of the economically weak communities could be achieved if the federal government took over the municipal expenditures on accommodation and heating (about 11 billion euros per year). This would relieve the cash-strapped municipalities to which no financial leeway has yet been made available. To emphasize the long-term nature of municipal investment promotion, the revenue from the solidarity surcharge should be used to finance the measures.

Secondly, the reallocation of public funding in the restructuring of the inter-state fiscal adjustments (*Länderfinanzausgleich*) should be based more strongly on the individual municipalities' financial situations, prioritizing municipalities with struggling economies and low investment activity. Currently, "municipal financial power" accounts for only 64 percent of the factors used to calculate the inter-state fiscal adjustments (in a narrower sense). If municipal tax revenues were fully taken into account, it would enable the cash-strapped federal states—through the additional redistribution of just under 2 billion euros—to make more funding for investment purposes available to their communities.

Thirdly, the strengthening of municipal companies can and should critically improve investment conditions. Municipal companies already finance a substantial portion of infrastructure in many communities. Organizing public

investment in municipal companies is useful in decoupling the essential investment decisions from the community's day-to-day politics, and in making the cost-benefit analyses more transparent. Our analyses indicate that the investment activity of municipal companies, unlike investment in the municipal core budgets, is largely stable and evenly distributed, and exhibits a similar level of investment activity to that of private companies. Accordingly, municipal

companies (via inter-municipal cooperation, as well) should take on more functions—for example, constructing buildings such as administrative offices and care facilities.

Investment within Germany is the foundation for our future prosperity and competitiveness. Regardless of the specific measures and the organization of public investment, we must not neglect to make the necessary and profitable investments.

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SIX QUESTIONS TO MARCEL FRATZSCHER

»Investing in Germany!«

1. Mr. Fratzscher, you've been making a case for more investment in Germany for quite some time now. Has there been any improvement in this area? No, the situation in Germany has essentially shown no improvement. In both private and public investment, we continue to see major weaknesses. The net investment of many municipalities and many states are negative. This means that depreciation is higher than investment. For this reason, we have a decay of public infrastructure in Germany, and thus the German government is becoming more dependent on its reserves.
2. How has the investment of federal, state, and municipal governments developed in recent years? Here we have very different developments in various regional administrative bodies. Although the federal government has done more with public investment in recent years, it's still nowhere near enough: Even at this level we continue to see a lack of investment. But this investment gap is still more significant among the municipal governments. In Germany, more than half of investment is made by municipal governments, and here we see that a very large proportion of them are investing far too little.
3. Can the municipal governments invest even more? Some of the municipalities are in good shape and have been able to budget very solidly. But there are evidently many structurally weak regions and municipalities in Germany. The differences among the municipalities are huge. This means that many municipalities have, above all, a major financing problem.
4. How large is the investment gap? We know from the KfW Municipal Panel that there are just under 132 billion euros of cumulative investment that municipalities would have liked to have made, but were not able to—and for two very central reasons: A lack of funding, and a lack of technical capacities.
5. How can we support municipalities so that they are able to invest effectively and economically? In our study, we suggest various measures that can remedy the lack of investment among the municipalities. The most important measure would be financial support from the federal government: In the future, solidarity contributions should be used to help structurally weak municipalities. Our study also shows that investments by public companies that operate relatively autonomously and in a market-oriented manner comprise a successful model.
6. Why has the federal government done less over the past few years than it ostensibly could have done? In Germany, we have a practical division among federal, state, and local authorities, which should not be challenged on principle. But we have a problem with the distribution of financial resources. In some areas—like education, for example—the federal government should do more, but because of this division, it is not allowed to. In other areas, the federal government could do more—for example, in the case of municipal investment. Here we need to find a mechanism in which the available funds are also allocated to the areas where they are most needed.

Interview by Erich Wittenberg

Local public infrastructure showing signs of wear and tear

By Martin Gornig, Claus Michelsen, Kristina van Deuverden

Investment in public infrastructure is essential to ensure competitiveness and create growth potential. Although Germany certainly has a well-developed infrastructure compared to other countries, local public infrastructure has been in decline for many years now. This means that current levels of investment are not sufficient to offset this decline, and the infrastructure is becoming increasingly outdated and limited in its scope.

In order for this backlog of local public investment to at least not continue growing, a rapid change in policy is urgently needed. The creation of a special central government fund to encourage investment in financially weak areas is a step in the right direction. Given the enormity of the local public investment backlog, a massive increase in immediate financial assistance seems imperative. At the same time, a systematic approach must be developed to compensate for the chronic underfunding of certain types of municipality. One improvement might be to take proper account of the financial weakness of the municipalities in fiscal equalization among the federal states.

Public infrastructure is one of the key prerequisites for growth and prosperity in modern economies.¹ This is also true of investment in research and development (R&D).² An efficient transport infrastructure is of fundamental importance for an economy with a high division of labor, a high level of integration in the world economy, and a central location in Europe.³ Furthermore, modern building infrastructure is essential for maintaining and developing efficient and productive administrative, social, and educational systems.⁴

The level of public infrastructure in Germany is relatively high in international comparison and is one of the key advantages of its location.⁵ However, maintaining a public infrastructure with such broad scope and high quality also has major cost implications. Compared to other countries, however, gross investment activities in Germany have not only developed more weakly over time, but the overall level is considerably lower than in most other industrialized nations.⁶

Traditionally, municipalities are responsible for public investment activities. At the beginning of the 1990s, roughly two thirds of public investment in buildings was made by municipal bodies. However, if we examine the evolution of public investment activity in Germany, we can see there has been a clear and marked decline

¹ Eck, A., J. Ragnitz, S. Scharfe, C. Thater, B. Wieland (2015): Öffentliche Infrastrukturinvestitionen: Entwicklung, Bestimmungsfaktoren und Wachstumswirkungen. Ifo-Dresden Studien, 72, Dresden 2015.

² Belitz, H., S. Junker, M. Podstawski, A. Schiersch: Wachstum durch Forschung und Entwicklung. Wochenbericht des DIW Berlin, 35.

³ Barabas, G., T. Kitlinski, C.M. Schmidt, T. Schmidt, L.-H. Siemers (2010): Verkehrsinfrastrukturinvestitionen – Wachstumsaspekte im Rahmen einer gestaltenden Finanzpolitik. RWI Projektberichte, Essen.

⁴ Reidenbach, M., T. Bracher, B. Grabow, S. Schneider, A. Seidel-Schulz (2008): Der kommunale Investitionsbedarf 2006 bis 2020, DIfU, Bericht, Berlin.

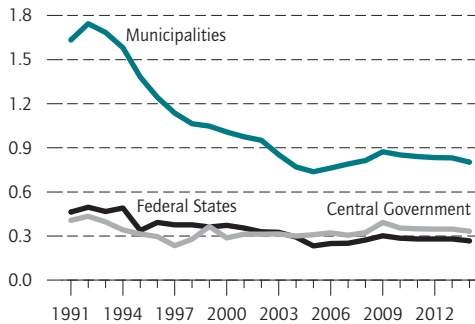
⁵ Bardt, H., E. Chrischilles, M. Fritsch, M. Grömling, T. Puls, K.-H. Röhl (2014): Infrastruktur zwischen Standortvorteil und Investitionsbedarf. IW Bericht, Köln.

⁶ Bach, S., G. Baldi, K. Bernroth, B. Bremer, B. Farka, F. Fichtner, M. Fratzscher, M. Gornig (2013): More Growth through Higher Investment. DIW Economic Bulletin 8.

Figure 1

Investment in Infrastructure by regional administrative body

In percent of GDP at current prices



Source: German Federal Statistical Office.

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The municipal investment rate, in particular, has fallen considerably.

in local public investment (see Figure 1). In 1991, municipal construction investment was about 1.7 percent of GDP, but it has seldom reached even half this figure since 2005. Only the second economic stimulus package (*Konjunkturpaket II*) led to slightly higher values in the short term. Investment by the central and federal state governments, on the other hand, has followed a slight upward trend since 2005. However, these investment figures remain below GDP ratios of the early 1990s.

The following analysis focuses, in particular, on the development of local public investment activities. We have concentrated on differences in gross investment between federal states and on the development of net investment.

Investment activity of municipalities differs considerably from region to region

Investment spending has declined markedly on the municipal level in recent years, also when calculated per capita. There might be many explanations for this decline. With hindsight, it can be said that the level of investment in the federal states of the former GDR was inflated: in order to reduce the investment backlog caused by partition, former East German federal states received transfers from the Solidarity Pact. These payments have been reduced on a diminishing scale since 2005 and led to a gradual decline in investment activities. For Germany as a whole, the decline in investment activity is also the result of more and more organizational units being outsourced from the public sector to the private sector (see box).

However, it stands to reason that the financial situation of the public sector should also be taken into account as an explanatory variable for investment activity. The cash position of the central government, federal states, and municipalities was tight until well into the second half of the 2000s. The tax reform implemented after the turn of the millennium was accompanied by a considerable loss of revenue and the economy became sluggish. The former resulted in a direct hit on the development of income taxes. The latter also impacted on the volume of cyclically sensitive business tax. Accordingly, tax revenues developed only modestly. This also applies on the federal state level where the budgetary situation continued to be strained. The latter is likely to have suppressed payments made to the municipalities of federal states as part of their municipal financial compensations. This is another reason for the modest development of municipal revenues. On the expenditure side, the municipalities were burdened by national legislation forcing them to take on an increasing number of tasks; these tasks were mostly motivated by social policy and continued to increase as a result of weak economic development. Overall, the financial scope of the municipalities contracted more and more during this period.

Municipalities generally have only limited options for alleviating tight budget situations. Particularly municipalities in financially weak federal states struggle with a small tax base which can barely offset the rate of assessment for their business tax or lower municipal taxes. The capacity for indebtedness is limited on the municipal level. On the expenditure side, current expenses are quite rigid, at least in the short term.⁷ The only consolidation measures available are through investment expenditure; these are more or less at the discretion of the municipalities and can be relatively quickly adjusted to the economic cash situation. Some of the decline in investment spending per capita is therefore likely due to financial difficulties in past years.

Only once economic development had recovered some momentum and tax revenues began flowing more steadily again after the financial crisis and its aftermath did the municipal budget situation improve gradually. In recent years, investment spending per capita has already risen a little in some municipalities. Since 2012 the municipalities altogether have, in fact, achieved a surplus. Certainly the underlying situation is extremely heterogeneous. Municipalities in financially weak federal states, in particular, are still struggling with budgetary issues.

⁷ Social spending is regulated by various laws, personnel expenses—at least in the short term—cannot really be influenced, and operating expenditure is not particularly flexible either.

These differences are also reflected in the regional development of public investment spending. Municipalities in federal states such as Bavaria or Baden-Württemberg invest substantially more per inhabitant than those municipalities in financially weak federal states such as Saarland (see Figure 2). It is also evident that per-capita investment spending is gradually decreasing in the former East German federal states as the additional funds made available through the Solidarity Pact slowly dry up. In 2013, municipal investment per inhabitant was, in fact, lowest in one of the former East German federal states, Mecklenburg-Western Pomerania. This is also because municipal tax revenues in eastern Germany have only reached half of levels achieved in former West German federal states.

Taking investment by federal states and municipalities as a whole gives a similar picture (see Figure 3). Again, the level of per-capita investment in Bavaria and Baden-Württemberg is well above spending levels in other federal states.⁸

The city states can also be considered if federal state and municipalities are examined together.⁹ As found in the area states (*Flächenländer*), it was discovered that the “rich” federal state of Hamburg has invested considerably more per inhabitant than the “poorer” Bremen or Berlin.¹⁰ Per-capita investment spending has declined in all three city states. It was scaled back substantially in Berlin at the turn of the millennium and, in Bremen, after 2005, when additional financial transfers from central government were discontinued.¹¹ Per-capita investment spending was cut drastically, particularly in federal states where fiscal consolidation has been widely implemented in recent years.

Public investment needs are difficult to quantify

The decline in gross public investment as a share of total economic output and/or the negative trend of investment sums per capita taken alone, however, are still not reason enough to speak of an investment deficit in Germany. In order to establish whether this really is the case, more information is needed both about investment activity and investment needs.

⁸ This also applies if large-scale projects such as the construction of Munich Airport are discounted.

⁹ In the city states, revenue and expenditure cannot be allocated to tasks specific to municipality or federal state and the levels can only be considered cumulatively.

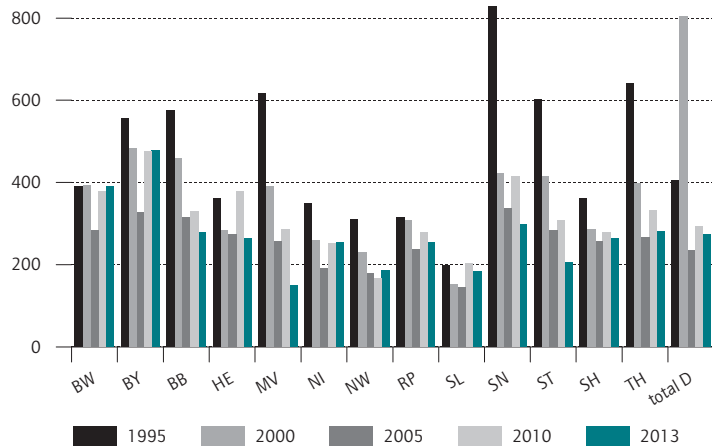
¹⁰ In 2013, investment spending in Hamburg was higher due to the construction of the Elbe Philharmonic Hall.

¹¹ Both Bremen and Saarland received supplementary federal grants (*Bundesergänzungszuweisungen*) from 1994 to 2004 after the German Federal Constitutional Court determined they were undergoing a budget crisis. Berlin failed to achieve a similar ruling in 2006.

Figure 2

Municipal investment

Per capita, in euros



Source: German Federal Statistical Office; calculations by DIW Berlin.

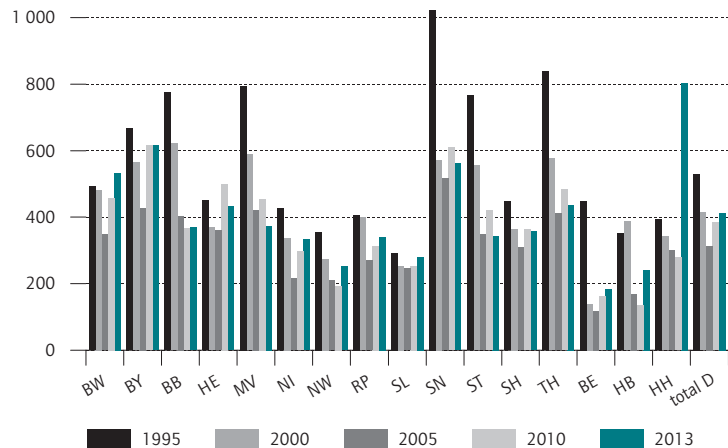
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Per-capita investment varies considerably.

Figure 3

Investment by federal state and municipality

Per capita, in euros



Source: German Federal Statistical Office; calculations by DIW Berlin.

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Rich federal states invest more than poor ones.

In this context, it is sometimes argued that reducing investment activity is a necessary step, given the changing demand for public services resulting from demographic trends. For example, certain municipal buildings con-

Box

Outsourcing from municipal core budgets

Many would argue that the decline in public investment is due to the substantial outsourcing from core budgets, particularly on the municipal level. In fact, public services were handed over to public funds, institutions, and enterprises (FEUs) or fully privatized in the 1990s, for instance in the field of waste management. The actual extent of outsourcing and investment in outsourced institutions, however, is very difficult to determine.¹ Nevertheless, there is an indication in the annual accounts of public funds, institutions, and enterprises though it may not always be absolutely clear which investments were allocated to "general government" according to the definition used by the national accounts system (*Volkswirtschaftliche Gesamtrechnungen, VGR*).² The approximate volume of unrecorded investment can be estimated if investment spending from extra budgets indicated separately in the accounting statistics is deducted from total investment. In 2012, around 50 percent of FEU investment was not allocated to "general government" according to the national account system.^{3,4}

Very little analysis has been conducted on the structure of FEUs. This is because it takes a very long time to obtain the corresponding data from the statistical offices due to the complex process required to generate it. What is clear is that the vast majority of these enterprises can be assigned on the municipal level. In 2008, over 90 percent of FEUs were municipal or owned by the city states of Hamburg and Berlin. A large share (just under 40 percent) are allocated to the industrial sectors water and sanitation, energy supply, and real estate activities. Around 15 percent of FEUs are allocated to "general government" in the national accounts. The industry sectors mentioned above in the field of supply and disposal barely feature at all

in "general government." The dominant industry sectors here are those allocated to social security, administration, social services, the arts, and sports.⁵

It is possible to assess balance sheets from 1999 to 2012. Data are therefore missing for the period during which the majority of outsourcing presumably occurred. As a result, it is impossible to estimate the full extent of outsourced investment. Nevertheless, it can be determined whether the decline of net investment by municipalities in the 2000s could have been offset by increased purchases and the construction activities of municipal enterprises.

In fact, considerable investment is made outside the core budgets. In 1999, the government invested 49.5 billion euros and, at 46.6 billion euros, the FEUs invested nearly as much. About 60 percent of investment went into municipal enterprises, funds, and institutions. In 1999, these investments were used to construct buildings and purchase new machinery, equipment, and licenses worth almost 28 billion euros. In 2012, the value at current prices was almost identical. Accordingly, the investment rate of FEUs has declined overall since 1999 (see Figure 1).

In 1999, this investment was offset by depreciations of approximately 18 billion euros, while in 2012 the corresponding figure was 19.3 billion euros. Overall, net investment in municipal FEUs during the period under observation fluctuated between 5 and almost 11 billion euros. By contrast, in 1999, net investment by the central and federal state governments in FEUs rose substantially from 1.5 billion euros (federal states) and 2.8 billion (central government) to 4.8 billion (federal states) and 8.1 billion in central government FEUs (see Figure 2). Overall, in 2012, FEUs probably made a contribution to net investment of around 11 billion euros which was not recorded in the national accounts. This unrecorded investment on the municipal level is likely to have totaled around 4.8 billion euros⁶ in 2012 and was, therefore, not enough to compensate for the lack of investment in the core budgets.

1 T. Eberhard, "Öffentliche Investitionsquote – Was wird abgebildet?," DIW-Roundup 74 (2015); P. Haug, "Kommunale Unternehmen als Schattenhaushalte – Wie sieht die tatsächliche Haushaltssituation der deutschen Kommunen aus?," *Wirtschaft im Wandel* 15(5) (2009): 220–228.

2 According to the German Federal Statistical Office, companies are considered to be "public funds, institutions, and enterprises" (FEUs) if they are in majority, direct, or indirect ownership of core budgets (central government, federal state, municipalities/municipality associations, and statutory social insurance). They are created by outsourcing tasks from the core budgets or by forming new companies or acquiring shares in domestic companies. They may be regulated under both public and private law. However, the ownership structure of these companies is not relevant for classification as public investment in the national accounts. A more decisive factor is that the company is controlled by the government and that it is a non-market producer. In 2008, 2,140 of a total of 14,704 public funds, institutions, and enterprises were assigned to "general government" in the national accounts.

3 Eberhard, "Öffentliche Investitionsquote."

4 Council of Experts for the Assessment of Overall Economic Development, Annual Report 2014/15; N. Schmidt, "Ausgliederungen aus den Kernhaushalten: öffentliche Fonds, Einrichtungen und Unternehmen," *Wirtschaft und Statistik* (2011): 154.

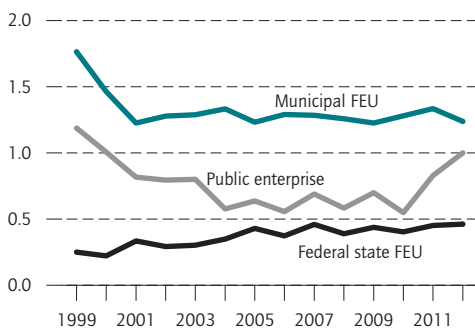
5 Schmidt, "Ausgliederungen aus den Kernhaushalten."

6 A 55-percent share of non-recorded investment is assumed here, see Eberhard, "Öffentliche Investitionsquote."

Figure 1

Investment rate of public funds, institutions, and enterprises (FEU) by municipal authority

Percent of GDP at current prices



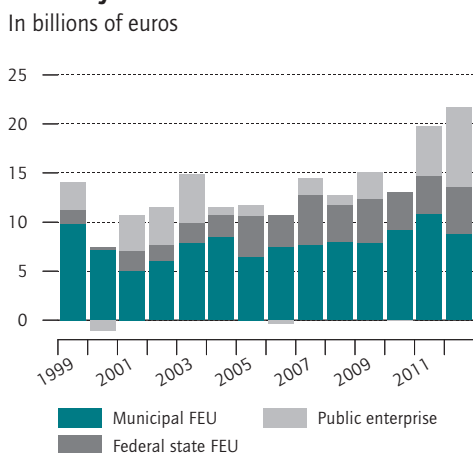
Source: special evaluation by the German Federal Statistical Office; calculations by DIW Berlin.

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Figure 2

Net fixed capital investment in public funds, institutions, and enterprises (FEU) by municipal authority

In billions of euros



Source: special evaluation by the German Federal Statistical Office; calculations by DIW Berlin.

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structed in the 1970s would no longer be needed today.¹² A decline in investment was therefore the logical consequence of this development.

An assessment of this kind is, however, in clear contradiction to the stated need to expand municipal infrastructure as a result of demographic change. It is certainly not self-evident that an aging population requires less public infrastructure. There is, in fact, substantial evidence that the need to develop the infrastructure in order to make adjustments for an aging population can be significantly higher than for an age structure that remains constant. This applies, for instance, to adjusting network infrastructures when they are used less intensively,¹³ making existing buildings¹⁴ more accessible, and/or changes in regional settlement patterns and urban development.

The effect of technical progress on investment needs is similarly equivocal. On the one hand, existing infrastructure can be utilized more efficiently with improved procedures. On the other hand, technological innovations such as digitalization create the necessity to modify existing infrastructure, also in the public sector. It is therefore virtually impossible to quantify specific investment needs using a model. Surveys on investment needs, particularly in municipalities, indicate a need for greater investment.¹⁵

The depreciation of public infrastructure capital stock is an important point of reference for estimating the appropriate level of investment. Depreciations are calculated mathematically and are intended to reflect the loss of value of an item of infrastructure over its lifetime.¹⁶ They do not represent the actual change in capital stock for the purposes of the national accounts and are not to be interpreted as a directly relevant variable for production potential; the actual asset disposals are relevant in this context.¹⁷ However, many years of negative net investment, i.e., lower gross investment than depreciation, can be taken as an indication that the pub-

¹² Council of Experts for the Assessment of Overall Economic Development, *Annual Report 2014/15, Mehr Vertrauen in Marktprozesse* (2014), 237.

¹³ This refers, *inter alia*, to the decommissioning of water and wastewater networks with a consistently large coverage area but declining numbers of users.

¹⁴ M. Eberlein and A. Klein-Hitpaß, *Altengerechter Umbau der Infrastruktur: Investitionsbedarf der Städte und Gemeinden* (Deutsches Institut für Urbanistik, 2012); M. Köller, "Baustelle Kommunen: Demografischer Wandel trifft kommunale Infrastruktur," *KfW Research, Fokus Volkswirtschaft*, no. 30 (2013).

¹⁵ KfW-Kommunalpanel 2015. BMWi-Online Befragung „Kommunale Investitionen“: <https://www.bmwi.de/BMWi/Redaktion/PDF/E/erste-ergebnisse-der-bmwi-online-befragung-kommunale-investitionen,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf>

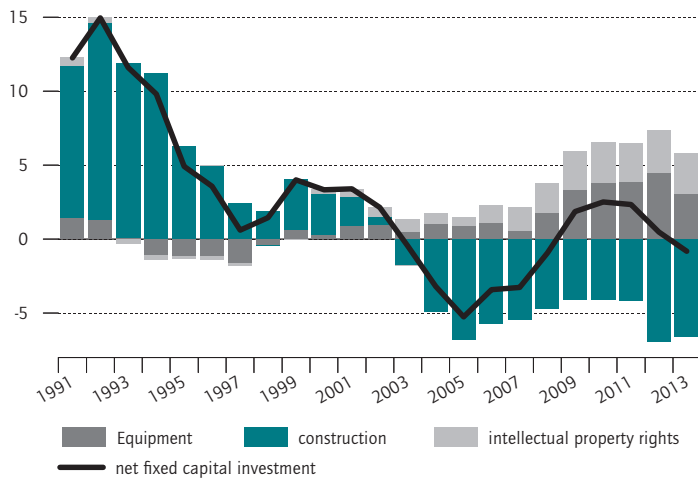
¹⁶ German Federal Statistical Office, *Volkswirtschaftliche Gesamtrechnungen – Beiheft Investitionen* (Wiesbaden, 2015).

¹⁷ Federal Ministry of Finance (BMF), *Monthly Report* (June 2015).

Figure 4

Net fixed capital investment by the public sector by type of goods

In billions of euros



Source: German Federal Statistical Office.

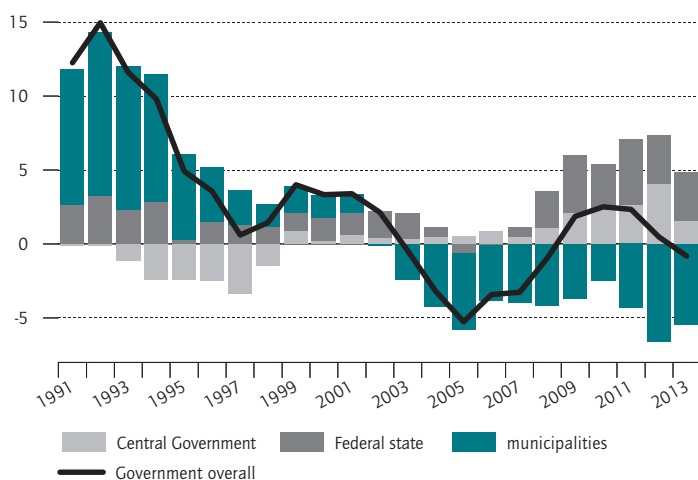
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The public sector is living off its assets, particularly in terms of infrastructure.

Figure 5

Net fixed capital investment by the public sector by local authority

In billions of euros



Source: special evaluation by the German Federal Statistical Office; calculations by DIW Berlin.

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Particularly investment of municipalities is weak.

lic capital stock is showing signs of depreciation or, at the very least, is outdated.

Consequently, in order to evaluate investment activities, the following section looks at the net and gross investment activities of municipal authorities. Net investment primarily comprises investment spending from the municipalities' core and special budgets. However, investment by the majority of public enterprises is not included.¹⁸ The main trends of net investment by public enterprises are shown in the box.¹⁹

Public net investment: living off assets

The German Federal Statistical Office reports net investment by sector since 1991. In the 1990s, net investment was clearly positive, mainly due to brisk investment activity in the former East German federal states. It has since fallen and was, in fact, even sometimes negative after the turn of the millennium (see Figure 4). The graph shows in detail that equipment and intellectual property have increased since the early 2000s. However, it is mainly in public non-residential construction that depreciation has exceeded investment since 2003. This picture is consistent with the frequently presented finding that there are considerable investment needs in the field of public infrastructure—in particular for maintaining transport infrastructure.²⁰

The graph depicting capital investment by local authority shows that the municipalities in particular have not expanded or maintained their capital stock. Net investment here has been negative since 2003 (see Figure 5).

The central and federal state governments, however, have substantially expanded public capital stock again in recent years. This is likely related to recent growth in investment in intellectual property and the resultant substantial increase in spending on research and development in particular, which is predominantly the responsibility of the federal states.

Conclusion

Investment in public infrastructure is an essential prerequisite for ensuring competitiveness and creating

¹⁸ For an explanation of the definitions, see T. Eberhard, "Öffentliche Investitionsquote – Was wird abgebildet?", *DIW-Roundup* 74 (2015).

¹⁹ For further analyses of the investment activities of public enterprises, see Cullmann et al.

²⁰ Daehre-Kommission, *Bericht der Kommission „Zukunft der Verkehrsinfrastrukturfinanzierung“* (2012); Cologne Institute for Economic Research (Institut der deutschen Wirtschaft Köln), *Infrastruktur zwischen Standortvorteil und Investitionsbedarf* (Cologne: 2014); U. Kunert and H. Link, "Transport Infrastructure: Higher Investments Needed to Preserve Assets," *DIW Economic Bulletin*, no. 10 (2013).

growth potential. Although Germany certainly has a well-developed infrastructure compared to other countries, public investment has undoubtedly declined sharply since the mid-1990s. This applies not only to eastern Germany with its specific reunification-related investment requirements but also to many western German federal states.

In particular, local public infrastructure has been showing signs of wear and tear for many years now. This means that current levels of investment are not sufficient to offset this decline, and the infrastructure is becoming increasingly outdated and limited in its scope. The investment activity of local public enterprises—as shown in the box—has been rather subdued in recent years and was not able to compensate for the lack of investment in municipal budgets.

In order for this backlog of local public investment to at least not continue growing, a rapid change in policy is urgently needed. Comprehensive structural measures are essential to ensure the possibility of growth-oriented investment activity by municipalities in the medium term. The Investment Commission (*Investitionskommission*) at the Federal Ministry for Economic Affairs and Energy (BMWi) has provided much food for thought on this issue.²¹

²¹ It is recommended that, among other things, a National Investment Pact is created for municipalities to improve funding, that infrastructure companies are set up for municipalities to increase consulting skills, and that public partnerships are strengthened. See Federal Ministry for Economic Affairs and

Energy (BMWi). (2014) *Stärkung von Investitionen in Deutschland*, Bericht der Expertenkommission, Berlin

It is hardly surprising that the more relaxed the financial situation is, the higher the (municipal) investment. As a result, the investment needs in financially weak municipalities are particularly high. It was, therefore, a step in the right direction for the central government to set up a special fund this year aimed at encouraging investment in financially weak areas up to 2019. Ultimately, however, this is only a one-off payment and not a systematic approach to solving the problem.

One additional improvement might be to take proper account of the financial weakness of the municipalities in fiscal equalization among the federal states. The reorganization of central government and federal state finances from 2020 is currently being negotiated. The federal state fiscal equalization system does not sufficiently take account of the financial strength of each municipality. Only 64 percent of municipal tax revenues are considered when comparing taxable capacity across the federal states. Financially weak municipalities rely considerably more on sufficient funding from municipal financial equalization. This means by implication that cash-strapped federal states have to set aside more resources for financial transfers to their municipalities. If fiscal equalization took account of all municipal tax revenues, the cash-strapped federal states would be in a better position to make sufficient funds available to their municipalities, making it more probable that they would have surplus funds for investment.

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Large and lasting regional disparities in municipal investments

By Felix Arnold, Ronny Freier, René Geissler, Philipp Schrauth

The regional dispersion of local public investment in Germany is very uneven. Even a comparison between the states shows considerable differences in gross investment. Municipalities in Bavaria currently invest more than three times as much per capita as those in Mecklenburg-Western Pomerania.

There are even greater differences between districts and independent cities, both nationwide and within the federal states. In 2013, the district of Munich invested 724 euros per inhabitant, in other words, almost 700 euros more than the independent city of Wilhelmshaven in Lower Saxony (35 euros per inhabitant). There are disparities within Bavaria, too, with the independent city of Weiden spending 560 euros less (160 euros per inhabitant) than the district of Munich.

Our analysis demonstrates that there have been virtually no changes in the regional dispersion of investment spending over time. Around 83 percent of the weakest quartile of all municipalities in 2000 were still in the lower half of the distribution 14 years later.

Overall, investment in economically strong municipalities is considerably higher than in the structurally weak regions. The level of investment has a positive correlation with high tax revenues and a negative one with high social security spending, a negative fiscal balance, and high levels of debt. Municipalities that are less competitive today will continue to struggle in the long term due to a lack of investment. This compounds differences in infrastructure and quality of location which are important general conditions for future economic performance.

Policy-makers and umbrella organizations have highlighted the inadequate levels of, and regional disparities in, investment by municipalities for many years now. Structurally underdeveloped regions are unable to keep pace with prosperous regions in the long term. In March 2015, the German government reacted by creating a fund to promote local public investment. It set aside a total of 3.5 billion euros between 2015 and 2018. The special feature of this fund is that the money is allocated according to the budgetary situation of the municipalities. The aim of the program is to specifically target structurally underdeveloped municipalities. The need for this approach is verified by financial statistics: since 2003, net investment by municipalities has been negative (see Gornig et al. in this issue of *DIW Economic Bulletin*). The loss of infrastructure continues to be a prerequisite for private investment, growth, and the economic and consequently financial strength of the municipalities. Added to this, the level of gross investment is widely supported by strong economic and financial municipalities. The low investment capacity of structurally weak municipalities is at risk of being forgotten in view of aggregated national or federal state data. However, investment differences that persist over many years compound the disparity of future opportunities for municipalities and therefore their citizens. The present paper examines, for the first time, the regional and temporal development of local public investment on the level of districts and independent cities and reveals the initial causes of inequalities.

Public investment in Germany is usually made on the federal state and municipality level. Of the 43.2 billion euros invested in general government infrastructure in Germany in 2013, 23 percent came from central government (and social security insurance), 26 percent from the federal states, and 51 percent from municipalities.

Looking at construction spending as a major part of local public investment highlights typical areas of expenditure. In 2013, construction spending totaled 16 billion euros, accounting for around two-thirds of total munic-

Box 1

Investment Spending

A variety of data sources were used for this analysis of local public investment. Municipality data for the years 2000 and 2008 are taken from regional and local statistics (regional database of federal state and central government statistical offices) and refer to the financial statistics of the districts and municipalities. The data from 2013 were provided by the Genesis Service of the German Federal Statistical Office. Again, these are financial statistics. Since there is no information on the municipalities in Saarland, NRW, Lower Saxony, Brandenburg, and Mecklenburg-Western Pomerania, these data were supplemented from the websites of their state statistical offices. They are calculated annually with the exception of Saarland.

The years 2000, 2008, and 2013 were selected for reasons of content and statistical data validity. They are more comparable than most other years in this period with regard to economic conditions and the overall financial situation. After 2008, the resilience of the financial statistics suffered in some years due to a change in the budgeting process from fiscal to double-entry accounting. In these years, investment figures and/or entire financial statistics were often not published at all. In addition, investment in 2009 and 2011 was above normal levels due to the central government's stimulus packages. They are not representative of other years. To a small degree, there was a systematic reduction in reporting of investment in the wake of the double-entry accounting system.

In defining the concept of investment, for the purpose of comparability over time, we have restricted ourselves to investment in fixed assets in three subgroups: construction measures, acquisition of movable assets, and acquisition of immovable assets. Here, we distinguish between the acquisition of investments, loans, and investment grants. Measured against accounting statistics for 2013, around 80 percent of local public investment is recorded in these three subgroups. Construction spending is by far the most important area of local public investment.

Gross investment is the fourth-largest local public spending item after personnel expenses, operating expenses, and social security payments. It should also be mentioned that there are frequently difficulties distinguishing between operating expenses and investment. The maintenance costs of a school can be entered as current operating expenses or under construction measures (and therefore as an investment). Similar gray areas arise when entering construction measures for own personnel (construction yards). Furthermore, our report focuses on the municipalities' core budgets. First, this part of local government administration can be distinguished most clearly. Second, this is where actual local policy discussions take place and, third, investment here is primarily based on the municipalities' taxable capacities. However, outsourced investment activity (municipal funds, institutions, or companies) is partly covered by economic activity.¹

¹ See report by Cullmann and Nieswand in this issue of DIW Economic Bulletin

ipality investment. The largest sums were spent on municipality and district roads (4.2 billion euros). This was followed by all types of school building (2.6 billion euros), daycare centers (1.6 billion euros), administrative buildings (1.3 billion euros), sewage treatment plants (1.2 billion euros), as well as sports facilities and swimming pools (0.6 billion euros).

Investment comprises a considerable share (350 euros per inhabitant) of adjusted total spending by municipalities (2,730 euros per inhabitant) (see Box 1). It represents the fourth-largest budget item after personnel expenditure (around 700 euros), social security spending (660 euros) and current operating expenses (575 euros).

Considerable Differences on the Federal State Level

A simple comparison of federal states already highlights considerable regional dispersion in the 13 area states. The economically strong states of Bavaria and Baden-Würt-

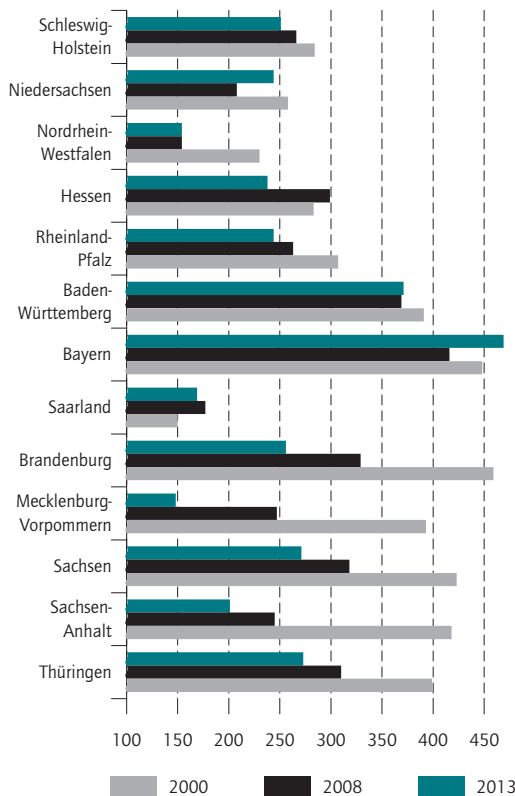
temberg invested heavily in all the years under observation. In 2013, Bavaria had the highest per capita spending nationwide with 469 euros, followed by Baden-Württemberg with 371 euros. Investment spending in other western German states, however, was markedly lower. In North Rhine-Westphalia (NRW) and Saarland, investment in all years was well below 300 euros and often less than 200 euros per capita (see Figure 1).

The rapid decline in investment in eastern Germany has been remarkable. While municipalities in eastern Germany still had the highest investment spending in 2000, per capita spending in most areas had fallen to half that level by 2013. In Mecklenburg-Western Pomerania, for example, a state with one of the highest per capita investment levels in 2000 at 393 euros, levels of investment spending fell to only 148 euros in 2013, the lowest level in Germany.

This development in eastern Germany can largely be explained by the Solidarity Pact. The Solidarity Pact II as-

Figure 1

Municipal investments at state level Euro per capita



Source: Own calculations based on data from the Federal Census Bureau (Fachserie 14, Reihe 2 für 2013; Genesis Datenbank des Statistischen Bundesamtes für 2000 und 2008).

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East-Germany registers a significant decline for investments over time, while Bavaria and Baden-Württemberg exhibit high-level persistence.

signs eastern German municipalities a total of 156 billion euros from 2005 to 2019, with a detour through federal state budgets. These funds serve merely to compensate for their low taxation and financial power, and as investment incentives. These annual allocations have fallen steadily since 2009. The lower these special allocations from central government, the more evident their low tax and financial power is. This phenomenon is also reflected in the population decline in eastern Germany over this period since it reduces the volume of financial equalization at the municipality level. It is also conceivable that federal states will reduce investment allocations to municipalities, especially given the debt brake that comes into effect as of 2020.

Investment Equally High throughout Bavaria and Baden-Württemberg Region

In addition to differences between the federal states, the level of investment spending also varies from district to district. To illustrate these disparities, we have outlined per capita spending on investment in all the regional districts and independent cities¹ for 2000 and 2013 in two detailed regional maps for the whole of Germany (see Figure 2).

A north-south divide is evident with high investment in Baden-Württemberg and Bavaria (with a few exceptions) and low investment in large parts of the rest of western Germany. The lower levels of investment in eastern Germany are also clearly discernible. In addition, it is evident that investment spending is heterogeneously distributed among the federal states. Investment is equally high throughout Bavaria and Baden-Württemberg.² In most other federal states, however, there are often several federal districts with high or low investment in the immediate vicinity. While investment in some areas of northern Hesse was extremely low, the situation in other parts of this federal state is much more favorable. A comparison of the Ruhr district with its surrounding regions shows clear differences within North Rhine-Westphalia. In Brandenburg, the full range of investment levels are represented between the Teltow-Fläming and Dahme-Spreewald regional districts close to Berlin and the more remote Prignitz in the northwest. It is no coincidence that the two districts in the south of Berlin with the highest tax revenues in eastern Germany also have the highest investment.³

Additional insights are provided by the ten regional districts and/or independent cities with the highest and lowest investment spending in 2013, that is, the distribution extremes of per capita investment spending (see Figure 3).

The top ten municipalities with the highest investment spending are all in Bavaria. Nine of the ten municipalities are regional districts. The district of Munich has by far the highest spending. This district has one of the strongest regional economies in Germany overall.

¹ Here, for graphical illustration we refer to the concept of regional districts. This summarizes the investment activity of all municipalities and local government associations (rural districts, municipal associations, communal unions, and administrative levels such as municipality departments) according to the geographical boundaries of the relevant regions. This aggregation is unnecessary for independent cities because all the levels are taken together.

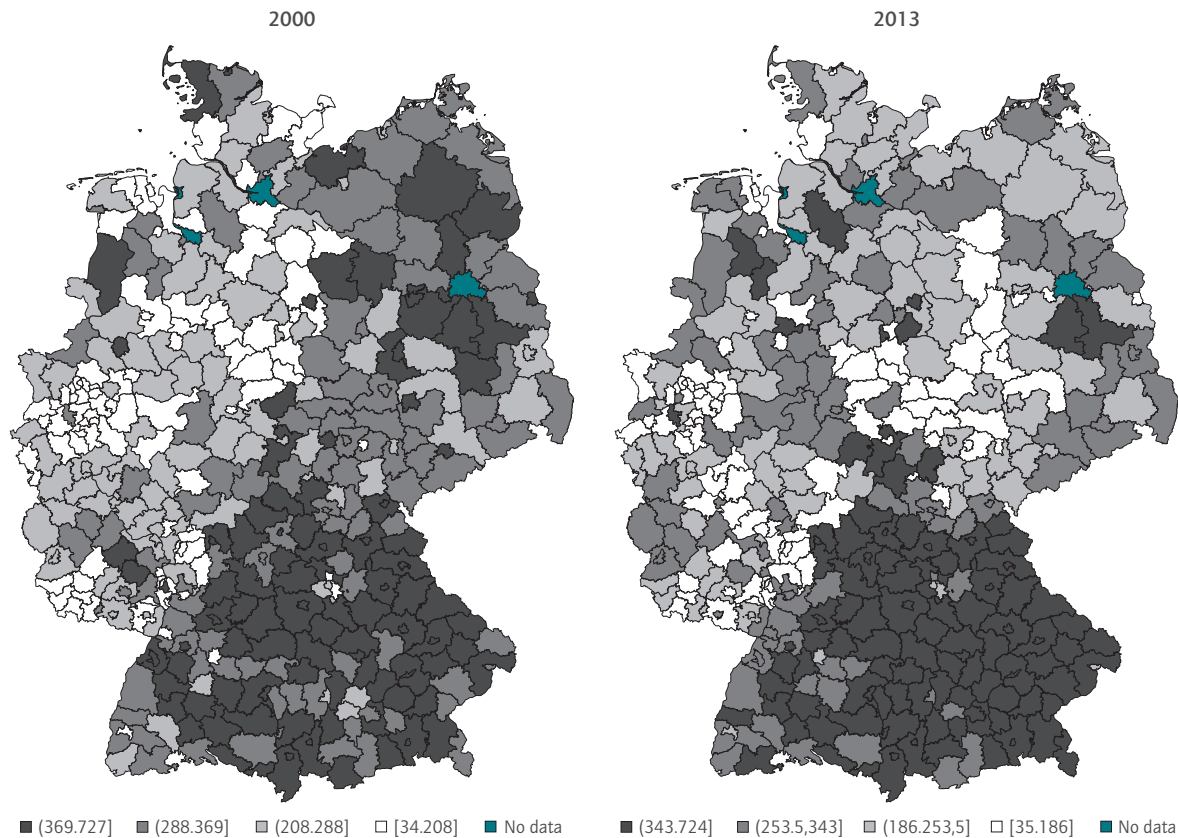
² The situation in Bavaria is quite remarkable since there are also municipalities in the north and east with low tax revenues. The high level of investment throughout the government supports the argument for a functioning fiscal transfer or incentive program at local government level.

³ Bertelsmann Stiftung (2015b), 89.

Figure 2

Investments on municipality level

Euro per capita



Source: Own calculations based on data from the Federal Census Bureau (Vierteljährige Kassenstatistik from www.regionalstatistik.de for 2000 and 2013; Federal Census Bureaus for Lower Saxony, NRW, BB and Saarland for 2013).

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Large differences not only between Federal states, but also between counties within states.

The headquarters of Infineon AG, Swiss Re, München-er Rück, ProSieben Satr Media AG, and Kabel Deutschland are all based here, as are many others. In fact, in 2013, this region also had the highest municipality tax revenues anywhere in Germany.⁴

Nine of the Ten Weakest Investment Districts Are Independent Cities

The picture is much more heterogeneous among municipalities with low investment. These ten municipalities are spread over seven different federal states and nine of them are independent cities. The lowest level of spending was recorded by the independent city of Wil-

helmshaven in Lower Saxony at around 35 euros per capita. NRW is represented by Bielefeld, Hagen, and Duisburg. Interestingly, Hagen, Duisburg, and Wilhelmshaven, three cities with the weakest levels of investment, are also among the highest on the list of cash loans⁵ for the whole of Germany. At the same time, no municipality from Saarland or Mecklenburg-Western Pomerania is represented, although these federal states have the lowest average levels of investment.

It may be surprising that Halle (Saxony-Anhalt) and Jena (Thuringia) are the only two eastern German municipalities among the ten regions with the weakest investment. However, an important statistical effect can

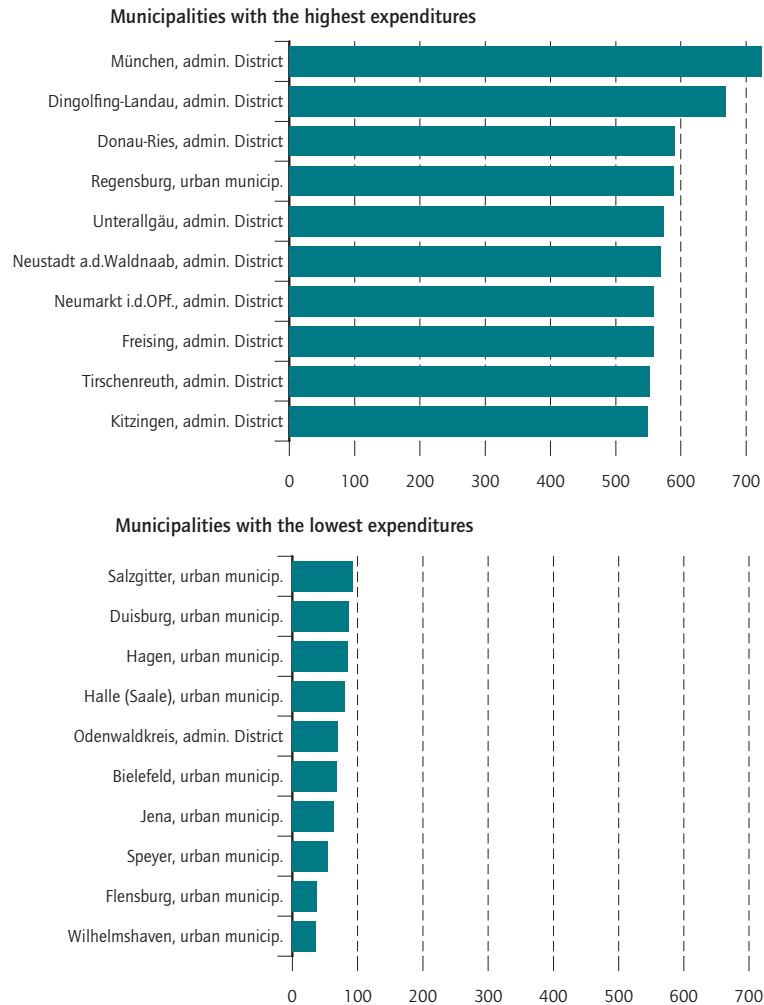
⁴ Bertelsmann Stiftung (2015b), 91.

⁵ DIW Glossary (in German only), http://www.diw.de/de/diw_01.c.422698.de/presse/diw_glossar/kassenkredite.html

Figure 3

Municipalities with highest respectively lowest per-capita investments in 2013

Euro per capita



Source: Own calculations based on data from the Federal Census Bureau.

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Municipalities with the highest per-capita investments all lie within Bavaria, while municipalities with low per-capita investments are scattered over various states north of the river Main.

be illustrated by the city of Jena. Like many other major cities, maintaining and developing local government property, including the corresponding investment payments, are outsourced to a government-operated enterprise.⁶ The only regional district among the ten municipalities with the weakest investment is Odenwaldkreis

⁶ The government-operated enterprise's 2013 business plan contains investment totaling around 139 euros per inhabitant.

in Hesse. Measured by the extremes, investment activity appears to be greater in the regional districts than in the independent cities. This might be due to the different level of social security spending⁷ or the trend toward more outsourcing.

Table 1 shows a general overview of the distribution of investment among the federal states. Here, we analyze the disparities between the districts of the relevant federal states based on selected distribution measures (range, decile ratio, and Gini coefficient). All values are based on gross investment per capita on the regional district level for the years 2000, 2008, and 2013.⁸

The *range* is the gap between the minimum and maximum per-capita investment in the relevant federal state. Values in the western German federal states range between 220 and 380 euros. However, there are also considerable outliers over 500 euros (see Bavaria or Baden-Württemberg in 2000). The eastern federal states have substantially lower ranges on average. Most values here are well below 300 euros per inhabitant. The federal state of Saarland is also unique as it invested 133 euros (or considerably less) in all years. There is no recognizable trend in the span during the years under observation. The range increased from 2000 to 2013 in six federal states and fell in seven.

The *decile ratio* is less prone to extreme outliers.⁹ Throughout Germany, this ratio is a factor of around three. This means the top decile spends three times more on investment than the lowest decile. The decile ratio among the federal states is usually smaller at a factor of approximately two. What is interesting here is that the decile ratio is relatively similar despite considerable differences in the ranges. A comparison of Bavaria and Saarland in 2000 shows a huge difference in the range (500 to 100) but both have a decile ratio of two. This indicates that the differences between the municipalities in Bavaria and Saarland are mainly due to the enormous difference in the level of investment. The relative distribution in both federal states is then comparable.

The *Gini coefficients*¹⁰ for investment reveal a similar picture within each federal state, and consequently between the municipalities. This measure varies between zero (all districts investing the same) and one (one district investing everything and all the others investing nothing).

⁷ Bertelsmann Stiftung, *Kommunale Sozialausgaben* (2015a), 79.

⁸ Bertelsmann Stiftung (2015b), 75–76.

⁹ The decile ratio compares the 90-percent and the 10-percent deciles. This allows most maximum and minimum values to be discounted.

¹⁰ The Gini coefficient is commonly used as a measure of income inequality.

Table 1

Selected measures of dispersion regarding per capita investments

	Range			Decile ration			Gini coefficient (regional district level)		
	2000	2008	2013	2000	2008	2013	2000	2008	2013
Schleswig-Holstein	219	332	269	2.39	1.54	1.68	0.16	0.12	0.12
Niedersachsen	509	263	492	2.31	3.15	2.61	0.17	0.18	0.17
Nordrhein-Westfalen	341	349	377	2.07	3.46	2.65	0.17	0.23	0.23
Hessen	234	283	274	2.34	2.17	2.38	0.12	0.15	0.18
Rheinland-Pfalz	312	285	268	2.13	2.62	2.25	0.13	0.19	0.17
Baden-Württemberg	513	329	289	2.80	1.96	1.72	0.17	0.12	0.12
Bayern	504	654	564	1.94	1.89	2.18	0.15	0.14	0.15
Saarland	99	28	133	2.02	1.17	2.10	0.13	0.03	0.17
Brandenburg	477	351	285	2.67	1.91	2.94	0.15	0.14	0.15
Mecklenburg-Vorpommern	226	328	152	2.07	5.85	1.97	0.10	0.18	0.12
Sachsen	200	151	133	1.65	1.55	1.51	0.10	0.10	0.10
Sachsen-Anhalt	163	209	149	1.56	1.99	2.02	0.08	0.17	0.17
Thüringen	292	374	344	1.86	2.94	2.81	0.13	0.20	0.24
Deutschland insgesamt	693	755	689	2.86	3.18	3.19	0.21	0.24	0.24

Source: Own calculations based on data from the Federal Census Bureau (Vierteljährige Kassenstatistik from www.regionalstatistik.de for 2000 und 2008, and 2013; Federal Census Bureaus for Lower Saxony, NRW, BB and Saarland for 2013).

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Baden-Württemberg registers the biggest change regarding the span width over time. Relatively low gini coefficients indicate relatively low differences between municipalities.

ing).¹¹ Here too, Bavaria and Saarland were very similar in 2000. Throughout Germany, the Gini coefficient for investment activity in 2013 was 0.24. This value is comparable to the distribution of tax revenues (Gini coefficient of 0.19) and less than the distribution measures for housing and heating costs (Gini coefficient of 0.31), debt (Gini coefficient of 0.41), and municipal cash loans (0.73) in 2013.¹² The Gini coefficient has also remained constant over the years. If there are shifts up or down in some federal states, these changes are not significant, nor do they exhibit a clear trend.

Investment Spending Virtually Unchanged over Time

As shown, the distributions of investment activity have remained virtually unchanged in the relevant years. There could be several reasons for this. It is possible that the municipalities retained their place in the distribution between the two years under observation. However, it is also possible that sometimes one or the other municipality is in the lower and upper part of the distribution without the distribution itself changing (because of bundled investments here or there, for instance). In

order to give policy-makers an estimate of long-term investment disparities, it is essential to analyze fluctuations within the distribution.

To achieve this, we use transition matrices (see Box 2), in which we divide the per-capita investment spending of the 396 regional districts and cities into quartiles¹³ and then show the fluctuations of individual municipalities on the quartile boundaries in a table. We performed these analyses for 2000 to 2008 (Panel 1), 2008 to 2013 (Panel 2), and for the entire period 2000 to 2013 (Panel 3) (see Table 2).

In 2000, around 100 municipalities were in the lowest quartile of the distribution (municipalities with investment of less than 210 euros per inhabitant) and 66 of these municipalities still had the lowest investment in 2008. When the second quartile is added, the full extent of this persistence is revealed. More than 90 percent of municipalities in the lowest quartile in 2000 remained below the distribution median in 2008. The situation is very similar at the other end of the distribution. More than 85 percent of municipalities with the highest investment in 2000 have also remained above the median.

¹¹ When Gini coefficients were calculated, per capita gross investment in the districts was weighted according to the population figures for those districts.

¹² Bertelsmann (2015b), 77, 92, 107, 113.

¹³ Given the fact that we have a total of 396 regional districts and independent cities in around 100 municipalities per quartile, the entries in the transition matrix can also be read as percentages.

Table 2

Transition matrices regarding per-capita investments on municipal level

In percent

Transition matrix from 2000–2008

			Dispersion 2008			
			1. Quartile	2. Quartile	3. Quartile	4. Quartile
		Euro per capita	48 to 169	172 to 243	244 to 324	325 to 803
Dispersion 2000	1. Quartile	34 to 210	66	25	7	2
	2. Quartile	211 to 294	23	42	21	13
	3. Quartile	295 to 373	6	22	46	26
	4. Quartile	374 to 727	5	10	26	58

Transition matrix from 2008–2013

			Dispersion 2013			
			1. Quartile	2. Quartile	3. Quartile	4. Quartile
		Euro per capita	35 to 186	187 to 256	257 to 349	350 to 724
Dispersion 2008	1. Quartile	48 to 169	63	27	9	1
	2. Quartile	172 to 243	26	45	26	2
	3. Quartile	244 to 324	8	21	43	28
	4. Quartile	325 to 803	3	6	22	68

Transition matrix from 2000–2013

			Dispersion 2013			
			1. Quartile	2. Quartile	3. Quartile	4. Quartile
		Euro per capita	35 to 186	187 to 256	257 to 349	350 to 724
Dispersion 2000	1. Quartile	34 to 210	48	35	15	2
	2. Quartile	211 to 294	28	29	38	4
	3. Quartile	295 to 373	13	26	32	29
	4. Quartile	374 to 727	11	9	15	64

Source: Own calculations based on data from the Federal Census Bureau (Vierteljährige Kassenstatistik from www.regionalstatistik.de for 2000 und 2008, and 2013; Federal Census Bureaus for Nds, NRW, Bb and SL for the year 2013).

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There are hardly any movements between quartiles. More than 80 percent of municipalities, which lay in the first quartile in 2000, did not exceed the second quartile in 2013.

An almost identical picture emerges for the 2008 to 2013 period. Again, the majority of municipalities remained in the same quartile or moved into the next quartile.

The picture is only different when we examine the entire period from 2000 to 2013. We would normally expect mobility between quartiles to increase over a longer period of time. Although the persistence values here are actually slightly lower, they are still very high. Of all the regional districts and independent cities in the lowest quartile in 2000, 83 percent of municipalities were still below the distribution median 14 years later. These high figures are all the more surprising because our analyses have shown that municipalities in eastern Germany invested less in this period due to the expiry of the Solidarity Pact, and so had exceptionally high

Box 2

Transition Matrix

The purpose of transition matrices is to illustrate mobility within a distribution at two points in time using an indicator. The aim of this transition matrix is to identify the “changers” between the quartiles. Are individual observation units able to change their position within the distribution over time? The transition matrix provides information about mobility between quartiles, both upward and downward.

To this end, all observations in both years were first sorted according to their rank in the distribution and divided into four quartiles. The transition matrix is then a juxtaposition of both these quartile divisions. Each cell of the transition matrix shows the combination of one quartile of the distribution in the first period and a second quartile of the distribution in the second period. The figures in the cells indicate how often this combination applies to the observation units.

If there was no mobility, all observations in the two years would be in the same quartile (and therefore with values only on the main diagonal). Once there is a “changer,” there will also be values off the main diagonal. The more values there are along the main diagonal, the lower the mobility over time.

mobility in the distribution. Taking these special factors into account, the persistence of the distribution has in fact been considerably higher over these longer periods.

Social Security Spending Reduces Scope for Investment

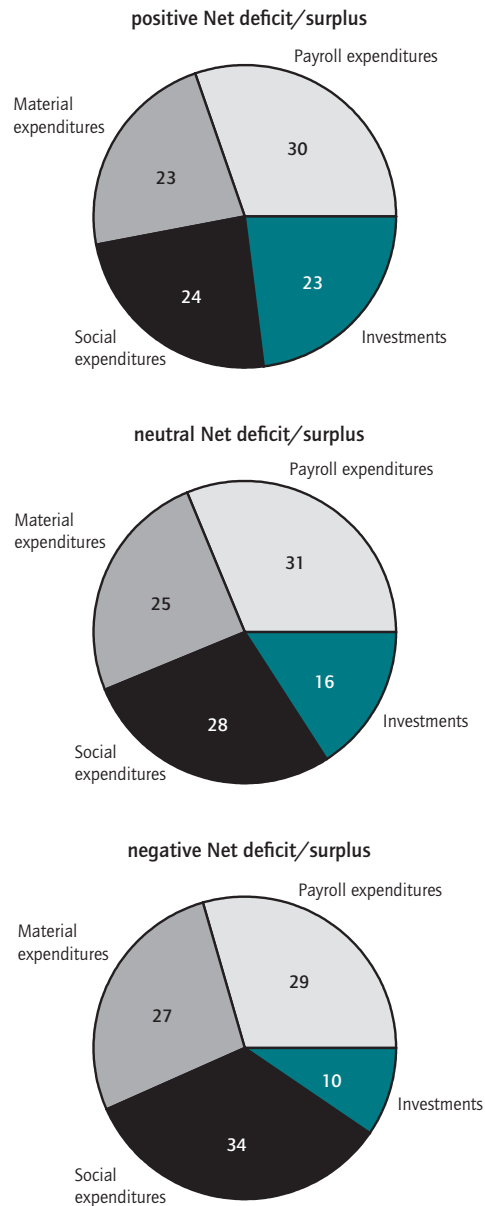
How can these sometimes extreme regional disparities be explained? Where does the money go if there is no investment? Figure 4 shows the budget shares of the four main items, depending on the fiscal balance. We have divided the municipalities into three groups: those with a positive fiscal balance (a surplus of more than 50 euros per capita), those with a negative fiscal balance (a deficit of more than 50 euros per capita), and those with a neutral fiscal balance.

The total amount of spending is roughly comparable in all three groups. Accordingly, the differences in the balances are driven by revenue. Expenditure on personnel and other administrative expenses is proportionally similar in the relevant groups. The main difference is expenditure on social security. Financially strong mu-

Figure 4

Relationship between net lending of municipalities and counties and type of expenditure

In percent



Source: Own calculations based on data from the Federal Census Bureau.

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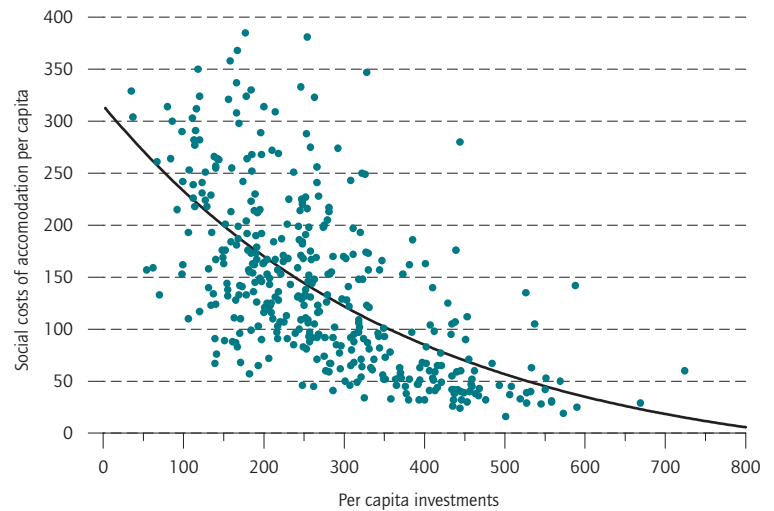
The better the net deficit/surplus, the more is spent for investments and the less for social expenditures.

municipalities only spend 24 percent of their budgets on social security payments, leaving 23 percent for investment. By contrast, the financially weaker municipalities only have ten percent remaining for investment. In

Figure 5

Correlation between social costs of accommodation and expenditures for investments on municipal level

In Euro per capita



Source: Own calculations based on data from the Federal Census Bureau.

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There is a clear relationship between the costs of accommodation and per-capita investments. The higher the costs of accommodation per capita on municipal level, the lower are per capita investments.

these municipalities, spending on social security is in fact the largest budget item at 34 percent.

When considering the correlation between housing and heating costs in accordance with Book Two of the German Social Code, Housing Costs (*Sozialgesetzbuch II, Kosten der Unterkunft (SGB II, KdU)*) and investment spending (both per capita), the correlation between the constraints of social functions on the one hand and investment spending on the other become even more evident. Not only are housing costs one of the most important items of social security spending (24.7 percent of social security spending and the main cost item according to Book Two of the German Social Code), they cannot generally be influenced by the individual municipalities because they are determined by the number of dependent households and local prices. Figure 5 shows housing costs for the individual municipalities in relation to investment spending. This highlights the considerable negative correlations between these two municipal spending items.¹⁴

¹⁴ Bertelsmann (2015b), 67.

Conclusion

The amount of money invested by the municipalities varies continuously. The municipalities of the economically strong federal states of Bavaria and Baden-Württemberg have, over the years, invested considerably more than the remaining western German federal states. Poor investment not only affects individually weak municipalities but, essentially, entire federal states. While the decline in investment in eastern Germany is to some extent systematic, the lack of investment in western Germany is a direct consequence of ailing municipal budgets.

However, the federal state averages are not universally representative. There is sometimes a considerable spread across the individual municipalities. There are major differences between the federal states of Lower Saxony, North Rhine-Westphalia, and Bavaria. Investment in Saarland, Mecklenburg-Western Pomerania, and Saxony-Anhalt is relatively low, while that of Baden-Württemberg is high across the board.

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An analysis of the mobility of all 396 independent cities and regional districts between 2000 and 2013 shows a high degree of stability at the upper and lower ends of the distribution. For instance, 83 percent of municipalities in the weakest quarter of investment in 2000 were also ranked below average in 2013.

One decisive cause of long-term underinvestment is social security spending which reduces the scope for investment. Bearing in mind that high social security spending is incurred in those municipalities that already tend to be economically weak, it is clear that these municipalities suffer a double setback as a result of economic malaise.

The foundation for future growth is sounder in the economically strong communities than in the weaker regions in any case. This creates a self-reinforcing growth effect—positive for the strong municipalities but negative for the weaker ones.

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JEL: H10, H41, H72

Keywords: local public investment, regional dispersion, inequality

No decline in investment in public-sector energy and water supply

By Astrid Cullmann, Maria Nieswand and Caroline Stiel

A considerable share of public investment comes not only from public budgets but also from public utility companies. One major area of investment is energy and water supply, where the utility companies have substantial fixed assets in the form of distribution infrastructure. Using new microdata which has not been analyzed before, the present report shows that—unlike with the core public budgets—public energy and water supply companies show no signs of insufficient investment. On the contrary, gross investment into distribution networks over the past ten years has shown an upward trend comparable to that of private energy and water supply companies—if investment related to the expansion of infrastructure resulting from the energy transition is not taken into account. In addition, no clear correlation was found between the investment expenditure of energy and water supply companies and the financial strength or demographic trends within a given region. However, this does not rule out the possibility of diverging investment trends in the near future in response to demographic changes.

Energy and water supply companies are instrumental in providing public infrastructure. In Germany responsibility for energy and water supply lies with the government. One way of providing energy and water is through publicly-owned companies. Most of them are owned by municipalities.¹ Only few enterprises belong to *Länder*, for example in city states. The federal state has no shares in public utilities.² On the other hand, local authorities may also regulate energy and water supply using private companies. In the energy supply sector, the ratio of public to private enterprises is currently relatively balanced: according to the German Association of Local Utilities (*Verband Kommunaler Unternehmen, VKU*), public enterprises supplied roughly half of the energy consumed in Germany in 2014.³ In the area of water supply, as much as 80 percent of consumption was covered by public enterprises. In 2012, they operated 64 percent of the gas networks, 60 percent of the water networks and 38 percent of the electricity distribution networks. Furthermore, they ran 16 percent of power generating capacities.

¹ Under Article 28 (2) of German Basic Law, municipalities reserve the right to manage any and all matters pertaining to the local community on their own authority. In the vast majority of cases, municipalities avail themselves of this right.

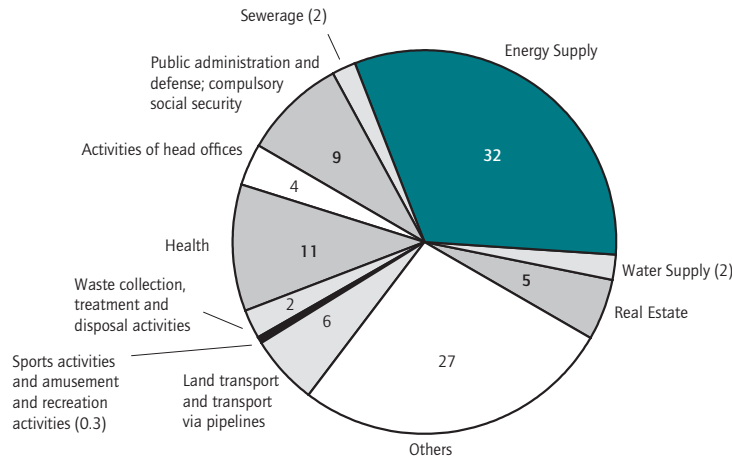
² N. Schmidt, "Ausgliederungen aus den Kernhaushalten: öffentliche Fonds, Einrichtungen und Unternehmen," *Wirtschaft und Statistik* 62 (2) (2011): Diagram 2 and calculations by DIW Berlin.

³ The energy supply figures for the individual sectors are as follows: 46 percent for electricity, 59 percent for gas, and 65 percent for heating. Verband Kommunaler Unternehmen (German Association of Local Utilities), *Zahlen, Daten, Fakten* (2014), <http://www.vku.de/presse/publikationen/zahlen-daten-fakten2014.html>, accessed September 29, 2015. For figures on the network length see VKU (2014) and BNetzA/BKartA, *Monitoringbericht 2013*, Bonn (2013) and BMU, *Wasserwirtschaft in Deutschland* (2011). For details on power generating capacities, see Monopolies Commission, "Special Report 65: Energie 2013: Competition in times of the Energiewende," special report by the Monopolies Commission pursuant to Section 62 (1) of the German Energy Industry Act (EnWG) (Bonn: 2013).

Figure 1

Revenue of public funds, institutions and enterprises (491 billion Euros in 2011)

In percentages



Source: Own calculations by DIW Berlin based on Heil, Hollmann, Jahresabschlussstatistik.

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Revenue of energy supply plays the most important role when compared to revenue from other sectors within public funds, institutions and enterprises.

Energy and water supply constitutes a major part of the outsourced economic activity of public companies

Unlike in public road construction companies, for example, public energy and water supply companies are not factored into the core or supplementary public budgets.⁴ Normally, public energy and water supply companies are counted as other entities that fall into the category public funds, institutions, and enterprises (in German: FEUs)⁵. In 2011, a good 21 percent of the 15,000 FEUs operated in the energy (9.6 percent) and water supply sectors (11.8 percent).⁶ Consequently, energy and water supply companies make up the majority of FEUs after real estate and wastewater management.

Public energy and water supply companies also account for the largest share of the total revenue from FEUs. Around 32 percent of the total revenue for the year 2011 (according to Code of commercial law), which amount-

ed to some 491 billion euros, was accounted for by energy supply companies alone (see Figure 1), as opposed to just two percent for water supply companies.

The total assets of public energy and water supply companies according to the balance sheet amounted to around 154 billion euros in 2009, increasing to 179 billion euros by 2012.⁷ In 2009, 94 percent of the total assets were attributed to municipally-owned companies, with the remaining six percent coming from companies in which the *Länder* hold shares.

The asset structure illustrates the capital intensity of both economic sectors: in order to provide the population with energy and water, substantial fixed assets such as generating, production, and distribution equipment are required. Fixed assets therefore make up, on average, between 60 percent (energy supply) and 86 percent (water supply) of the balance sheet total assets, which is why investment in infrastructure is of such great importance for energy and water supply companies.

Most of investment goes into distribution networks

In public energy and water supply companies, investment depends, among other things, on the extent to which the given municipal infrastructure is in need of expansion or repair and maintenance. This can vary from one region to the next for a number of reasons, ranging from demographic trends and economic structure to the need to integrate renewable sources of energy into the energy mix and the condition of existing equipment and installations. *De facto* requirements, however, are difficult to determine. Fundamental findings on the investment behavior of public energy and water supply companies can be obtained using newly available microdata from official statistics. This data can be used, in particular, to compare public and private enterprises. The main data source is an investment survey of energy and water supply companies conducted for official statistics purposes.⁸ This survey contains information on both public and private energy and water supply com-

⁴ Schmidt, "Ausgliederungen," 154–163.

⁵ For more information, see the box in M. Gornig, et al., "Local Public Infrastructure Showing Signs of Wear and Tear," DIW Economic Bulletin, no. 42/ 43 (2015): 564

⁶ N. Heil and D. Hollmann, "Jahresabschlussstatistik öffentlicher Fonds, Einrichtungen und Unternehmen," *Wirtschaft und Statistik* 65 (5) (2014): 307–315.

⁷ N. Heil and P. Mödinger, "Ausgewählte Struktur- und Bilanzmerkmale öffentlicher Fonds, Einrichtungen und Unternehmen," *Wirtschaft und Statistik* 63 (4) (2012): 342–352; German Federal Statistical Office (Destatis), "Vermögensstruktur der kaufmännischen öffentlichen Fonds, Einrichtungen und Unternehmen 2012," accessed September 29, 2015, https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/OeffentlicheFinanzenSteuern/OeffentlicheFinanzen/FondsEinrichtungenUnternehmen/Tabellen/Vermögensstruktur_Wirtschaftszweige.html.

⁸ German Federal Statistical Office (Destatis), "Investitionserhebung bei Unternehmen der Energieversorgung, Wasserversorgung, Abwasser- und Abfallentsorgung, Beseitigung von Umweltverschmutzungen," quality report (Wiesbaden: 2015).

Table 1

Investment of Energy and Water Supply Companies in 2012

In billion euros

	Public	Private
Generation and Collection	710	2,283
Distribution		
Networks	2,855	2,386
Equipment	330	1,165
Other fixed assets	885	1,013
Total investment	4,780	6,847

Source: AfID Investment Survey of German Energy and Water Supply Companies. Subsample with NACE Codes 35 and 36 according to NACE classification rev. 2. Firms from the land Baden-Württemberg discarded. Deflation based on 2010. Own calculations by DIW Berlin.

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Publicly-owned energy and water supply firms invested up to 4.8 billion euros in 2012.

panies and is available for the years 2005 to 2012.⁹ The survey is conducted annually on around 1,000 private enterprises, 1,400 purely public companies, and around 300 companies where government entities are majority shareholders. The census was conducted among all companies in the German energy and water supply industry with more than ten employees.¹⁰

Both public and private energy and water supply companies invest mainly in distribution networks and equipment (see Table 1 and Figure 2). These are used to distribute electricity, gas, and district heat. In 2012, two-thirds of total investment in fixed assets made by public energy and water supply companies went into distribution networks and other distribution equipment such as transformers or pump installations. As little as 15 percent of investment capital is allocated to generation and production equipment. This is in line with the relatively minor role played by government-owned conventional power generation facilities: in 2012, just 16 percent of conventional power generation was in government hands.¹¹ At 33 percent, the share of investment in production and generating equipment by private energy and water supply companies is correspondingly

⁹ For more details on the dataset, see Stiel, "Data Documentation Energiestatistiken der amtlichen Statistik (Official Data on German Utilities) DIW Data Documentation No. 80 (2015). (2015).

¹⁰ For easier comparability over time, companies from the state of Baden-Württemberg were not included. In 2010, the state government of Baden-Württemberg bought back the energy company EnBW, resulting in the transfer of substantial investment capital from the private to the public sector.

¹¹ Monopolies Commission, "Energie."

Figure 2

Composition of investment into fixed assets in energy and water supply in 2012

In percentages



Source: AfID Investment Survey of German Energy and Water Supply Companies. Subsample with NACE Codes 35 and 36 according to NACE classification rev. 2. Firms from the land Baden-Württemberg discarded. Deflation based on 2010. Own calculations by DIW Berlin.

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Both public and private firms spend the majority of their investment on network infrastructure.

higher. As with the public sector, the majority of private-sector investment (52 percent) is also used for distribution networks.

Identical trend in public and private-sector investment in distribution networks

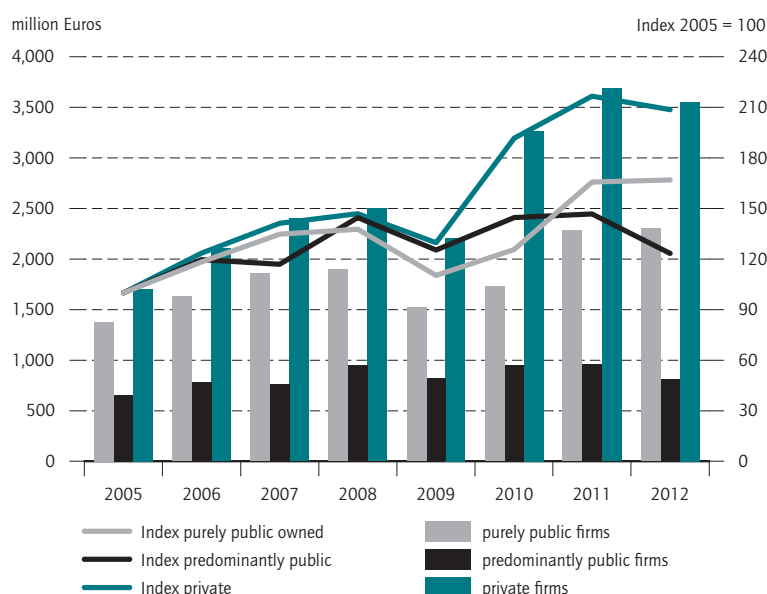
A look at the past ten years reveals little difference between public and private investment in distribution networks: by 2009, the investment behavior of energy and water supply companies, irrespective of ownership, was very similar (see Figure 3). Induced by the energy transition in Germany, investment behavior since 2009, however, has taken different paths. The integration of equipment and installations under the German Renewable Energy Sources Act (*Erneuerbare-Energien-Gesetz*, EEG) and the German Act on Combined Heat and Power Generation (*Kraft-Wärme-Kopplungsgesetz*, KWKG) called for investment in grid expansion infrastructure. Under the new regulations, network operators are obligated¹² to make the necessary investments before they are entitled to receive compensation payments.¹³ Much of

¹² Priority dispatch under Section 8 of the Renewable Energy Sources Act (EEG) and Section 4 of the Combined Heat and Power Generation Act (KWKG).

¹³ See Sections 10, 11, and 23 of the incentive regulation scheme (*Anreizregulierungsverordnung*).

Figure 3

Gross investment into networks of public and private energy and water companies



Source: AfID Investment Survey of German Energy and Water Supply Companies. Subsample with NACE Codes 35 and 36 according to NACE classification rev. 2. Firms from the land Baden-Württemberg discarded. Deflation based on 2010. Own calculations by DIW Berlin.

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After 2009, private firms raised their investment expenditure more than public firms...

the renewable energy infrastructure is located in sparsely populated rural areas and coastal regions where area distribution and transmission network operators mainly operate. Calculations by RWTH Aachen University show that the connection of 80 percent of the installed renewable energy capacity to the grids lies within the responsibility of only 20 area network operators.¹⁴ If these companies are divided up into public and private ownership, it becomes clear that the vast majority of grid connection has to be done by private-sector energy and water supply companies (see Table 2).

This development is also evident in the investment survey conducted for official statistics: while the investment spending of predominantly public energy and water supply companies barely went up from 2005 to 2012, private-sector and purely-public energy and water supply companies increased their investment considerably (see

¹⁴ A. Moser, "Zukünftige Herausforderungen für Verteilnetzbetreiber," presentation on November 25, 2013 at the Federal Network Agency (Bonn: 2013), accessed on September 29, 2015, http://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/Netzentgelte/Evaluierung_ARegV/Auftaktveranstaltung_Evaluierung/Vortrag_Prof_Moser.pdf.

Table 2

Location of decentralized generation capacities (EEG-Anlagen) within network areas of selected electricity network operators

Owner	Number of network operators	Share of installed capacities in total installed capacity (Percentage)
majority private	9	58
purely public	7	15
predominantly public	3	2
EnBW	2	5
Sum	21	80

Source: Own calculations by DIW Berlin based on data on installed decentralized capacities (EEG-Anlagen-Stammdaten) from 50Hertz Transmission GmbH, TenneT TSO GmbH, Transnet EnBW GmbH and Amprion GmbH as of 2014.

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...because they had to connect the majority of decentralized generation capacities to their networks.

Figure 3). The level of investment among private enterprises is also greater than that of public enterprises.

If, however, the uneven spread of installed renewable energy capacity across the network areas of major public and private network operators is taken into account, one can assume that, in the area of distribution networks, the investment behavior of public enterprises does not differ much from that of private ones.

This conclusion is concurrent with the findings of a report commissioned by the German Federal Network Agency as part of the evaluation of the regulation.¹⁵ This report investigates the investment behavior of energy distribution network operators using a different source of data which is not available to the public. The rate of investment of these operators is positively affected by the expansion of renewable energy sources, but no variation resulting from the difference in ownership structure was found.

No clear correlation between investment behavior of public supply companies and regional financial resources

A correlation can be found between a municipality's investment behavior and its finances: municipalities with fewer financial resources invest less than those whose

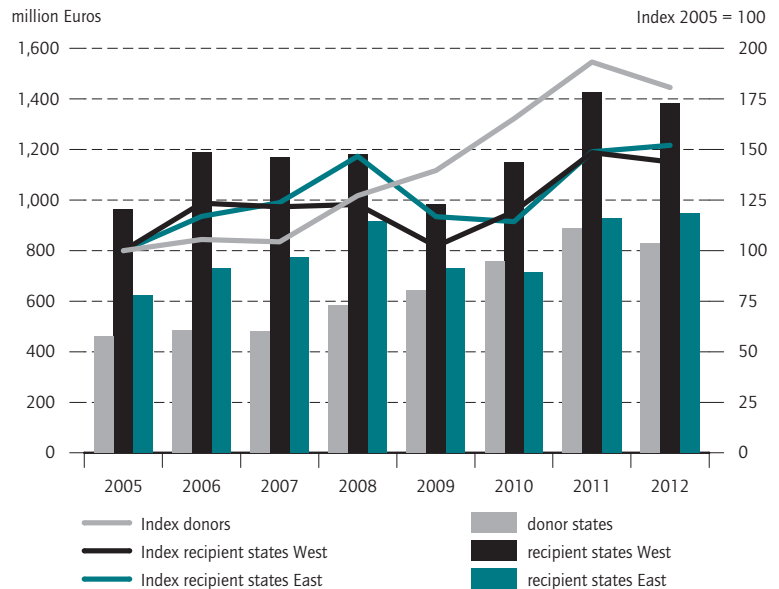
¹⁵ F. Pavel, A. Cullmann et al., "Gutachten zum Investitionsverhalten der Strom- und Gasnetzbetreiber im Rahmen des Evaluierungsberichtes nach § 33 Abs. 1 ARegV," *Politikberatung kompakt* 92 (Berlin: 2014).

finances are stronger.¹⁶ The question that arises here is whether this also applies to public energy and water supply companies, i.e., whether they, too, invest less if the municipality has less money at its disposal. To answer this question, a comparison of the finances of the municipalities with the investments made by public companies would be ideal. No comparative data of this kind is available to date, however.¹⁷ For this reason, a first approximation is performed using data on the level of the Länder: taking the financial strength in relation to the fiscal equalization indicator¹⁸ as a basis, the Länder are divided up into donor states, western recipient states, and eastern recipient states as per the German fiscal equalization system. In relation to the reference year 2005, public companies in the donor states spent even less than those in the recipient states up to 2008 (see Figure 4). Thereafter, this trend was reversed, albeit as a result of the ever increasing grid expansion in the course of the energy transition. Interestingly, the investment behavior of eastern German recipient states, despite their having the lowest financial strength on average, did not differ from that of their counterparts in western Germany.

Here, it is worth noting that the energy and water supply sectors are fundamentally different from other municipal services. Indeed, these sectors tend to be profitable, meaning they are largely independent of the financial situation in the municipality. Nevertheless, the municipality could, in its capacity as owner, demand that profits be transferred, thus reducing the financial resources the companies have at their disposal to such an extent that their scope for investment would be limited. The present study shows no indication whatsoever of this, however. Moreover, electricity, gas, and water supply companies are each subject to distinct quality regulations that call for continual investment into

Figure 4

Gross investment into energy and water networks of public utilities by regional financial resources of the countries



Source: AfD Investment Survey of German Energy and Water Supply Companies. Subsample with NACE Codes 35 and 36 according to NACE classification rev. 2. Firms from the land Baden-Württemberg discarded. Deflation based on 2010. Donor states: Bavaria, Hesse. Recipient states West: Schleswig-Holstein, Lower Saxony, Rhineland-Palatinate, Saarland, North Rhine-Westphalia. Recipient states East: Former Eastern Germany. Own calculations by DIW Berlin.

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There is no clear evidence for gross investment into networks being correlated with regional financial resources.

treatment and distribution equipment.¹⁹ Consequently, the quality of the infrastructure cannot be reduced arbitrarily. In addition to the mandatory requirement to connect and feed-in new renewable energy, the gas and electricity distribution companies are also subject to the obligation to connect customers to the network, meaning that they are required to build new distribution networks where economically viable.²⁰

In sum, it can be said that there is no indication of a correlation between the municipalities' financial strength and the investment activities of municipal energy and water suppliers.

¹⁶ See also F. Arnold et al., "Local Public Investment: Growing Economic Divide Due to Longstanding Inequalities," *DIW Economic Bulletin*, no. 42/43 (2015).

¹⁷ This is mainly due to the strict data protection requirements of official statistics and the harmonization processes that would be required.

¹⁸ To determine the allocations in the fiscal equalization system, the financial strength per capita of the given state is calculated on the basis of the state revenue. A total of 64 percent of the revenue generated in the municipalities goes into the financial strength calculation. The equalization indicator is then determined: this indicator represents the fictitious revenue of the state if the state had the average financial strength. If the financial strength of a state exceeds the equalization indicator, the state is deemed a donor state and vice versa. For the purposes of our analysis, annual data for the years 2005 to 2012 were taken. With the exception of North Rhine-Westphalia, no switches from donor to recipient occurred. In the present study, owing to its lower financial strength in comparison to Bavaria, Hamburg, and Hesse, North Rhine-Westphalia is considered to be a recipient state for the entire analysis period. For further information on the federal fiscal equalization system between *Länder*, see Federal Ministry of Finance, "Der bundesstaatliche Finanzausgleich" (2015) accessed on October 7, 2015, http://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Oeffentliche_Finzen/Foederale_Finanzbeziehungen/Laenderfinanzausgleich/DE-Bundestaatliche-FAG.pdf.

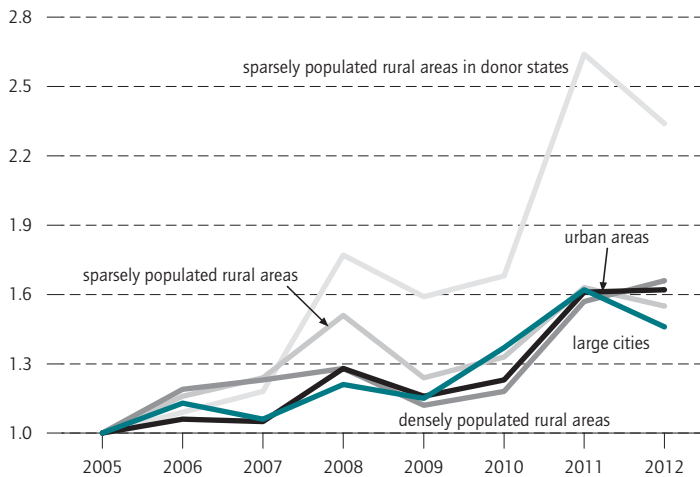
¹⁹ See German ordinance on the quality of water intended for human consumption (*Trinkwasserverordnung, TrinkwV 2001*) as well as the Incentive Regulation Ordinance (*ARegV*) of October 29, 2007, paragraph 4.

²⁰ See the German Energy Sources Act (*Energiewirtschaftsgesetz, EnWG*) of July 7, 2005. Sections 17 and 18.

Figure 5

Gross investment into energy and water networks of public utilities by settlement patterns

Index 2005 = 1



Source: AfD Investment Survey of German Energy and Water Supply Companies. Subsample with NACE Codes 35 and 36 according to NACE classification rev. 2. Firms from the land Baden-Württemberg discarded. Deflation based on 2010. Classification of settlement types was done using data from BBSR (2015) at regional level Kreis. Own calculations by DIW Berlin.

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Diverging trends in population growths do not yet seem to influence investment expenditure by local utilities.

No signs of waning investment in rural areas

Various studies argue that, in the long term, demographic change and altered settlement patterns will have an impact on the use of distribution infrastructure and will, consequently, indirectly affect the need for investment on the part of public energy and water supply companies.²¹ For this reason, the possible existence of a correlation between settlement patterns and the investment behavior of public energy and water supply companies is examined below.

Changes in population figures and settlement patterns are all-important for energy and water supply. While rural areas are suffering from declining populations, the

cities are growing. In the influx areas, existing infrastructure consequently has to be expanded. In the exodus areas, investment is needed to adapt the distribution networks to the changed demand. Owing to technical problems associated with the reduction or change in network capacity, in particular, investment in this area has been very limited to date. A survey conducted among the municipalities as part of the 2012 KfW Municipal Panel—a nationwide survey among local governments conducted by the reconstruction loan corporation KfW—shows that investment into network downsizing in the energy and water supply sectors has not been one of the main focus areas of the municipalities to date.²²

To analyze the correlation between settlement patterns and investment behavior, the investment survey data were used once again, although in this case they were linked at district level with settlement data from the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). Here, a distinction was drawn between independent major cities, urban areas, rural districts, and sparsely populated areas. The analyses revealed that, over the period 2005 to 2012, investment trends in rural and urban areas took a similar course. In other words, the different population trends in cities and rural areas have not yet taken their toll on the level of investment in the public energy and water supply sectors (see Figure 5). One exception here is sparsely populated areas in Hesse or Bavaria, where the level of investment has soared. The assumption here, however, is that this surge of investment is mainly a result of the network expansion required for the integration of renewable energy sources.

In the cities, in contrast, the energy transition has meant that the need for network expansion has decreased. Thus, if a correlation between investment behavior and demographic trends did exist, small towns in eastern Germany, in particular, might be expected to invest less in infrastructure given the drop in population in the wake of reunification. Empirical data, however, do not show this to be the case: a comparison of investment activities shows that investment in small eastern German towns is not lagging behind that of small towns in Lower Saxony or North Rhine-Westphalia (see Figure 6). However, owing to nature of the data used here, it is impossible to finally clarify whether the investment is related to changes in demographic structure or differences in investment cycles.

Conclusion

A considerable share of public investment comes not only from public budgets but also from public companies.

²¹ S. Siedentop, M. Hans et al., *Kommunale Infrastrukturkosten und Demographie*, (Dortmund: TU Dortmund and Institut für Landes- und Stadtentwicklungsforschung gGmbH, 2015); M. Köller, "Baustelle Kommunen: Demografischer Wandel trifft kommunale Infrastruktur," *Fokus Volkswirtschaft* 30 (September 2013): 1–3; C. Deilmann and P. Haug, *Demografischer Wandel und technische Infrastruktur: Wer soll die Kosten tragen? Eine Untersuchung am Beispiel ostdeutscher Mittelstädte*, (Aachen: Shaker, 2010). K. Einig, S. Siedentop et al., "Infrastrukturkostenrechnung in der Regionalplanung," *Werkstatt: Praxis* 43 (2006).

²² Köller, "Baustelle Kommunen."

Around 21 percent of public companies operate in the energy and water supply sectors. Unlike with core municipal budgets,²³ in the area of outsourced energy and water supply, no decline in investment was seen. In contrast, gross investment in distribution equipment and installations by municipal energy and water supply companies is on the increase. This is similar to the trend observed among private energy and water supply companies. It remains to be seen, however, whether these findings also apply to other outsourced or non-outsourced municipal services. This is of importance since the energy and water supply sectors are different from other public tasks: they are often profitable, meaning they are not dependent on the financial state of affairs in the municipality.

Despite the differences that exist in the financial strength and demographic trends in the distribution areas, these differences have not been found to have a clear impact on the investment behavior of public energy and water supply companies to date. Existing differences in investment behavior among public and private municipal infrastructure firms are mainly a result of the increasing use of renewable sources of energy. Given the considerable challenges that municipalities will have to face in future, in particular in light of demographic change, it is impossible to rule out demographics and financial strength having an effect on investment behavior in the future.

²³ See also Arnold, "Local Public Investment."

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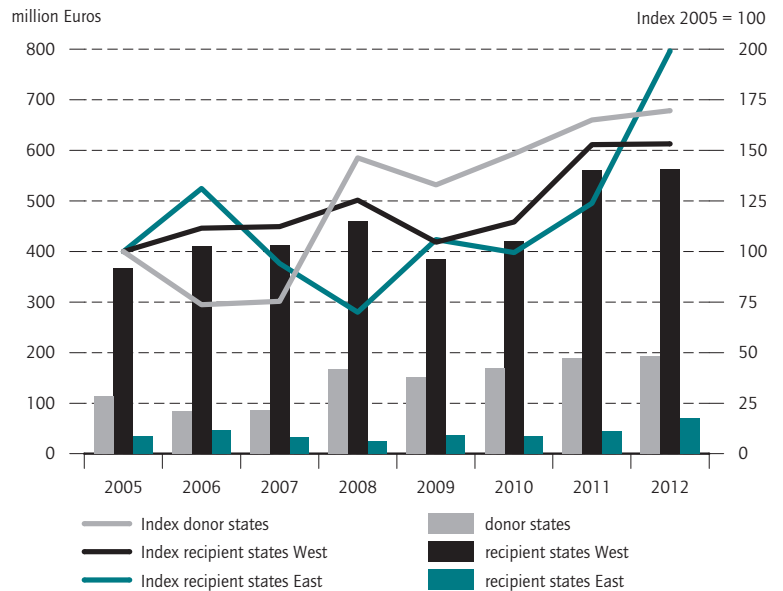
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JEL: R53, L33, L97

Keywords: Investments, Public Utilities

Figure 6

Gross investment into energy and water networks of public utilities in urban areas by regional financial resources



Source: AfD Investment Survey of German Energy and Water Supply Companies. Subsample with NACE Codes 35 and 36 according to NACE classification rev. 2. Firms from the land Baden-Württemberg discarded. Deflation based on 2010. Donor states: Bavaria, Hesse. Recipient states West: Schleswig-Holstein, Lower Saxony, Rhineland-Palatinate, Saarland, North Rhine-Westphalia. Recipient states East: Former Eastern Germany. Classification of settlement types was done using data from BBSR (2015) at district level. Own calculations by DIW Berlin.

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Public local utilities do not spend less on investment into networks in small towns located in Eastern Germany compared to those situated in Western Germany.

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