

Chapter 9
Infrastructure investment
in the face of digital,
climate and cohesion challenges

## EUROPEAN INVESTMENT BANK INVESTMENT REPORT 2020/2021

Building a smart and green Europe in the COVID-19 era

Part II Investing in the transition to a green and smart economy

# Chapter 9 Infrastructure investment in the face of digital, climate and cohesion challenges



#### Investment report 2020/2021: Building a smart and green Europe in the COVID-19 era

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The EIB annual report on Investment and Investment Finance is a product of the EIB Economics Department, providing a comprehensive overview of the developments and drivers of investment and its finance in the European Union. It combines an analysis and understanding of key market trends and developments with a more in-depth thematic focus, which this year is devoted to European progress towards a smart and green future in a post-COVID-19 world. The report draws extensively on the results of the annual EIB Investment Survey (EIBIS) and the EIB Municipality Survey. It complements internal EIB analysis with contributions from leading experts in the field.

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The mission of the EIB Economics Department is to provide economic analyses and studies to support the Bank in its operations and in the definition of its positioning, strategy and policy. The Department, a team of 40 economists, is headed by Debora Revoltella, Director of Economics.

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## Chapter 9

## Infrastructure investment in the face of digital, climate and cohesion challenges



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#### Chapter 9

## Infrastructure investment in the face of digital, climate and cohesion challenges

A large share of EU municipalities still identify infrastructure gaps, even though investment in municipal infrastructure is increasing. These gaps are particularly frequent in Southern and Central and Eastern Europe, and pertain to infrastructure critical to facing the challenges of climate change and digitalisation. The findings of this chapter are based on the EIB Municipality Survey 2020, which queries 685 municipalities throughout the 27 EU Member States. Looking ahead, municipalities intend to increase investment, focusing on climate change and digitalisation. However, investment barriers – notably limited funding and regulatory red tape – are acting as a break. The first wave of the coronavirus pandemic reinforced the demand for more digital investment, while rekindling the need for social infrastructure.

How municipalities address green and digital challenges affects their outlook on climate change and is also related to local corporate innovation in these areas. Municipal digital sophistication (such as providing public services online) and green administrative capacity (such as adherence to green budgeting) are associated with greater assuredness towards economic transition risks. Municipalities that have jointly developed these attributes are also less pessimistic about the physical risks posed by climate change. Furthermore, combining results from the EIB Municipality Survey with the EIB Investment Survey (EIBIS) shows that, on a national level, the share of firms innovating and adopting technologies in digital and green areas rises with the share of municipalities that are digitally sophisticated and have developed green administrative capacities.

Municipalities are less able to close investment gaps if they are more reliant on capital transfers or grants. This poses a challenge for EU cohesion, since this inability to close investment gaps primarily affects municipalities in regions whose economic performance has been below par.

#### Introduction

This chapter looks at municipal infrastructure and capacity, focusing on the challenges of the digital transformation, climate change and economic cohesion. The results presented here rely chiefly on the EIB Municipality Survey 2020, which was conducted over the summer of 2020 and which includes 685 municipalities across EU Member States. The survey specifically asks municipalities to assess their infrastructure gaps, investment needs and constraints. The survey also delves into the impact of the COVID-19 crisis and challenges related to climate change, decarbonisation and digitalisation.

The surveyed municipalities perceive a need to adapt their infrastructure to the challenges related to digitalisation, climate change, and economic cohesion as well as the coronavirus pandemic. Despite rising infrastructure investment, a large share of municipalities identified gaps in critical areas – especially concerning climate change and digitalisation. Funding, regulatory red tape and a lack of technical capacity are inhibiting investment. Regional differences are important, however, with Western and Northern Europe generally enjoying relatively more investment, fewer infrastructure gaps and investment barriers, as well as better-developed administrative capacities to engage with green and digital challenges. The unfolding coronavirus pandemic has reinforced demand for more digital investment and has rekindled the need to invest in social infrastructure.

Policy action needs to support municipalities in tackling these challenges. In the face of climate change, municipalities with greater digital sophistication (for instance the online provision of public services) and better developed green administrative capacities (such as green budgeting²) tend to be more assured. What is more, merging the EIB Municipality Survey 2020 and EIBIS firm-level data shows that the share of firms that are advanced digitally and environmentally rises in countries with large shares of municipalities with better digital and green credentials. Cohesion is also at stake. Municipalities in regions with subpar economic performance tend to face more infrastructure challenges. What is more, the more those regions depend on capital transfers and grants for investment, the more difficulty they have in closing infrastructure gaps, notably in urban transport.

The remainder of the chapter is structured as follows. Section one provides a summary view of municipalities' assessment of their infrastructure, investment barriers, expected investment and the impact of the coronavirus pandemic. Section two digs into the municipal challenges emanating from climate change. In this context, we construct measures of municipalities' digital sophistication and green administrative capacity. Box A looks at how investment gaps and financing obstacles affect buildings' energy efficiency. Section three explores whether the state of municipal infrastructure in Europe is an obstacle to firms' investment activities. Section four looks at the relationship between municipalities' ability to close investment gaps and funding, focusing on municipalities dependent on state transfers and taking into account regional economic performance. Box B looks at the findings in more detail. The final section concludes with some considerations for policy implications.

<sup>1</sup> The 2020 survey follows an inaugural run conducted in 2017.

<sup>2</sup> Green budgeting seeks to align expenditure and revenue processes with climate and other environmental goals.

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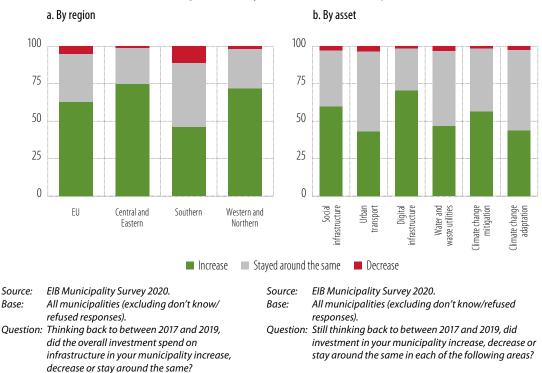
#### Municipal infrastructure investment: Gaps, barriers and outlook

#### Municipalities' assessment of local gaps

Nearly two-thirds of EU municipalities have increased their investment in infrastructure in the past three years. The outlier is Southern Europe, where over half of municipalities decreased investment or kept it constant. Northern Europe contrasts with other EU regions, with nearly three-quarters of municipalities increasing infrastructure investment (Figure 1b).3

Municipal investments predominantly targeted digital and social infrastructure as well as climate change mitigation (Figure 1a). Municipalities were asked about investment for six categories of infrastructure: social, urban transport, digital, water and waste, climate change mitigation and climate change adaptation. Investment increased most frequently in digital infrastructure (70%), social infrastructure (60%) and climate change mitigation (55%).

Figure 1 Infrastructure investment over past three years (share of municipalities, %)

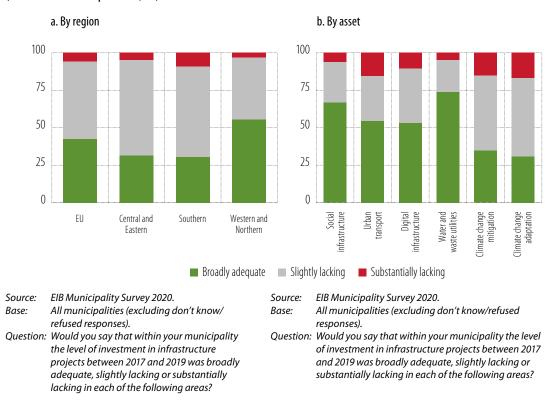


The majority of municipalities said infrastructure investment in recent years was lacking, especially for climate change, digitalisation and urban transport. Respondents were asked about the adequacy of infrastructure investments in their municipalities over the past three years for each of the infrastructure assets mentioned above. Overall, the majority of municipalities said investment has been lacking, with only 40% saying it was broadly adequate. Perceptions about the adequacy of investment vary between regions and by the type of infrastructure. Investment is most frequently said to be lacking for: i) climate

This picture is consistent with a general uptick of EU infrastructure investment since 2017. For more information, see Chapter 2 of this report.

regions and by the type of infrastructure. Investment is most frequently said to be lacking for: i) climate mitigation and adaptation, with three-quarters of municipalities not satisfied with the level for at least one of these areas; ii) digitalisation, with the majority of municipalities dissatisfied; and iii) urban transport, which roughly 45% of municipalities said was lacking (Figure 2b). Broad discrepancies exist between regions, however. Municipalities in Western and Northern Europe were more positive, with 55% saying they were broadly satisfied with recent levels of investment, while only 30% of municipalities in Central and Eastern Europe and in Southern Europe thought that investment was sufficient. (Figure 2a).

Figure 2
Adequacy of infrastructure investment over the past three years (share of municipalities, %)



Questions on municipal satisfaction with social and transport infrastructure reveal gaps, notably in affordable housing and electric charging stations for vehicles. Respondents were asked to evaluate the adequacy of their local infrastructure assets. These assets were grouped according to whether they serve either transport or social purposes. For transport, the group of infrastructure assets included: cycling lanes and footpaths, urban public transport, inter-urban and urban-rural transport connectivity, as well as electric charging stations for vehicles. Only 25% of municipalities said electric charging infrastructure was adequate. For social infrastructure, the underlying infrastructure assets included health and care, education and training, as well as social housing. Social housing stands out, with every second municipality identifying a lack.

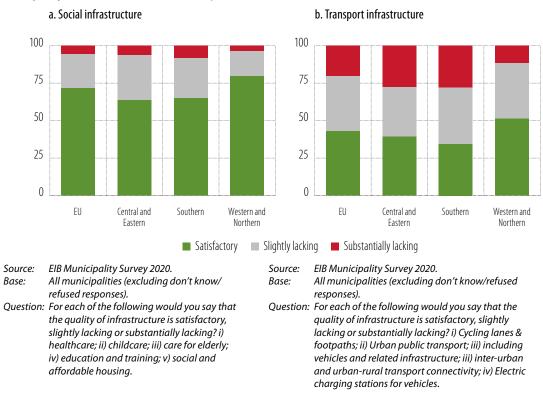
Aggregating over the assets in each group yields two measures of adequacy of municipal infrastructure: one for social infrastructure and the other for transport infrastructure. Figure 3 displays these measures of satisfaction with social (Figure 3a) and transport (Figure 3b) infrastructure by region.

Overall satisfaction with transport and social infrastructure confirms regional differences, while also showing that transport infrastructure is a source of discontent for the majority of municipalities.

Figure 3 shows that regions outside of Western and Northern Europe are more likely to say that social and transport infrastructure was inadequate. Comparing satisfaction between social and transport, satisfaction with social infrastructure is relatively frequent (70%) whereas the majority of municipalities identifies transport infrastructure as deficient (55%). Indeed, 20% of municipalities identify a severe gap in transport infrastructure.

Figure 3

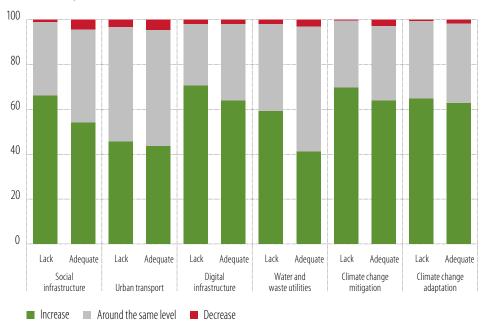
Adequacy of stock (share of municipalities, %)



Municipalities plan to increase investment over the next five years, looking to close gaps and prioritising digital and social infrastructure and climate change mitigation and adaptation (Figure 4). Three-quarters of municipalities plan to keep infrastructure investment at least stable over the same period. About 50% indicate they will increase investment, especially climate and digital investment. The share of investment in digital and climate infrastructure is even higher for municipalities that said recent investment in these two areas was insufficient.

With infrastructure investment set to increase, municipalities plan to focus on modernisation. As Figure 5 shows, over the past three years maintenance and repair has accounted for the largest share of municipal investment all over Europe. Southern European municipalities, in particular, spent nearly half of their investment on maintenance and repair, leaving little for new building or modernisation. Taken together with the relatively low levels of infrastructure investment and the inadequacy of both infrastructure stock and investment in Southern Europe as shown in Figures 1-3, the focus of investment on maintenance and repair indicates that investment gaps have continued to grow here. Municipalities expect, on average, to increase the share of infrastructure investment dedicated to modernisation to 40% over the coming five years. Municipalities in Central and Eastern Europe generally follow the same levels of investment for modernisation, while the share of investment dedicated to maintenance and repair is likely to remain high in Southern Europe.

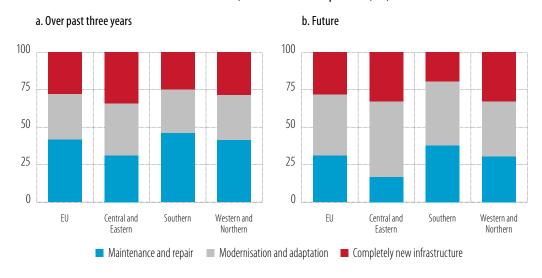
Figure 4
Expected composition of investment over the next five years, by adequacy (share of municipalities, %)



Base: All municipalities (excluding don't know/refused responses).

Question: And for each of the following areas, over the next five years, does your municipality expect to increase, decrease or have around the same level of spending on infrastructure investment?

Figure 5
Orientation of infrastructure investment (share of municipalities, %)



Source: EIB Municipality Survey 2020.

Base: All municipalities (excluding don't know/

refused responses).

Question: Over the past three years, what proportion

of the investment was for...?

Source: EIB Municipality Survey 2020.

Base: All municipalities (excluding don't know/refused

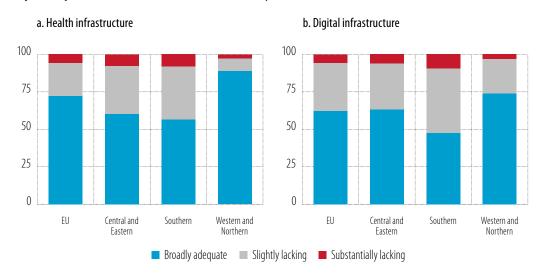
responses).

Question: And looking ahead to the next five years, do you expect the largest required share of investment on infrastructure to be for...?

#### Impact of COVID-19

Faced with the coronavirus pandemic, a lack of digital and health infrastructure stifles the ability of a large share of Central and Eastern, and especially, Southern European municipalities to deal with the crisis (Figure 6). Everywhere it hit, the pandemic strained health and care infrastructure. Even where the spread of the virus had, by the time of the survey, been contained, the pandemic forced municipalities to reassess the resilience of their health infrastructure. At the same time, measures to contain the spread of the virus placed demands on other infrastructure, primarily digital infrastructure, for instance to facilitate teleworking. Even though the survey was conducted at a time when the first wave of the pandemic was still unfolding, many municipalities were already certain their municipal infrastructure would face problems dealing with the crisis. Of the municipalities in Southern Europe, more than 50% considered their digital infrastructure to be lacking, while 40% considered their health infrastructure to be insufficient. In Central and Eastern Europe, around 40% considered overall infrastructure lacking, with a greater share concerned about health infrastructure. In Western and Northern Europe, infrastructure deficiencies were less of an issue. One-quarter of municipalities were concerned about digital infrastructure, with a mere 10% expressing concern about their health infrastructure. Of course, a more complete assessment of responses will need to take into account the severity of the pandemic in the relevant regions.

Figure 6 Ability to cope with COVID-19 (share of municipalities, %)



EIB Municipality Survey 2020. Source:

All municipalities (excluding don't know/ Base:

refused responses).

Question: To what extent is your health infrastructure able to cope with the current COVID-19

situation in your city?

EIB Municipality Survey 2020. Source:

All municipalities (excluding don't know/refused Base:

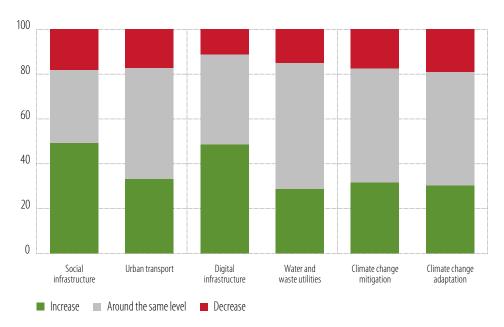
responses).

Question: To what extent is your digital infrastructure able to cope with the current COVID-19 situation in your city?

Already by the summer of 2020 some 40% of municipalities had determined that their investment plans would need to change as a result of the pandemic, with an emphasis on digital and social infrastructure (Figure 7). Nearly every second municipality said they expected to increase both social and digital investment - in Southern Europe this rises to 60%. In Western and Northern Europe it was still 50% for digital and 40% for social infrastructure. In Central and Eastern Europe, the pandemic's impact on investment plans is more evenly spread out across infrastructure categories.

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Figure 7 Impact of COVID-19 on investment plans, by asset (share of municipalities, %)



Source: EIB Municipality Survey 2020.

Municipalities whose investment plans changed due to COVID-19.

Question: For each of the following areas will your municipality increase or decrease spending on infrastructure investment due to coronavirus, or have around the same level of spending on this area?

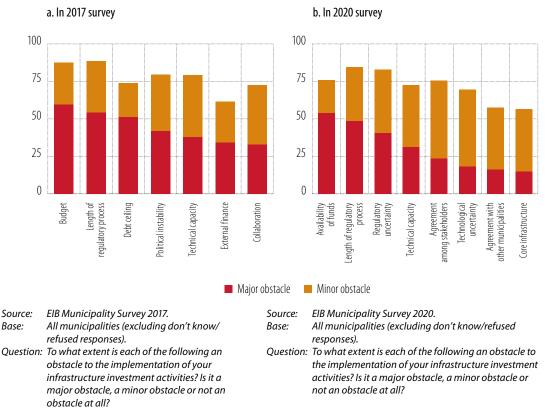
#### Barriers to investment

Regulatory red tape and limited availability of funding remain the most frequently cited obstacles to investment, with limited funding commonly cited as a major obstacle (Figure 8). Municipalities were asked to indicate whether each of the following pose a major, minor or no obstacle to their infrastructure investment: i) funding; ii) technical capacity; iii) access to core infrastructure; iv) agreement with other stakeholders; v) agreement among stakeholders; vi) length of regulatory processes; vii) regulatory uncertainty; and viii) technological uncertainty. Municipalities most commonly cited regulatory red tape4 (over four-fifths), and lack of funding (three-quarters of municipalities). In addition, every second municipality identified a lack of funding as a major obstacle. Other common barriers were stakeholder agreement, technological uncertainty and technical capacity. Though the categories have not remained entirely the same, the overall picture remains similar to that found in the 2017 edition of the EIB Municipality Survey, with funding and length of regulatory processes topping the list at the time.

Red tape lumps together the individually flagged obstacles of regulatory uncertainty and length of the regulatory process.

Figure 8

Municipal barriers to investment (share of municipalities, %)



#### Infrastructure financing

Given the prevalence and severity of lack of funding as a barrier to investment, a deeper understanding of the underlying issues is important. Municipal investment can be financed through internal resources, transfers (from central or regional government or EU funds) or from direct access to external finance (such as bank loans and bond issuances). The composition and magnitude of municipal investment funding is related to a number of factors, including municipality size, national governance structures and laws and regulations or the relative level of regional gross domestic product (GDP), which may affect revenue streams or entitlements to receive transfers and grants. <sup>5</sup> National laws and regulations can specify a number of criteria, including the types of revenue accruing to municipalities or the modalities of access to capital transfers and grants. Similarly, externally sourced municipal financing is often regulated at the national or regional level, including stipulations of which entities are entitled to borrow and for what purpose as well as debt ceilings. Aside from these factors, the structural economic features of the region or the municipality is important to determining the composition of funding, such as development of capital markets or the extent to which certain types of revenue are included in regional economic performance.

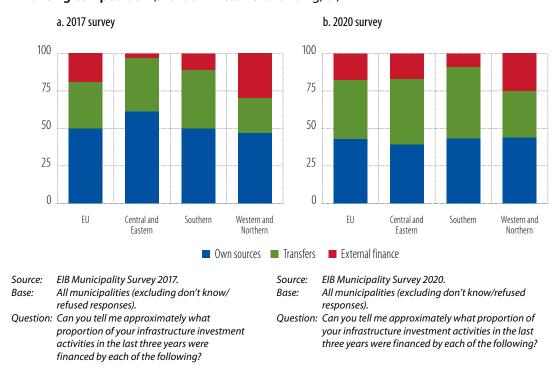
On average, 43% of municipal investments were funded from current income or their own resources; 39% by capital transfers; and 18% through external financing. Figure 9 shows the respective average breakdowns of funding as reported for the 2017 and 2020 editions of the EIB Municipality Survey. The average reported reliance on capital transfers has increased in all regions from the 2017 poll to the one

<sup>5</sup> For a more general discussion on subnational funding, the reader might consider Organisation for Economic Co-operation and Development (OECD)/United Cities and Local Governments (UCLG) (2016), Subnational Governments around the world: Structure and finance.

<sup>6 85</sup> municipalities did not report on the composition of their financing, with more than half of these from Central and Eastern Europe.

breakdowns of funding as reported for the 2017 and 2020 editions of the EIB Municipality Survey.<sup>6</sup> The average reported reliance on capital transfers has increased in all regions from the 2017 poll to the one conducted in 2020. Of course, this increase can be due to a number of issues, including the composition of samples and responses, or a decline in municipal revenues or more difficult access to external financing. Still, it is noteworthy that the increase has been strongest in Central and Eastern Europe, where capital transfers now account for 43% of funding. Capital transfers are also dominant in Southern Europe, where they fund nearly half of activities. By contrast, in Western and Northern Europe, the share remained below one-third. Municipalities have traditionally relied more on external finance, particularly in Western and Northern Europe (now accounting for 25%). Lately, the share of external financing has increased to 18% in Central and Eastern Europe, but not in Southern Europe.

Figure 9
Financing composition (share of investment funding, %)



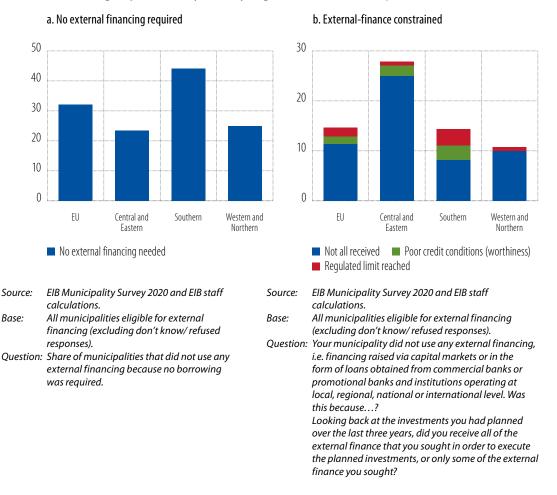
#### Survey results show that one in seven municipalities have difficulties accessing external finance.

The survey defines external financing as financing raised – for the purpose of investment – via capital markets or in the form of loans obtained from commercial banks or promotional banks and institutions operating at the local, regional, national or international level. Of the respondents eligible to apply for external financing, more than 50% received all the financing requested and one-third had no need for external financing (Figure 10a). The remaining 15% can be considered finance-constrained, because either they did not receive all the funding they would have desired (11.5%); they already reached statutory debt limits (2%); or, based on their credit worthiness, they considered credit conditions prohibitive (1.5%) (Figure 10b). External credit-constrained municipalities are clearly more prevalent in Central and Eastern Europe, where this constraint affects every fourth eligible municipality. External finance constraints are least prevalent in Western and Northern Europe (10%).

<sup>6 85</sup> municipalities did not report on the composition of their financing, with more than half of these from Central and Eastern Europe.

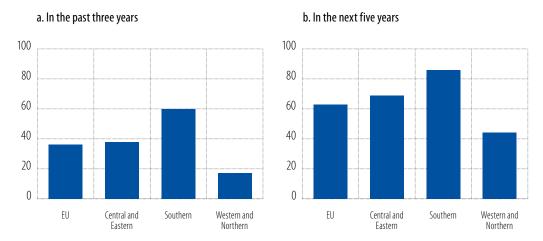
<sup>7 11</sup> respondents indicated that their municipality is not entitled to borrow.

Figure 10 External financing in past three years, by region (share of municipalities, %)



The share of municipalities reporting to have benefitted from EU financial instruments continues to rise, with more than one-third of municipalities saying they benefitted from such instruments – particularly in Southern Europe and in Central and Eastern Europe. (Figure 11). In terms of regional shares of municipalities having benefited from EU financial instruments over the past three years, nearly 60% of those in Southern Europe declared having done so compared to 38% of those from Central and Eastern Europe. In Southern Europe, the frequency of the use of financial instruments increases with municipal size. The share of municipalities benefitting from these instruments has doubled from that reported in the 2017 survey. Looking ahead, nearly two-thirds of EU municipalities expect to benefit from EU financial instruments (Figure 11b). More than two-thirds of those in Central and Eastern Europe and 86% in Southern Europe expect to take advantage of these instruments.

Figure 11
Use of EU financial instruments, by region (share of municipalities, %)



Base: All municipalities (excluding don't know/

refused responses).

Question: In the last three years, has your municipality benefited from EU-funded financial instruments such as subsidised loans, quarantees and other risk bearing

mechanisms?

Source: EIB Municipality Survey 2020.

Base: All municipalities (excluding don't know/refused

responses).

Question: In the next five years, in order to finance planned investment projects, does your municipality plan on benefiting from EU-funded financial instruments such as subsidised loans, guarantees and other risk bearing mechanisms?

## Climate change and municipalities' development of green administrative capacity and digital sophistication

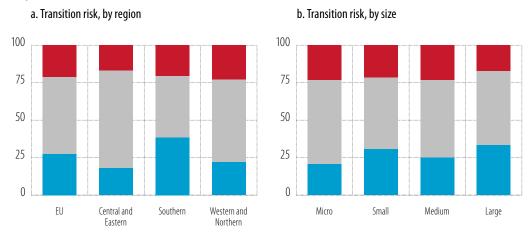
#### Municipalities tackle the challenges of climate change

Municipalities are, on balance, more concerned about the physical risks of climate change, while adopting a more neutral view on transition-related risks. Municipalities were asked to evaluate their exposure to climate risk, distinguishing between physical risks and risks associated with the EU plans for a transition to a net-zero carbon economy. For each of these risks, respondents were asked to assess, on balance, whether they pose more of a challenge or opportunity, or whether the risks were broadly balanced or not relevant. The outlook on the transition risk is relatively balanced, with the neutral view prevailing, whereas concerns about the physical risks related to climate change dominate (Figure 12). Some 60% of EU municipalities consider physical risks to be a challenge, with slightly higher ratios in Southern Europe and in medium-sized municipalities. When requested to assess the economic impact of the EU transition towards a zero-emission economy, on the other hand, municipalities expressed rather balanced views, with 27% pointing to opportunities and 21% to challenges. Southern European municipalities, in particular, and especially large municipalities, tend to perceive some economic upside in the transition risks.

Finance constraints are the most frequently noted barrier to green and climate-related investment (Figure 13). Asked to identify the two principal barriers to green or climate-related investment, nearly 70% of municipalities flag finance, with a large majority identifying it as the primary obstacle. The next three categories are each cited by one-quarter of municipalities as among their principal constraints, namely length of regulatory process, regulatory uncertainty and lack of technical capacity.

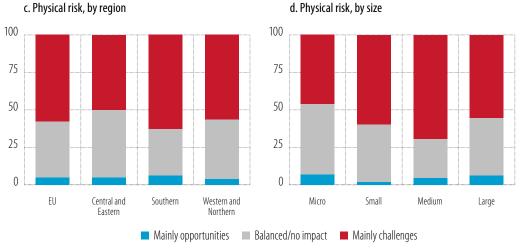
Figure 12

Municipal perception of the impact of risks emanating from climate change (share of municipalities, %)



Base: All municipalities (excluding don't know/refused responses).

Question: On balance, over the next five years what economic impact do you expect this transition to have on your municipality?



Source: EIB Municipality Survey 2020.

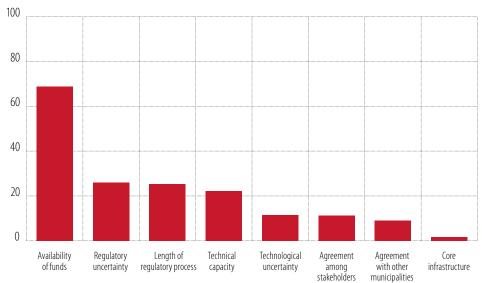
Base: All municipalities (excluding don't know/refused responses).

Question: Thinking about perceived climate change and changing weather patterns: over the next five years, what impact do you expect the physical risks associated with these weather events to have on your municipality?

The negative impact of funding obstacles is particularly evident for infrastructure investments focused on climate change. As already discussed in the first section of the chapter, the perceived adequacy of infrastructure investment varies by infrastructure asset class (Figure 2). Since financing is a major obstacle to investment, Figure 14 juxtaposes groups of municipalities that perceive funding to be an obstacle against those that do not. For investment related to climate change, there is a clear difference between these groups. For municipalities that do not flag funding as an obstacle, a higher share consider climate investment to be adequate than for municipalities that experience funding obstacles. Digital, transport and social infrastructure also show differences between municipalities highlighting a slight lack of investment.

Figure 13

Municipal barriers to green or climate-related investment (share of municipalities, %)



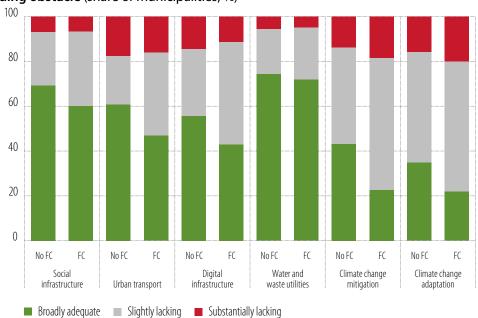
ase: All municipalities (excluding don't know/refused responses).

Question: Thinking of green or climate-related infrastructure investment, which are the two main obstacles to this type of

investment?

Figure 14

Adequacy of infrastructure investment for different asset classes, by perception of funding obstacle (share of municipalities, %)



Source: EIB Municipality Survey 2020 and EIB staff calculations.

Base: All municipalities (excluding don't know/refused responses).

Note: Funding a major constraint (FC) vs. not (not FC).

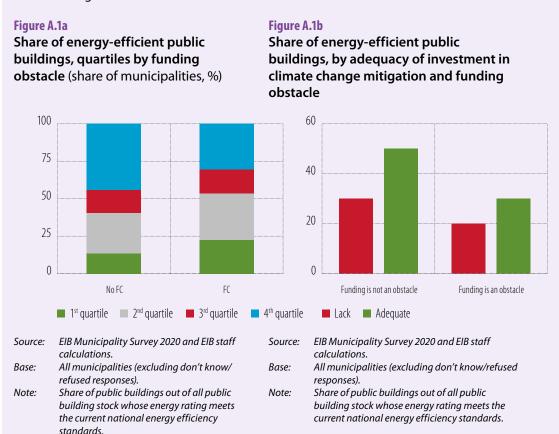
Question: Would you say that within your municipality, the level of investment in infrastructure projects between 2017 and 2019 was broadly adequate, slightly lacking or substantially lacking in each of the following areas?

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### How does green matter? The case of energy-efficient buildings and the role for public

A positive relationship exists between adequate climate change-related investment and the energy efficiency of buildings - funding obstacles, however, limit those investments. To examine the issue further, this box draws on municipalities' estimates of the share of public buildings that meet the highest national norms on energy efficiency.8

Municipalities that do not identify funding as an obstacle to investment tend to have higher shares of energy-efficient public buildings. Figure A.1a reports the quartiles of shares of energy-efficient buildings, juxtaposing those facing funding as an obstacle against those that do not. Clearly, the higher share of energy-efficient buildings (the fourth quartile) is found in the group that does not face financing constraints.



Even where climate-related investment is considered adequate, funding barriers have a major impact on energy efficiency. For the 344 municipalities that say recent investment in climate change infrastructure was inadequate, the mean share of energy-efficient buildings is 29%, and the median is 20%. On the other end, for the 105 municipalities that indicated this type of investment was adequate, the mean and median are 40%. Figure A1b shows how funding obstacles push down the average. It shows the median shares of energy-efficient buildings by adequacy of investment and

Survey responses are not audited, and so their exactness cannot be guaranteed. It is worth noting, however, that municipalities that commissioned energy audits reported a higher average share of energy-efficient buildings compared to those that had not undertaken an energy efficiency audit.

energy-efficient buildings depends on whether financing is an obstacle. Those municipalities that face funding obstacles record a mean of 36%, and median of 30%. By contrast, those municipalities that do not face this barrier report a mean share of 47% and a median share of 50%. For municipalities that deem climate investment to be inadequate, on the other hand, the impact of financial constraints is less palpable.

#### Municipal digital sophistication and green administrative capacity

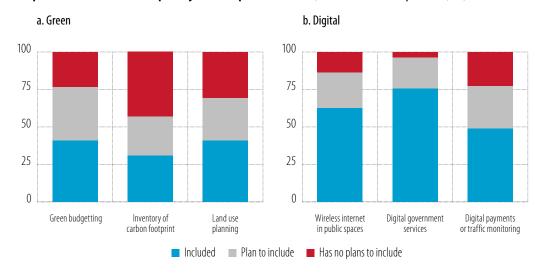
As climate change and the digital transformation unfold, municipalities are becoming more sophisticated and adapting their administrative capacity. Climate change and digitalisation present paradigm shifts. They demand that economic participants, including municipal authorities, acquire new ways of operating. The EIB Municipality Survey 2020 detects whether certain underlying capacities have been developed. These capacities are split into two sets: green and digital.

- green underlying capacities are i) green budgeting or procurement; ii) the existence of an inventory of the carbon footprint; and iii) land-use planning, including to deal with extreme weather events;
- digital underlying capacities are i) the provision of wireless internet in public spaces; ii) the provision of digital or online government services; and iii) and digital payment systems or real-time traffic monitoring for public transport.

Figure 15 provides a summary view of how these capacities are distributed across municipalities.

Figure 15

Municipal administrative capacity and sophistication (share of municipalities, %)



Source: EIB Municipality Survey 2020 and EIB staff calculations.

Base: All municipalities (excluding don't know/refused responses).

Question: For your municipality's infrastructure investments, have you included, do you plan to include or do you have no plans to include in the next five years, any of the following considerations or types of projects?

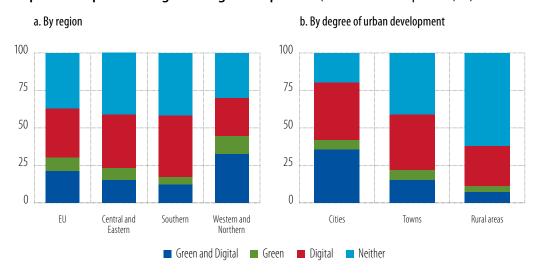
Aggregating the data for each category allows us to measure municipal digital sophistication and green administrative capacity. We introduce two indicators based on the survey responses, one for green capacity and the other for digital sophistication, which serve as a proxy for the degree to which

municipalities are developing their ability to meet the challenges of climate change and digitalisation. Each of these indicators represents an aggregate of a set of underlying capacities. For the purposes of this chapter, each measure of underlying capacity is rendered dichotomous: either it is in place or it is not. Pairing the dichotomous variables yields four possible combinations. Municipalities are therefore labelled according to a binomial classification for green and digital capacity: i) green and digital; ii) green (and not digital); iii) digital (and not green); and iv) neither green nor digital.

Measures of municipal digital sophistication and green administrative capacity suggest disparities exist between and within regions – and are also influenced by the degree of urbanisation. Over one-third of EU municipalities have poorly developed green administrative capacity and digital sophistication, whereas one-fifth are well developed in these respects. The remainder have developed one of the capacities. Digital sophistication is clearly more frequently developed than the green capacities being considered. At the regional level, Western and Northern Europe lead in green and digital capacities. Yet, even within Northern and Western Europe there is a clear divide, with one-third of municipal capacities being poorly developed against one-third being well developed. That being said, other regions see a degree of specialisation. Southern Europe is quite advanced in terms of digital sophistication. Central and Eastern Europe, on the other hand, is slightly ahead in green. Both of these regions have large shares of municipalities with poorly developed green and digital capacities (Figure 16a). The degree of urbanisation appears to be an important factor in developing these capacities. Rural municipalities exhibit a low share of both green and digital capacities, whereas towns have a similar share of digitally enabled capacities as cities (Figure 16b).

Figure 16

Municipal development in digital and green capacities (share of municipalities, %)



Source: EIB Municipality Survey 2020 and EIB staff calculations.

Base: All municipalities (excluding don't know/refused responses).

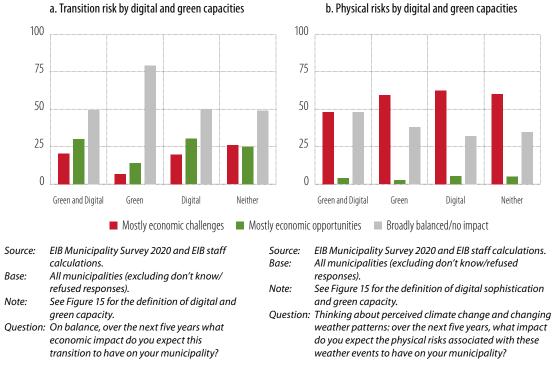
Question: See Figure 15 for the definition of digital sophistication and green capacity.

<sup>9</sup> The concepts of green administrative capacity and digital sophistication are, of course, complex and multi-dimensional, with different development paths chosen based on a number of factors. The European Committee of the Regions and European Commission have various publications that highlight their importance, including the importance of service delivery and digitalisation and its implication for implementation and innovation as well as business environment. See, for instance, Administrative capacity of local and regional authorities, Committee of the Regions, 2018, or Quality of Public Administration — A Toolbox for Practitioners, European Commission, 2017. Adequately capturing the extent to which a municipality has developed these capacities is therefore challenging. Two remarks for the interested reader: i) an important question is whether the existence of an underlying capacity relates to local capacity or is simply a reflection of a national wave. Clearly national and regional factors matter. The reader may take some comfort from the fact that the national distributions suggest that deployment is far from uniform. ii) Administrative capacity is a broad concept and alternative specifications are, of course, legitimate. One might consider audits on energy efficiency or exposure to climate change. The survey allows for this. Initial results based on such specifications find the same general trends as in this chapter.

Municipalities that do not have well-developed green administrative capacity or digital sophistication tend to be less optimistic about the economic transition (Figure 17a). For the most part, municipalities without either green or digital capacities view transition risks neutrally. This deviates from the more optimistic overall outlook displayed in Figure 12a. As Figure 16b shows, municipalities without developed green capacity or digital sophistication tend to be located in rural areas. Figure 12b shows that the smallest municipalities tend to be more pessimistic. On the other hand, the remaining municipal groupings have developed either green capacity or digital sophistication. For these, the net balance of perceptions is tilted towards seeing opportunity and away from perceiving challenges. A balanced outlook dominates among these more optimistic groups, particularly for municipalities focused on developing green capacities. Several factors could be at play here. Future research could control for more objective assessments of transition risks for the area as well as for economic development. Still, digital sophistication and green administrative capacity could be important factors in helping municipalities deal with climate change.

Concerns about physical risks tend to be less pronounced in municipalities that have developed both green administrative capacity and digital sophistication (Figure 17b). This finding supports the potentially complementary nature of green and digital capacities for municipalities facing the physical risks posed by climate change. As Figure 16 shows, these municipalities tend to be located in Western and Northern Europe, and are often cities.

Figure 17
Perception of climate change-related risks by infrastructure adequacy and administrative capacity (share of municipalities, %)

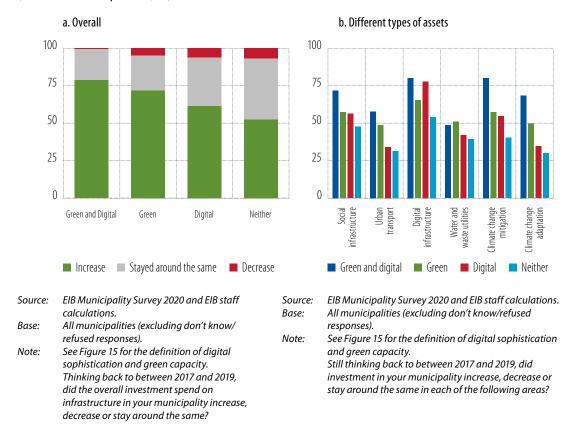


Digital sophistication and green capacity appear to have grown with recent municipal investments (Figure 18). Municipalities that have invested in recent years tend to have more developed green and digital capacities, in general and across infrastructure type. Where both digital and green capacities are advanced, the share of municipalities that invested was highest across infrastructure types<sup>10</sup>, followed by green and digital.

<sup>10</sup> The high share of municipalities with digital as well as digital and green capacities suggests that some overlap exists between digital sophistication and digital infrastructure. This is not surprising, since elements of digital sophistication might be considered as intangible digital infrastructure, for example digital public services, online payments or real-time traffic monitoring.

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Figure 18
Infrastructure investment over past three years, by digital and green capacity (share of municipalities, %)

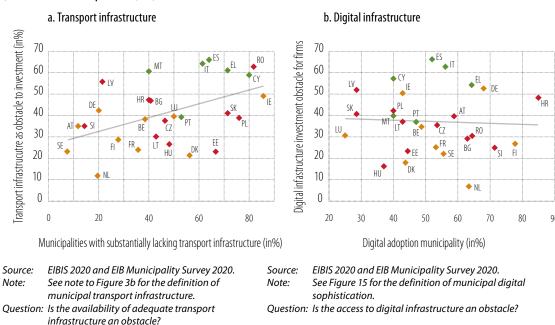


## Green and digital orientation: Synthesising municipal and corporate data

Is the state of municipal infrastructure in Europe an obstacle to firms' investment activities? This section aims to explore this question by combining EIBIS firm-level data and the EIB Municipality Survey 2020. To this end, the datasets are aggregated to the national level. The EIBIS records firms' perception of whether inadequate access to infrastructure poses an obstacle to their investment activities. As explained in the previous section, the municipality survey provides insight into the state of municipal transport and digital infrastructure as well as municipal digital sophistication and green administrative capacity. These indicators are cross-referenced with firm data from the EIBIS that was collected in different EU countries. Additionally, patent data are used to draw basic inferences about innovation.

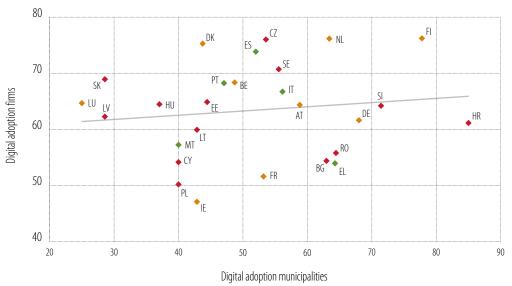
The quality of transport and digital infrastructure is correlated with firms' investment decisions (Figure 19). Firms complain more frequently about transport being an obstacle to investment in countries where a high share of municipalities claim to severely lack transport infrastructure. The better the transport infrastructure, the less an impact it has on firms' general investment activities. The link between digital infrastructure and investment activities is weaker. In countries where a higher share of municipalities say digital capacity is low, firms complain slightly more often about digital infrastructure being an obstacle to investment.

Figure 19
Perceived municipal infrastructure quality and firms' investment barriers (share of municipalities, %)



Municipal digital sophistication is positively correlated with firms' uptake of digital technologies. Firms have higher rates of digital adoption in countries where a high share of municipalities are digitally sophisticated. Figure 20 displays a positive correlation between municipal adoption of digital technologies and digital adoption rates of firms.

Figure 20 Digital adoption



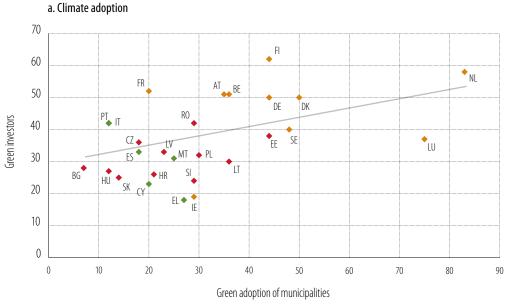
Source: EIBIS 2020 and EIB Municipality Survey 2020.

Note: See Figure 15 for the definition of municipal digital sophistication.

Firms made more green investments in countries where a high share of municipalities have good green administrative capacity – firms in those countries also cited the cost of an investment as less of an obstacle. Figure 21a plots green municipal capacity against the share of firms making green investment. It illustrates a clearly positive relationship between the two, highlighting the importance of putting in place the right infrastructure for firms' investments. What is more, in countries where a high share of municipalities have good climate capacity, firms complain less about cost being an obstacle when investing to prepare for weather events or to cut emissions.

Figure 21

Municipal green capacity vs. firms' perceptions and behaviour (share of municipalities, %)

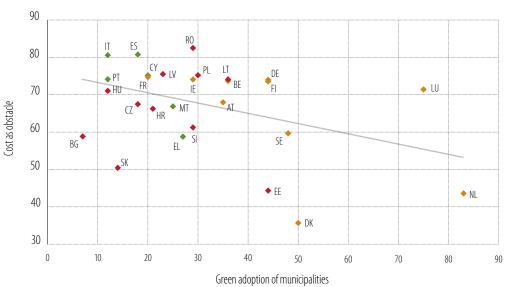


Source: EIBIS 2020 and EIB Municipality Survey 2020.

Note: See note to Figure 15 for the definition of municipal green administrative capacity.

Question: Has your company already invested to tackle the impacts of weather events and reduction in carbon emissions?

#### b. Cost as obstacle

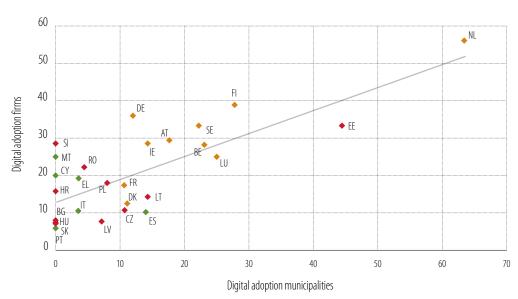


Source: EIBIS 2020 and EIB Municipality Survey 2020.

Note: See note to Figure 15 for the definition of municipal green administrative capacity.

Question: Are costs an obstacle to investing in activities to tackle the impacts of weather events and emissions reduction?

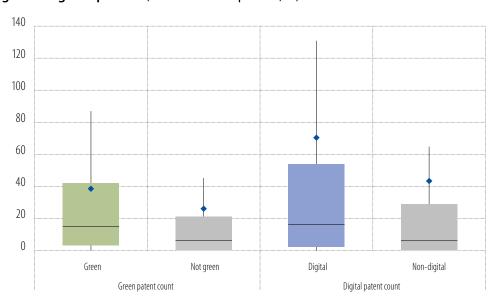
Figure 22
Digital and green adoption (share of municipalities, %)



Source: EIBIS 2020 and EIB Municipality Survey 2020.

Note: See note to Figure 15 for the definition of municipal green capacity and digital sophistication.

Figure 23
Digital and green patents (share of municipalities, %)



Source: Authors' calculations based upon European Patent Office PATSTAT data in collaboration with the Centre for Research and Development Monitoring (ECOOM) in Belgium.

Note: The figure shows the distribution of – and average count of – green or digital patents in the NUTS3 region, for green and digital municipalities and their counterparts.

Though driven by the developed regions in Western and Northern Europe, a strong relationship exists between municipalities with strong green capacities and digital sophistication and firms that have a competitive advantage in the green and digital domains (Figure 22). EU governments have made efforts to invest in green and digital infrastructure in recent years. In Central and Eastern Europe, as well as in Southern Europe, it seems that firms' green and digital investment is racing ahead of efforts by municipalities.

The shares of green and digital municipalities and of firms that are innovative in green and digital domains appear to develop in tandem (Figure 23). The number of green patent applications is clearly higher in regions with green municipalities. A similar picture emerges for digital innovation. This finding suggests that there is a clear link between the development of regional infrastructure and innovation activities. While further research is needed to assess the link, academic research supports the idea that infrastructure helps determine the innovative capacities of regions (see Porter and Stern (2001) for one of the seminal papers on this topic).

#### Cohesion

#### Regional characteristics

For decades, EU cohesion policy has focused on the disparities between low-income and high-income regions and the convergence among them. This focus has motivated institutional development on a historic scale by creating expectations about prosperity in countries in Central and Eastern Europe. It is reckoned to be only part of regional development strategies in recent contributions to the academic literature on regional policy (Barca, 2009; Barca, McCann, and Rodríguez-Pose, 2012; OECD, 2009). Attention should also be paid to social inequality and economic underperformance, even in higher income regions.

Economic performance varies across regions, within Member States and across the European Union. To study these discrepancies more closely, we compared NUTS3 regions based on their economic growth over the past 20 years, conditional on their initial income per capita, instead of simply grouping them based on income per capita. The approach makes it possible to focus on economic underperformance and how it relates to infrastructure and investment.

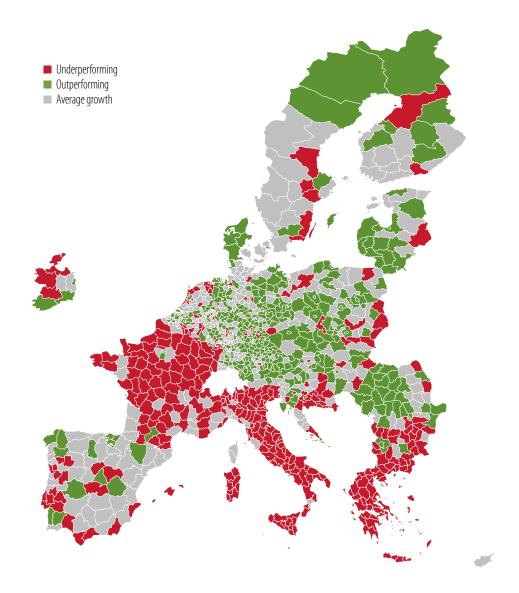
The analysis contrasts the results of the EIB Municipality Survey 2020 for regions that have grown at about the EU average, against those that have grown rapidly and those that have grown slowly. If a region grows too slowly relative to the rest, conditional on its initial income in 2000, then it is classified as a region in relative decline, or underperforming. Regions growing faster than the average are grouped into a category of relative growth, or outperforming. Regions close to the average are classified as average growth regions. Pot all regions in relative decline are poor regions. For instance, the GDP per capita (in purchasing power standards, or PPS) of the Italian NUTS3 Reggio nell'Emilia was 122% of the European Union average in 2017. It is nevertheless classified as a region in relative decline, as it has grown too slowly from 2000 to 2017 compared to peers, with 1% average annual growth. Figure 24 shows the geographic distribution of regions classified according to this categorisation.

<sup>11</sup> The nomenclature of territorial units for statistics, abbreviated NUTS (from the French version Nomenclature des Unités territoriales statistiques) is a geographical nomenclature subdividing the economic territory of the European Union into regions at three different levels: NUTS 1, 2 and 3 respectively, moving from larger to smaller territorial units. See also the Data annex of this report.

<sup>12</sup> Too little here means that the average annual growth rate of a region from 2000 to 2017 results in GDP per capita in 2017 that is in the lower third of growth rates in the population of NUTS3 regions, conditional on its GDP per capita in purchasing power standards (PPS) in 2000. Very rapid growth is used when the average annual growth rate is in the top third of the regional growth distribution, conditional on GDP per capita in PPS in 2000. The middle third defines average growth.

<sup>13</sup> The estimated average annual growth of GDP per capita of this region in 2000 is 2%. Because of its sub-par growth, GDP per capita of this region fell from 162% relative to the EU27 average in 2000 to 122% 17 years later — a decline of 40 percentage points.

Figure 24
EU NUTS3 regions classified according to their relative economic growth, 2000-2017



Source: Eurostat and EIB staff calculations.

Outperforming regions account for about 36% of the EU population (Table 1). Underperforming regions are home to 30% of the EU population. They are more sparsely populated compared to the rest and their population is ageing faster. The employment rates of underperforming regions are smaller and were stable from 2000-2017, in contrast to the average growth and outperforming regions. Employment rates have increased 2.1 percentage points for average-growth regions and 4.8 percentage points for outperforming regions over the period (Table 1).

Table 1
Demographic labour market characteristics of EU NUTS3 regions

Enabling technologies	Underperforming regions	Average-growth regions	Outperforming regions
	Demographics		
Share of total population, %	30	34	36
Population density, persons/km <sup>2</sup>	91	131	157
Old dependency ratio, %	34	32	31
		Labour market	
Employment rate, %	39	44	48
Employment rate, p.p.	0.1	2.1	4.8

Source:

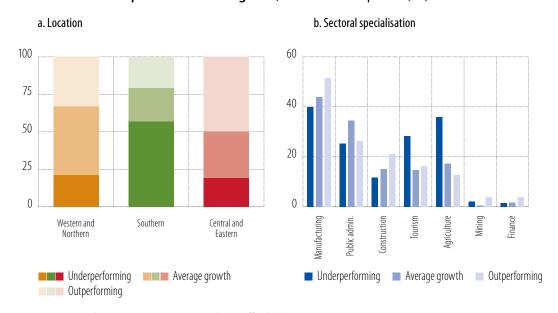
Eurostat and EIB staff calculations.

Note:

Old dependency ratio is the population over 65 years as a share (in %) of the population of 15-64 years. The employment rate is the percentage of total employment to total population. Employment rates are not necessarily bounded by 100 due to workers commuting across NUTS3 regional borders. The change in the employment rate is the within-group median of the total change over 2000-2017 in percentage points. All measures, except the share of population, use the median within the group.

In the EIB Municipality Survey 2020, Central and Eastern Europe contains more regions in relative growth than in relative decline (Figure 25a).<sup>14</sup> The share of outperforming regions in Western and Northern Europe is about one-third. In Southern Europe, on the other hand, nearly 60% of the regions have grown slowly from 2000 to 2017 and are classified as underperforming. Regions that grew relatively rapidly are home to significantly more manufacturing, construction and finance (Figure 25b). In turn, the slow-growth regions rely much more on agriculture and tourism.<sup>15</sup>

Figure 25
Location and sectoral specialisation of regions (share of municipalities, %)



Source: EIB Municipality Survey 2020, Eurostat and EIB staff calculations.

<sup>14</sup> The regional performances gleaned from the EIBIS Municipality Survey 2020 are broadly similar to the shares in the population of NUTS3 regions for Western and Northern Europe and for Central and Eastern Europe. In Southern Europe there is a significant difference, however. According to Eurostat, the share of the population living in underperforming regions is 73%, higher than the 57% in the EIBIS Municipality Survey 2020.

<sup>15</sup> Farole, Goga, and Ionescu-Heroiu (2018) observe that, on current trends, mostly low-income regions in Central and Eastern Europe will surpass mostly low-growth regions in Southern Europe by 2025.

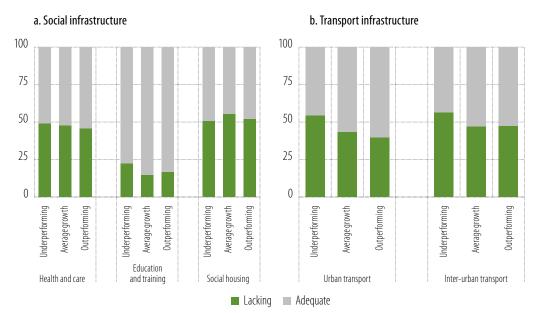
The locally available and required infrastructure will vary with socioeconomic characteristics. The different demographic and industrial structures require, to some extent, different infrastructure. Regions with a greater share of elderly people may need more health care and retirement facilities and less childcare and educational infrastructure. Higher shares of manufacturing require transport infrastructure that facilitates the supply and distribution of goods. Greater shares for tourism might mean a higher share of recreational infrastructure.

#### Assessment of infrastructure stocks

The regional groups assess the adequacy of social infrastructure slightly differently (Figure 26a). Nearly half of interviewed municipalities assess their health and care infrastructure as adequate, and this assessment does not vary a lot across groups with different growth rates. The finding is similar for social and affordable housing. Respondents in underperforming regions are more likely to assess education and training infrastructure as lacking than the other two groups, but the level is relatively low at only 22%, against 78% who think that such facilities are adequate. The responses for outdoor and recreational areas are very similar. Underperforming regions are more likely to think such infrastructure is lacking – 20% against 13% in high-growth regions.

Assessments of transport infrastructure vary significantly across regions with different rates of growth (Figure 26b). Municipalities and cities in underperforming regions are significantly more likely to say transport infrastructure is lacking. The share of respondents who think urban transport infrastructure is lacking is 15 percentage points higher in underperforming regions than in outperforming regions. The difference for inter-urban and urban-rural transport infrastructure is about 10 percentage points.

Figure 26
Assessment of adequacy of infrastructure stocks in EU regions (share of municipalities, %)



Source: EIB Municipality Survey 2020, Eurostat and EIB staff calculations.

Question: For each of the following would you say that the quality of infrastructure is satisfactory, slightly lacking or substantially lacking? i) healthcare; ii) childcare; iii) care for elderly; iv) education and training; v) social and affordable housing.

Source: EIB Municipality Survey 2020, Eurostat and EIB staff calculations.

Question: For each of the following would you say that the quality of infrastructure is satisfactory, slightly lacking or substantially lacking? i) Cycling lanes & footpaths; ii) Urban public transport; iii) including vehicles and related infrastructure; iii) inter-urban and urban-rural transport connectivity; iv) electric charging stations for vehicles.

#### Infrastructure investment and finance

Underperforming regions are less likely to adjust their investment to address infrastructure deficiencies, creating a mismatch between needs and actual investment. While 55% of respondents in underperforming regions find their transport infrastructure lacking, only 37% have increased investment in transport infrastructure over the past three years (Figure 27b and Figure 28a). Of these respondents, 53% say transport investment is lacking. A similar pattern is observed for social infrastructure in underperforming regions, where 70% of respondents say social infrastructure is lacking. Yet, only 59% have increased investment in these assets. However, for those that have invested, 61% said social infrastructure investment was adequate.

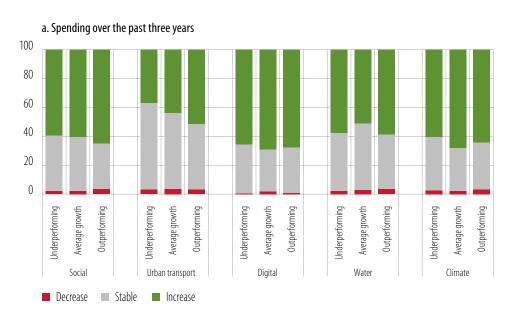
The pattern differs in municipalities located in more dynamic regions. While 55% of average-growth regions think social housing is lacking, investment in these assets has increased commensurately (60%) over the past three years and about 67% of municipalities think their investment is adequate. Likewise, 40% of respondents in high growth regions say urban transport infrastructure is lacking, but 51% have increased transport investment over the past three years and 62% now see this investment as adequate.

Future investment plans in underperforming regions do not fully address perceived infrastructure deficiencies (Figure 28). Less than 50% of underperforming regions plan to increase investment in urban transport and only about 60% plan increases in social infrastructure. In more dynamic regions, the share of respondents planning to increase investment in urban transport (about 48%) exceeds the share of those assessing urban transport infrastructure as lacking – by 5 percentage points in regions with average relative growth and by 8 percentage points in outperforming regions.

These observations suggest that infrastructure investment in underperforming regions is more constrained than elsewhere. The EIB Municipality Survey 2020 provides a battery of questions aimed at identifying likely constraints to infrastructure investment by cities and municipalities. These include questions about perceived barriers to investment, questions about administrative capacity to promote and assess investment projects and questions on investment finance. The reason for lower-than-needed infrastructure investment seems to be a limited availability of internal funds to invest – at least that reason correlates best empirically (Figure 29). Underperforming regions have the highest (median) reliance on transfers, subsidies and grants from national or supra-regional governments or the European Union to finance their investments. Underperforming regions rely less on their funds and external financing than more dynamic regions. These regions' reliance on transfers, subsidies and grants may significantly constrain investment because the granting of these funds is notoriously discretionary, as was observed in the wake of the global financial crisis.

Figure 27

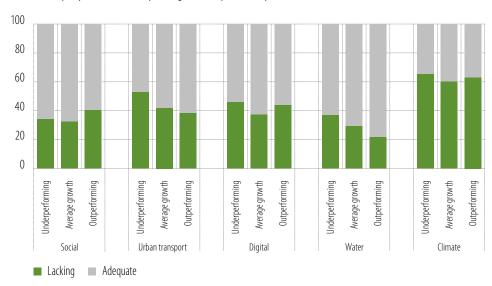
Adequacy of recent infrastructure investment (share of municipalities, %)



Source: EIB Municipality Survey 2020, Eurostat and EIB staff calculations.

Question: Still thinking back to between 2017 and 2019, did investment in your municipality increase, decrease or stay around the same in each of the following areas? Please consider all infrastructure investment in your municipality, irrespective of who is responsible for the investment.

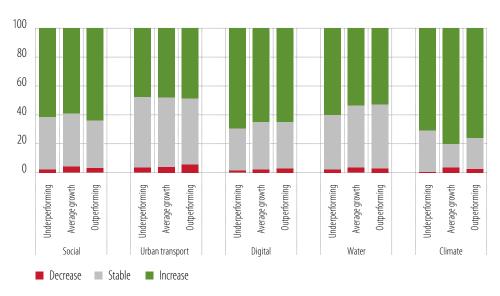
#### b. Adequacy of investment spending over the past three years



Source: EIB Municipality Survey 2020, Eurostat and EIB staff calculations.

Question: Would you say that within your municipality the level of investment in infrastructure projects between 2017 and 2019 was broadly adequate, slightly lacking or substantially lacking in each of the following areas?

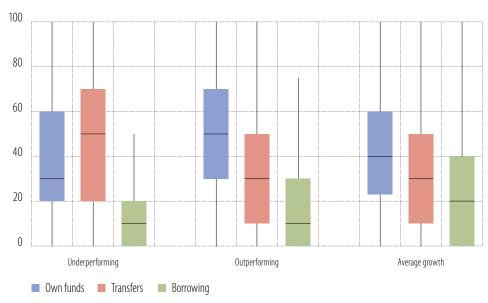
Figure 28
Investment plans over the next five years (share of municipalities, %)



Source: EIB Municipality Survey 2020, Eurostat and EIB staff calculations.

Question: And for each of the following areas, over the next five years, does your municipality expect to increase, decrease or have around the same level of spending on infrastructure investment?

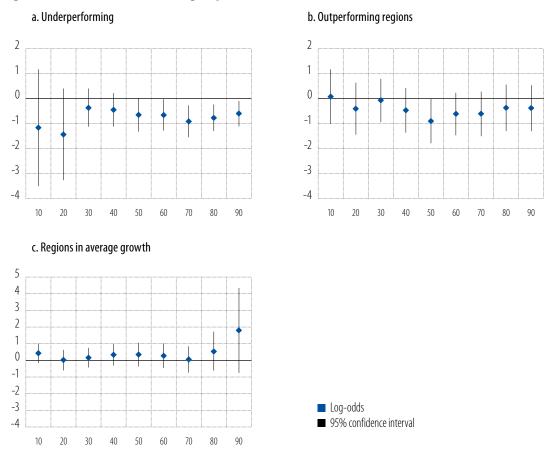
Figure 29
Sources of municipality and city investment finance



Source: EIB Municipality Survey 2020, Eurostat and EIB staff calculations.

Question: Can you tell me approximately what proportions of your infrastructure investment activities in the last three years were financed by each of the following?

Figure 30
Probability of having increased investment over the past three years by share of transfers and grants in investment financing (log-odds)



Source: EIB Municipality Survey 2020, Eurostat and EIB staff calculations.

Note: Calculations are based on the estimated regression in Table B.1 in Box B and on an identical regression with an

Calculations are based on the estimated regression in Table B.1 in Box B and on an identical regression with an alternative definition of the variable Transfer. In Table B.1, this variable is defined as 1 if transfers and grants account for investment financing of 50% or more and 0 otherwise. Each point estimate on this chart corresponds to a different definition of Transfer. The horizontal axis records the cut-off value for the share of transfers and grants, above which Transfers equal 1.

We consider the importance of transfers in addressing suboptimal investment in the less dynamic regions in a formal statistical analysis (Box B). The analysis quantifies the effects of constraints on local governments' propensity to increase investment in urban transport over the past three years. We mainly find that financially constrained municipalities in less dynamic regions suffer from a large investment mismatch in the sense that real investment does not address perceived infrastructure deficiencies. Figure 30 plots the change in the likelihood (log-odds ratios) of increasing investment if a city or municipality relies on transfers and grants above a certain threshold compared to peers that rely on transfers and grants below this threshold. Thresholds vary along the horizontal axis. Thus, the point corresponding to 70 on panel a, for example, plots the change in the odds (in logarithm) of increasing the investment of a city or municipality that relies on transfers and grants to finance 70% or more of its investment vs. a city or municipality that relies on transfers and grants for less than 70% of its investment. In this case the probability of investing decreases by about 30 percentage points.<sup>16</sup>

<sup>16</sup> The estimated difference in log-odds is -0.92. Converting this from log-odds to odds yields an odds ratio of 0.4. This translates in to a decrease in probability of about 30 percentage points.

Financially constrained municipalities in regions in decline are significantly less likely to invest in transport than peers in the same region (Figure 30a). This is particularly the case for municipalities that finance 50% or more of their investments with transfers and grants received from supra-local levels of government or the European Union. However, the situation changes in more dynamic regions, where a reliance on transfers does not affect the propensity to invest (Figure 30b and Figure 30c). While more analysis is needed to understand the reasons for differences across the regions, information from Figure 25a provides a tentative explanation. It reveals that each economic performance group is dominated by certain geographical regions. For example, regions from Southern Europe dominate the group of underperforming regions (46%). Regions from Central and Eastern Europe dominate the group of outperforming regions (51%), and regions from Western and Northern Europe dominate the group of average-growth performance (51%).

The fiscal constraints of central governments – particularly prevalent in Southern Europe – are probably at the core of suboptimal municipal investment in regions in relative decline. As central governments struggle to consolidate fiscal positions, they are likely to reduce investment grants and transfers to regional governments and municipalities, consistent with findings in Chapter 2 of this report (see Box B in Chapter 2). On the other hand, regions in Central and Eastern Europe are the main beneficiaries of the European Structural and Investment Funds (ESIF). These funds have likely reduced the financing constraints on local governments in Central and Eastern Europe and especially on those more reliant on transfers. Additional evidence suggesting that ESIF financing goes predominantly to large cities in Central and Eastern Europe might explain the results of the analysis in Box B.

#### **Box B**

#### Internal financing constraints and infrastructure investment in EU municipalities

Local government investment appears to be constrained, especially in less dynamic regions, because investment changes poorly match local governments' assessments of infrastructure gaps. The focus of the analysis is investment in urban transport infrastructure, where the divergence between investment and perceived gaps is the largest. In the statistical model, the decision to increase investment or not is a function of the perceived infrastructure gap. We control for financing constraints, economic performance, size, location and degree of urbanisation. This function is modelled as a logistic regression.

 $\Delta I_i = \alpha + \beta_1 RegClass_i + \beta_2 Transf_i + \beta_3 RegClass_i * Transf_i + \beta_4 InfraQual_i + \gamma X_i + \varepsilon_i$ 

The dependent variable takes values of 1 if the ith city or municipality has increased investment in urban transport in the past three years and 0 otherwise. The variable *RegClass* denotes the regional classification adopted in this chapter. The variable *Transf* is also binary and takes values of 1 if 50%, or more, of the investment is financed by transfers or grants from higher levels of government and 0 otherwise. The variable *InfraQual* is also binary and takes a value of 1 if urban transport infrastructure is assessed as adequate and 0 otherwise. *X* gathers several variables to control for size (logarithm of population); geographical location – Western and Northern Europe, Southern Europe or Central and Eastern Europe; degree of urbanisation – city, town or suburb or rural area. The interaction term between regional classification and transfers is intended to address the nexus between economic performance and financial constraints that may affect the propensity to increase investment. In essence, significant reliance on transfers and grants to finance investment is taken to be a sign of financial constraints. Cities or municipalities do not generate enough of their own revenue to finance investment or to borrow against.

The estimation results are included in Table B.1. The first observation is that large, densely populated areas, as well as cities and municipalities located in Central and Eastern Europe, are more likely to have increased investment over the past three years than smaller towns, suburbs and rural areas and cities and municipalities in Southern Europe. Likewise, cities and municipalities located in NUTS3 regions

with high economic growth over the past 20 years are significantly more likely to have increased investment than municipalities in less dynamic regions.

Cities and municipalities in Southern Europe and located in less dynamic regions are less likely to have increased investment in urban transport over the past three years, even though they assessed their stock of urban transport infrastructure as lacking. This multivariate analysis therefore confirms the observations from the simple bivariate analysis above that these municipalities' investment choices are constrained.

The last and most important piece of evidence in Table B.1 relates to the coefficient on the interaction between the type of region and the measure of financial constraints. The statistically significant coefficients mean that cities and municipalities that rely highly on transfers to finance their investment are much less likely to have increased investment than peers that are not so reliant on transfers and grants. This is particularly true for cities or municipalities located in underperforming regions, to some extent, in outperforming regions.

Table B.1

Change in investment in urban transport over the past three years correlates with availability of internal finance in a logistic regression

Variables	Coefficient (odd-ratios)	t -stat
ΔI (Urban transport)		
In decline	1.395	1.03
In growth	1.769**	2.14
Transfers > 50%	1.228	0.62
Underperforming#Transfers > 50%	0.385**	-2.02
Outperforming#Transfers > 50%	0.434*	-1.91
Lacking infrastructure	0.687**	-2.04
Central and Eastern Europe	1.857***	3.44
Western and Northern Europe	1.254	0.85
Population size (log)	1.273***	2.78
Towns and suburbs	0.416***	-3.23
Rural areas	0.725	-0.64
Constant	0.117*	-2.26
Observations	573	
Psuedo R <sup>2</sup>	0.09	
Wald Chi square (11)	59.05	

Notes: Logistic regression. Odds ratios reported. T-statistic based on robust standard errors. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

These results confirm the importance of the design of fiscal policies of central governments related to local governments. Such policies may result in underinvestment in infrastructure, even though that infrastructure is deemed very necessary at the local level. These mismatches create inefficiencies in government investment.

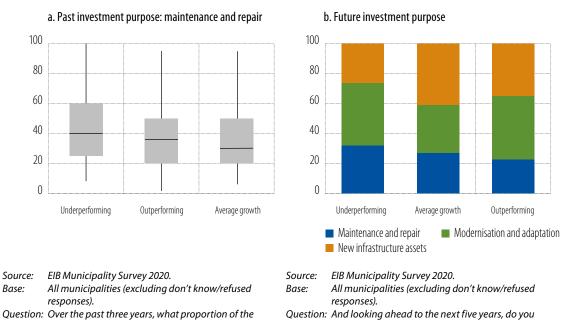
Lack of funding constrains investment options, leading to increased focus on maintenance and repair (Figure 31). The evidence of constraints on investment, especially in underperforming regions, may help explain another dimension of the investment choices of cities and municipalities in these regions. Over the past three years, they are more likely to have invested in cheaper and divisible options like maintenance and repair, rather than in capital-intensive, indivisible new assets. Likewise for the next five years, local governments in underperforming regions are less likely to invest in new infrastructure that typically requires large and lumpy investments.

expect the largest required share of investment

on infrastructure to be for...?

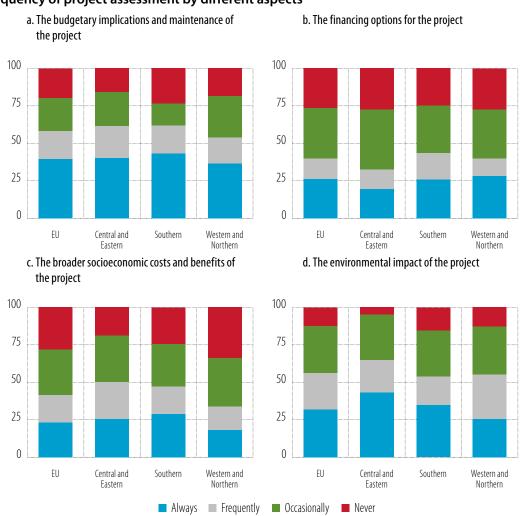
Figure 31 Investment purpose (share of municipalities, %)

investment was for...?



Assessing the impact of past projects could result in better infrastructure investment in the medium term. Municipalities do not appear to often independently assess the impact of past projects (Figure 32). Only a quarter of respondents regularly consider the different financing options available (Figure 32b) and about the same share regularly use cost-benefit analysis to assess a project's socioeconomic impact (Figure 32c). The lack of such insight reduces the ability of municipalities to objectively prioritise different investment projects and to find alternative financing for the most pressing projects. Increasing the use of impact assessment could lead to tangible improvements in infrastructure and increase the implementation of the most relevant projects.

Figure 32
Frequency of project assessment by different aspects



Base: All municipalities (excluding don't know/refused responses).

Question: Before going ahead with an infrastructure project, does your municipality obtain an independent assessment of any of the following...?

353

#### Conclusion and policy implications

Municipal infrastructure gaps remain prevalent in the European Union, especially for digitalisation and climate change. The EIB Municipality Survey 2020 highlights these gaps, even though municipalities are investing and remain eager to do so. In recent years, municipalities have focused on developing digital, urban transport and social infrastructure. Still, a large share of surveyed municipalities said that their infrastructure investment remained inadequate, especially in critical areas. Over two-thirds of municipalities said investment was inadequate to tackle climate change mitigation or adaptation; nearly 50% said the same about digitalisation, and roughly 45% for urban transport. A lack of investment is also reflected in municipalities' poor assessment of critical aspects of their own social and transport infrastructure, such as affordable housing or electric charging stations for vehicles. Municipalities, however, said they intend to add these investments to the list of priorities. Where the COVID-19 crisis had already buffeted investment plans, municipalities are paying more attention to digital and social infrastructure.

Lack of funding and regulatory red tape are the major barriers to investment. Limited funds are the most important obstacle: every second municipality deems it a major issue and three-quarters cite it as an issue. Limited funds also stand out as the main issue facing climate-related investments. Also important are the length of regulatory process and regulatory uncertainty, which affect 85% of municipalities, and a lack of technical capacity, which is a constraint for 70% of municipalities. Access to funding has real implications for outcomes, such as investment in buildings' energy efficiency, which is better when funding is not an obstacle.

Municipal green administrative capacity and digital sophistication tend to be associated with greater optimism towards the risks associated with climate change. As municipalities take on the challenges of climate change and digitalisation, they are adapting the manner in which they provide public services. These adaptations may have an important role to play in how municipalities master these challenges. For instance, synergies between digital sophistication and green capacity are also related to municipal views of the physical risks posed by climate change.

Policy support should focus on promoting corporate and municipal advancements in the green and digital spheres, and doing so in a manner that maximises potential synergies. The development of municipalities' green administrative capacities and digital sophistication is associated with higher rates of technological adoption rates and innovation by firms in the green and digital domains. This suggests that common factors are at work, while also raising the question of synergies. The analytical results support greater and more targeted policy action to support municipalities in tackling the digital transition and climate change.

Municipalities' ability to close infrastructure gaps appears to be inversely related to their reliance on transfers – notably in regions that economically perform below par – which begs the question whether the effectiveness of transfers can be improved. Municipalities in Central and Eastern as well as Southern Europe report that capital transfers and grants represent, on average, a significant share of their investment funding. For municipalities located in regions whose economic performance has been below par, those that rely heavily on capital transfers and grants tend to be more limited in their ability address gaps in transport infrastructure. Of course, a lack of alternative sources of funding also points to deeper issues facing the municipality. Still, this finding leads us to question whether the effectiveness of capital transfers and grants can be improved to better address investment gaps in regions in decline.

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Data annex

Glossary of terms and acronyms