Structural investment needs in CESEE and the use of EU funds

Rocco L. Bubbico, Miroslav Kollar, Tomáš Slačík[1]

Investment recovery in Central, Eastern and Southeastern Europe (CESEE) as well as in Europe as a whole is gaining steam. Hence, despite measurement challenges, there seems to be a broad consensus that there is currently no cyclical quantitative investment gap that would need to be addressed. However, there is tangible evidence suggesting that there are significant structural investment needs, particularly with regard to the quality of capital. Against this background, the aim of the present paper is twofold. First, we shed some light on the thematic areas in which structural investment needs persist by collecting and exploring a large set of strategic indicators. Second, we compare these structural investment needs with the structure of the European Structural and Investment Funds (ESIF) in the 2007–2013 programming period. This gives us some insights into whether the ESIF were directed to areas with the greatest investment needs and offers some tentative suggestions regarding the impact the ESIF had on the respective structural areas and as to the efficient use of the ESIF.

JEL classification: F33, F36, F42, F45, F55, O11
Keywords: European Structural and Investment Funds, investment gap, structural investment needs

Investment recovery in Europe is gaining steam. To a large extent, this holds also true for Central, Eastern and Southeastern Europe (CESEE), where gross fixed capital formation is broadening and strengthening, even though it has not yet recovered to pre-crisis levels (EIB, 2017a). In this context, the question arises whether recovering investment activity is still below, at or even above the levels it should be. In other words: Is the CESEE region still facing an investment gap? Providing a comprehensive answer to this question is not an easy task as any quantitative analysis is subject to a high uncertainty with respect to data, measurement and methodology (Bubbico et al., 2017). Moreover, assessing the investment gap is dependent on cyclical conditions: In light of recent economic developments, there is a prevailing consensus that there is no urgent need to stimulate investment for countercyclical reasons (EIB, 2017a).

While quantifying the investment gap is a challenging task, there is some tangible evidence suggesting that there are significant structural investment needs[2] with regard to the quality of capital. The EIB Investment Survey (EIB, 2017b, and EIB, 2017c) unveils, for example, that EU firms do not necessarily report an investment gap regarding capacity utilization, but rather regarding outdated machinery, equipment and information and communications technology (ICT), which they largely do not perceive to be state-of-the-art. Addressing structural investment gaps is essential for the CESEE countries in particular. The CESEE region has attained middle-income status mostly by exploiting obvious advantages, such as relatively low labor costs. However, all the low-hanging fruit has been picked so that most of the CESEE countries now require a new growth model based on

[1] *European Investment Bank, Economics Department, r.bubbico@eib.org and m.kollar@eib.org; Oesterreichische Nationalbank (OeNB), Foreign Research Division, tomas.slacik@oenb.at.* *The authors would like to thank an anonymous referee, Debora Revoltella (EIB), Peter Backé, Markus Eller and Doris Ritzberger-Grünwald (all OeNB) for helpful comments and valuable suggestions as well as Konstantinos Gkrimmotsis (EIB) for research assistance.*

[2] *By structural investment needs we particularly mean investments that foster job-rich economic growth, address environmental challenges, tackle gaps in human capital endowment, help fight poverty and social exclusion, and improve the quality of enabling infrastructure.*

higher value added, innovation and skills (EBRD, 2017). The success of the new economic concept will largely hinge on the provision of skilled labor together with the countries' quality of infrastructure and the endowment with state-of-the-art capital.

The public sector should play a key role in addressing the structural backlogs in CESEE, which tend to result from market failures, the absence of key enabling infrastructure and insufficient provision of other public goods. Moreover, as most countries of the CESEE region register substantial income, infrastructure and competitiveness gaps[3] from a single market perspective (European Commission, 2017a), the process of tackling structural weaknesses is likely to rely heavily on the European Structural and Investment Funds (ESIF), which are aimed, in particular, at promoting the harmonious growth of European regions by reducing disparities in levels of development. While the ESIF have been able to mitigate pressures on public investment[4] and the ESIF's policy cycle is strongly linked to the investment cycle in CESEE, these funds have not been able to entirely offset the decline in public investment in the wake of the crisis (IMF, 2015)[5]. Furthermore, even with the support of the ESIF, the level of public investment has been well below thresholds defined in the relevant literature as one of the necessary, but not sufficient conditions for a successful transition from middle- to high-income status (see Bubbico et al., 2017, and Commission on Growth and Development, 2008).

Against this background, the present paper is structured as follows: In section 1, we first set the stage by looking at corporate investment trends in the EU and by providing some anecdotal evidence about qualitative investment gaps through the lens of a unique EIB Investment Survey. Section 2 sheds light on the thematic areas in which structural investment needs persist by collecting and exploring a large set of strategic and competitiveness indicators. In section 3, we then compare these structural investment needs with the structure of ESIF flows in the 2007–2013 programming period, which were specifically aimed at helping CESEE countries catch up with the rest of the EU. This comparison provides some insights into whether the ESIF were directed to areas with the greatest investment needs and gives some tentative suggestions on the impact the ESIF had on the structural area in question as well as on the efficient use of the ESIF.

1 Gaps in capital quality in CESEE through the EIBIS lens

To analyze the investment trends of firms, we use the EIB Group Survey on Investment and Investment Finance (EIBIS), a unique EU-wide survey conducted annually among a panel of more than 12,000 firms. EIBIS collects data on firm characteristics and performance, past investment activities and future plans, sources of finance, financing issues and other challenges that businesses face. Using a stratified sampling methodology, the survey is designed to be representative across all

[3] *Despite the significant support provided by the European Structural and Investment Funds (ESIF), the volume of EU-funded public investment has not been fully additional to domestically sourced gross fixed capital formation, also because requirements for compliance with additionality were not ambitious (OECD, 2016).*

[4] *In national accounts, public investment data usually comprise the general government. However, off-budget entities, which may undertake a large part of public investment, are not (or only partially) taken into account.*

[5] *ESIF's contribution to public investment in CESEE remains about 1.5 percentage points of GDP lower than the pre-crisis level (EIB, 2017a).*

28 Member States of the EU as well as all firm size classes (from micro to large) and four main sectors (manufacturing, services, construction and infrastructure).[6] In CESEE EU Member States, the survey involved interviews with 4,881 firms. In its 2017 EIBIS edition, the EIB furthermore interviewed more than 550 municipalities across the EU (and 200 in CESEE) to assess their investment activities, needs, constraints and financing, providing a unique snapshot of municipal investment trends.

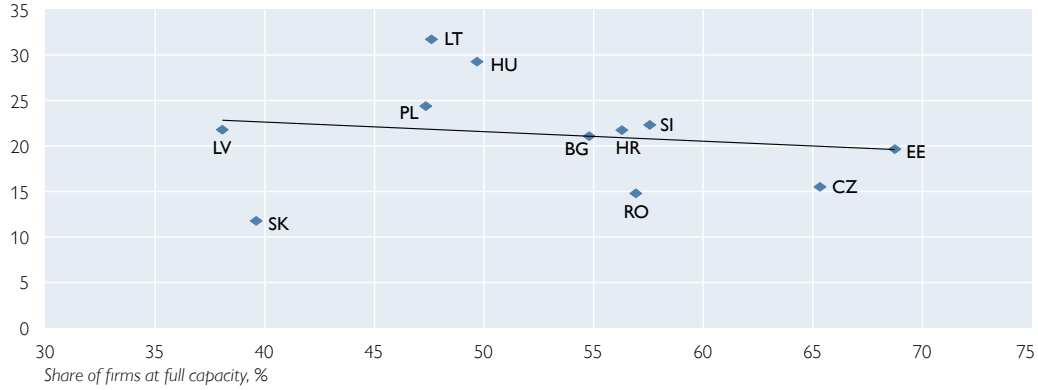
According to the 2017 EIBIS edition, about 21% of CESEE firms report that they have invested too little over the last three years to ensure the success of their business going forward (this can be interpreted as the firms' own perception of an "investment gap"[7]). In comparison, an investment gap is reported by about 15% of firms throughout the EU. In both the CESEE region and the EU, about 52% of firms say that they operate at or above full capacity attainable under normal conditions[8].

There is, however, little evidence indicating a link between firms reporting investment gaps and capacity constraints.[9] One might conjecture a positive correlation as firms that have reportedly invested too little do not have sufficient production capacity. However, as shown in chart 1, there is hardly any correlation and, if any, rather a negative one. Surprisingly, many of the CESEE countries with the largest investment gap also record low shares of firms operating at or above full capacity. This suggests that lack of sufficient production capacity (i.e. the quantity of capital) is most likely not at the core of firms' concerns when they report too little investment over the last three years.

Chart 1

Capacity utilization and investment gap in CESEE

Share of firms reporting an investment gap, %



Source: EIB.

[6] *The data are weighted by value added to better reflect the contribution of different firms to economic output. All firms that participated in the first 2016 wave of the survey were re-interviewed in the following survey waves. To compensate for panel attrition and to ensure cross-sectional representativeness, panel firms are complemented in each wave with a refresher sample of new survey firms.*

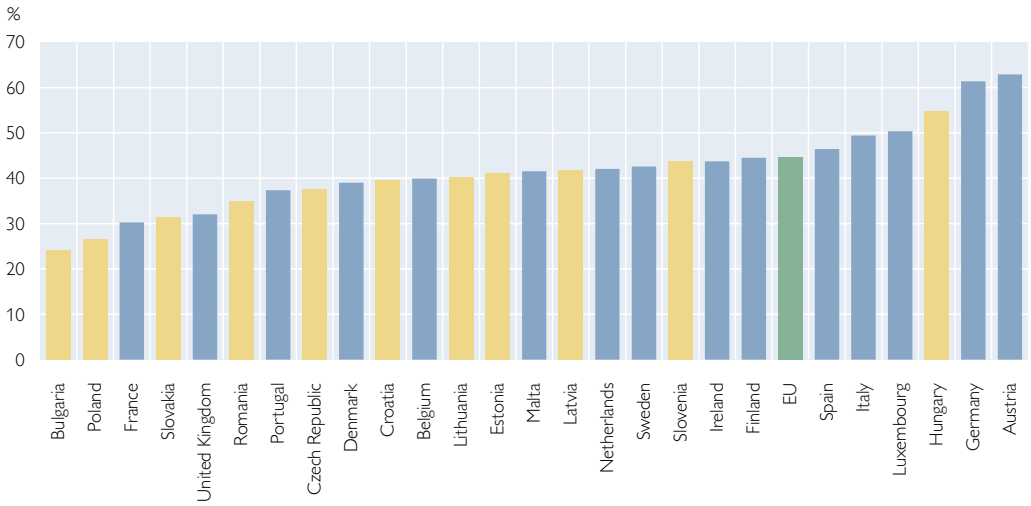
[7] *There are, of course, many different ways to define and measure investment gaps (see e.g. Bubbico et al., 2017, for a discussion). The question asked in EIBIS was: "Looking back at your investment over the last three years, was it too much, too little, or about the right amount to ensure the success of your business going forward?"*

[8] *See EIB, 2017b, and EIB, 2017c.*

[9] *See EIB, 2017b, also for econometric evidence.*

Chart 2a

State-of-the-art machinery and equipment

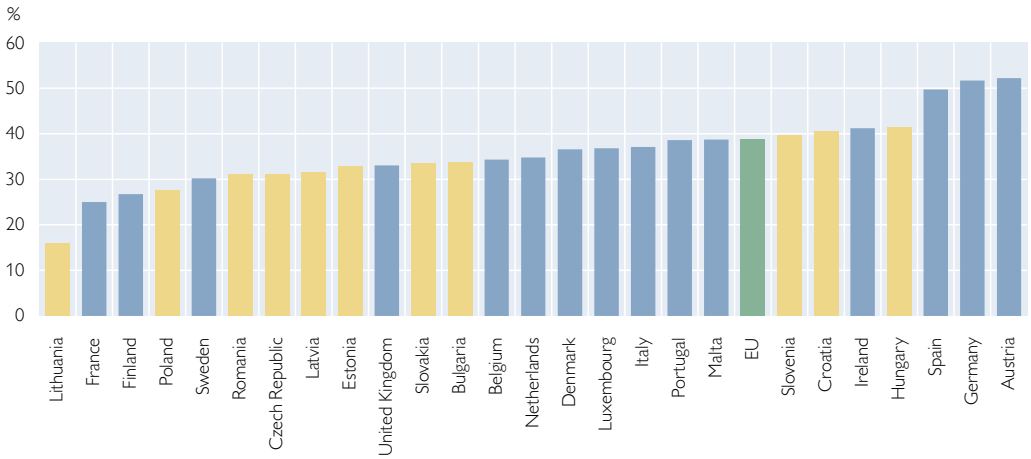


Source: EIB.

Instead, there are signs of underinvestment in the quality of firms' capital stock. EIBIS aims to approximate the quality of firms' capital stock by asking firms to state the share of their machinery and equipment that they consider to be state-of-the-art[10] and to report the portion of their commercial building stock that satisfies high or the highest energy efficiency standards. As can be seen in the two panels of chart 2 below, the answers to both of these questions indicate that the quality of capital in the CESEE countries, as self-reported by firms, is below the EU average in most cases.

Chart 2b

Share of building stock that meets high energy efficiency standards



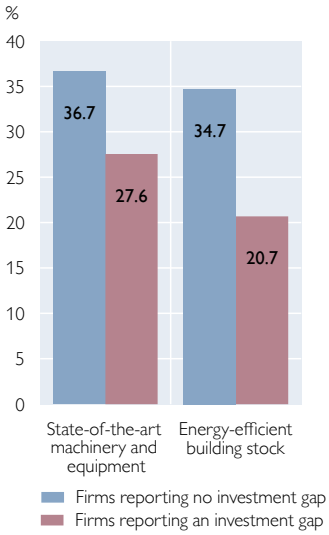
Source: EIB.

[10] *This is further specified as referring to "cutting-edge" or "developed from the most recent ideas or methods."*

Combining the findings about investment gaps and capital quality unveils that firms in CESEE that report an investment gap are also more likely to report a lower quality of their capital stock (see chart 3). The share of machinery and equipment described as state-of-the-art by firms that report an investment gap is 9 percentage points lower than for firms that do not report an investment gap (28% versus 37%). In terms of building stock that satisfies high or the highest energy efficiency standards, we find a difference of 14 percentage points (21% versus 35%) for the two groups. This substantiates the view that the quality of capital in the CESEE region is at least as much (if not more) of a pressing issue as is the quantity of capital stock.

Chart 3

Investment gap by quality of capital stock in CESEE



Source: EIB.

2 Capital quality and flow of EU funds to CESEE

2.1 Structural indicators

To substantiate the hypothesis about qualitative investment gaps, we developed a set of structural indicators across five thematic areas for each CESEE country[11]: (1) human capital, (2) R&D and innovation, (3) environment protection, (4) transport and energy infrastructure as well as (5) ICT. As will be explained below, these five clusters correspond to our categorization of the disbursement areas of the ESIF for the 2007–2013 programming period in CESEE. Each of these areas comprises a number of structural variables collected from various sources (see annex for details), each of which is standardized to calculate the distance from the EU average in standard deviations. The composite area indicator is built as an arithmetic average of the standardized indicators in a given category. Similarly, the aggregate for the CESEE region for a given area is formed as a simple average of the country scores across all countries.[12]

Table 1 shows the standardized gaps for each thematic area compared to the EU average at the beginning of the 2007–2013 programming period. This perspective allows us to gain some insight into the most pressing structural needs in the CESEE region and to see how the CESEE countries fare in terms of capital quality compared to the EU average. For better readability, the values in each of the five categories are marked with a color ranging from red (indicating the country that fares worst compared to the EU average) to green (indicating the country

[11] *Croatia is not included because of its later entry into the EU.*

[12] *We opted for a simple average to obtain an aggregate indicator that assigns the same weight to each country irrespective of its size. We chose this approach as we are interested in measuring the capital quality gap (and convergence) for each individual country. Therefore, also the CESEE aggregate needs to reflect the individual country scores with the same weight. A (GDP- or population-)weighted average would be more appropriate if we looked at the CESEE region as one homogeneous block.*

Table 1

Structural gap vis-à-vis the EU average at the beginning of the 2007–2013 programming period

	Human capital	R&D and innovation	Environment protection	Transport and energy infrastructure	ICT	Average across all categories
	Average standard deviations from the EU average					
BG	–1.1	–1.0	–0.5	–1.0	–1.1	–0.9
CZ	0.3	–0.1	0.1	0.8	–0.2	0.2
EE	–0.1	–0.2	–0.0	–0.2	0.4	–0.0
HU	–0.4	0.2	–0.1	0.0	–0.4	–0.2
LV	–0.7	–0.9	0.2	–0.7	–0.7	–0.6
LT	–0.2	–0.8	0.6	–0.7	0.1	–0.2
PL	–0.3	–0.9	–0.5	–0.1	–0.9	–0.5
RO	–1.1	–1.1	–0.4	–0.5	–1.3	–0.9
SI	0.0	–0.1	0.0	0.1	–0.5	–0.1
SK	–0.2	–0.7	0.1	–0.1	–0.5	–0.3
CESEE average	**–0.4**	**–0.6**	**–0.1**	**–0.3**	**–0.5**	**–0.3**

Source: Eurostat, OECD, World Bank, WEF, authors' calculations.

Note: The values in each of the categories are marked with a color ranging from red (indicating the country that fares worst among the CESEE EU Member States compared to the EU average) to green (indicating the country with the best score compared to the EU average).

with the best score compared to the EU average). Moreover, table 1 also shows the average distance from the EU average in standard deviations across all CESEE countries as well as the average distance from the EU average across all five categories for a given CESEE country.

At the beginning of the 2007–2013 ESIF programming period, the CESEE region lagged behind the EU, on average, in all five structural categories under study. The greatest gaps in the CESEE region were recorded in the areas of R&D and innovation as well as ICT. In contrast, the CESEE region was nearly on a par with the EU average in the area of environment protection. A comparison across all CESEE countries revealed that the Czech Republic and Estonia had the best quality of capital vis-à-vis the EU average, with the Czech Republic scoring even slightly better than the EU average. The Czech Republic stands out among the CESEE countries in particular due to its relatively high quality of human capital as well as transport and energy infrastructure. In contrast, Bulgaria and Romania performed worst and recorded some of the biggest structural gaps in nearly all categories vis-à-vis the EU average.

When assessing how the indicators changed over the 2007–2013 programming period, we take two different perspectives. First, we look at how the respective aggregate indicators changed by adopting a relative convergence perspective. This means that we compute – in the same way as described above – the indicators' distance from the EU average at the end of the programming period, thus also taking into account the improvement of the EU average. Ideally, the countries' structural gap vis-à-vis the EU average should narrow over time as the countries in the CESEE region converge in real terms toward the richer EU Member States. However, this relative perspective does not provide any information about how the structural fitness of the CESEE countries evolved in absolute terms. Therefore, second, we look at the absolute improvement of the indicators by keeping the EU average constant at its 2007 level.

Table 2

Structural gap changes in CESEE (regional average) over the 2007–2013 programming period

	Human capital	R&D and innovation	Environment protection	Transport and energy infrastructure	ICT	Average across all indicators
	Average standard deviations from the EU average					
Change against EU average (gauging convergence)	–0.07	0.05	0.01	0.03	0.10	0.02
Absolute change (keeping the EU average constant)	0.13	0.27	0.24	0.26	3.87	0.96

Source: Eurostat, OECD, World Bank, WEF, authors' calculations.

Note: The average standard deviation is computed accross all indicators in a given category and across the CESEE countries.

Table 2 shows that the CESEE countries did not significantly improve their quality of capital relative to the EU average as there was virtually no improvement, on average, across the five thematic areas. It was only in the area of ICT that the CESEE region could somewhat catch up with the EU benchmark. However, the convergence observed in this area contrasts with the diverging human capital. Developments in the other categories were positive, yet close to negligible.

In absolute terms, i.e. eliminating indicator changes from the impact of the EU average, the CESEE countries enhanced their quality of capital in all five thematic areas. The largest improvements were recorded in the areas of ICT and network infrastructure in transport and energy. In contrast, the smallest absolute improvement was reported with regard to the quality of human capital.

Overall, we can therefore conclude from table 2 that the CESEE countries did improve capital quality in absolute terms in all categories over the programming period. However, since other EU countries improved as well, and did so even more significantly, the distance between the CESEE region vis-à-vis the EU average increased even more in most instances.

2.2 Thematic classification of EU funds

Following the EU enlargement rounds of 2004 and 2007, the countries joining the EU became eligible for European support in the form of the ESIF, which aim at reinforcing economic, social and territorial cohesion. The main EU instruments within the ESIF promoting cohesion include the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF). In the context of the EU's Multiannual Financial Framework for 2007–2013, the ERDF and ESF provided support to all European countries and regions, lending stronger financial support to "convergence regions."[13] Almost all of the CESEE EU Member States were classified as convergence regions, with only three regions having a GDP per capita above the EU average. The CF was allocated to Member States whose gross national income (GNI) per capita was below 90% of the EU average. All CESEE countries were eligible for this fund (European Commission, 2007).

Cohesion Policy, with a budget of EUR 350 billion, represented the largest item in the 2007–2013 EU budget. As Cohesion Policy (and its financial support)

[13] *In other words: less developed regions with a GDP per capita below 75% of the EU average.*

placed a particular emphasis on helping less developed areas, significant country and per capita allocations were assigned to newer Member States. These resources were allocated over seven years, and capped at a certain percentage of GDP depending on the income gap of each country with regard to the EU average, which resulted in significant variations of per capita aid intensity in monetary terms across the CESEE region[14]. Newer Member States could receive related payments up to three years after their yearly allocation. For this reason, the 2007–2013 resources could be used in CESEE up to 2016, overlapping with resources of the following programming period (2014–2020). The latter, however, suffered from a very slow start, with only 9% of total resources having been paid to CESEE EU Member States by end-2016 (European Commission, 2017b). Over the time period analyzed, Cohesion Policy contributed greatly to sustaining total public investment in CESEE (IMF, 2015). This was especially the case in the post-crisis years when the component of public investment financed by domestic sources in CESEE decreased significantly, before experiencing a rebound in 2014 (Bubbico et al., 2017). Table 3 provides an overview of the ESIF spent in CESEE countries in per capita terms during the 2007–2013 programming period, reporting the distribution of ESIF across five main categories. This categorization is based on data that are collected and published by the Directorate-General for Regional Policy[15] and that provide information on EU funding per Member State by aggregating allocations to different thematic areas within the various funding programs. For consistency purposes, these thematic areas have been regrouped into the following five categories[16]:

- human capital (including culture, human capital development, social inclusion, social infrastructure, labor market)
- research and innovation (including innovation, research and technological development, business support)
- ICT (IT services and IT infrastructure)
- network infrastructure in transport and energy (including energy, road transport, rail transport and other means of transport, urban development)
- low-carbon economy (environment)

Table 3 below reports the expenditure in euro per capita estimated for each thematic category by applying the national absorption rate observed at the end of the programming period to initial allocations[17].

[14] *According to Council Regulation (EC) No 1083/2006, aid intensity was capped at 3.78% of GDP for Member States with a GNI under 40% of the EU average; lower caps were applied to countries with higher levels of GNI.*

[15] *For details on the data, see cohesiondata.ec.europa.eu.*

[16] *Technical assistance and capacity building have been excluded from this broad categorization.*

[17] *By end-2016, national absorption rates ranged between 90% of initial allocations (Romania) and 98% (Poland) compared to an EU average of 96%.*

Table 3

2007–2013 European Structural and Investment Funds

	Human capital	R&D and innovation	Environment protection	Transport and energy infrastructure	ICT	Sum
	EUR per capita					
BG	167.5	105.1	187.9	324.3	8.2	793.0
CZ	523.1	445.2	375.4	927.5	80.5	2,351.6
EE	676.4	572.6	552.4	529.5	53.8	2,384.7
HU	579.8	430.6	433.4	749.3	65.1	2,258.3
LV	489.2	398.8	374.6	723.6	89.5	2,075.7
LT	541.7	397.7	312.9	749.2	77.4	2,078.9
PL	323.0	331.7	174.0	741.9	93.5	1,664.1
RO	178.5	105.0	209.3	312.7	20.3	825.9
SI	319.5	537.1	369.4	539.7	72.1	1,837.9
SK	483.4	273.1	325.3	685.1	176.9	1,943.8
CESEE average	**428.2**	**359.7**	**331.5**	**628.3**	**73.7**	**1,821.4**

Source: European Commission, authors' calculations.

Note: The values in each of the categories are marked with a color ranging from red (indicating the country that fares worst among the CESEE EU Member States compared to the EU average) to green (indicating the country with the best score compared to the EU average).

Based on the CESEE average, most of the ESIF in per capita terms went to network infrastructure, followed by human capital during the 2007–2013 programming period. The least amount of EU funds was spent on ICT capacity. However, allocations were widely heterogeneous across countries. For instance, in R&D and innovation, the Czech Republic was allocated twice as much funds per capita as Slovakia. The opposite could be observed in the ICT category.

3 Does the ESIF structure match structural investment needs?

After having discussed structural investment needs in the previous section, we now turn to the relationship between the structural gaps identified in table 1 and the flow of EU funds along the following three dimensions:

1. During the 2007–2013 programming period, were EU funds allocated to those areas that could be identified, at the beginning of the programming period, as the weakest compared to the EU average?
2. Did the flow of EU funds commensurate with the improvement in capital quality gaps vis-à-vis the EU average during the 2007–2013 programming period? This second perspective also encompasses the dimension of convergence, i.e. whether the quality of capital in the CESEE region improved relative to the EU as a whole.
3. Did the flow of EU funds commensurate with the absolute improvement in the quality of capital during the 2007–2013 programming period?

Table 4

Correlation between the ESIF and the (change in) structural quality indicators

	Human capital	R&D and innovation	Environment protection	Transport and energy infrastructure	ICT
	Correlation coefficient				
ESIF (EUR/capita) and indicators at the beginning of the programming period	0.63	0.74	0.49	0.60	0.26
ESIF (EUR/capita) and indicator changes over the programming period (relative to the EU average)	0.01	0.26	–0.16	–0.18	–0.06
ESIF (EUR/capita) and indicator changes over the programming period (absolute)	–0.12	0.03	–0.11	–0.49	–0.53

Source: Authors' calculations.

Table 4 explores these three dimensions by showing the correlation between the flow of EU funds in individual CESEE countries and the respective quality indicator changes[18].

With regard to the first dimension, the desired correlation between the ESIF and structural quality indicators would be negative, i.e. the lower the indicator of capital quality was at the beginning of the programming period, the more EU funds should have subsequently been directed to the related thematic area during the programming period. However, this is not confirmed by the data. On the contrary, the correlation was positive in all five categories, for which there are a number of possible explanations that are not mutually exclusive. One possible reason is that the CESEE countries tried to pick the low-hanging fruit first, i.e. they were using EU funds to further improve areas in which they did not perform so poorly vis-à-vis the EU. This allowed faster and easier absorption of EU funds and reinforced their relative competitive advantages both in the CESEE region and the EU. Another reason might be related to weak identification of areas with the largest structural gaps.

As far as the second and third dimension are concerned, the desired correlation would be positive, i.e. the flow of EU funds during the programming period would be positively correlated with the relative and absolute improvements in the respective areas[19]. Regarding the relative improvements (second line in table 4), "R&D and innovation" was the only area in which the flow of EU funds considerably positively correlated with some convergence toward the EU benchmark. No strong correlation could be observed in the areas of human capital and ICT. In contrast, the areas of transport and energy infrastructure as well as environment protection showed a negative correlation, suggesting a divergence in the quality of capital compared to the EU average. This is, to some extent, worrisome and

[18] *Such correlations provide, of course, only a preliminary indication of a relationship but no ultimate evidence of causality. To obtain the latter, a deeper analysis would be required, which would go beyond the scope of this paper.*

[19] *This is subject to the proviso that the flow of EU funds to a particular area was certainly not the sole determinant of improvement in that area. Hence, looking at the correlation alone does not allow any conclusions on causality.*

Table 5

ESIF resources spent for one-standard-deviation improvement in structural quality

Human capital	R&D and innovation	Environment protection	Transport and energy infrastructure	ICT
EUR/capita				
3188	1327	1365	2373	19

Source: Authors' calculations.

surprising as transport and energy network infrastructure was the thematic area that received the highest average per capita amount from the ESIF.[20]

Looking at absolute changes (third line in table 4), the correlation coefficient is, to our surprise, negative in all areas, except for R&D and innovation, for which no strong correlation could be observed. This suggests that the absolute improvement of capital quality in the CESEE region over the programming period did not rise with higher per capita amounts flowing in from the ESIF. In addition, it is particularly striking that the second largest negative correlation existed between the flow of EU funds and changes in transport and energy infrastructure – the area that received the highest EU funding in per capita terms.

To shed further light on how efficient the use of EU funds was, table 5 reports, for the different thematic areas, the CESEE-wide average per capita amount of EU funds divided by the absolute changes in the quality of the respective indicators. The resulting figure thus illustrates how much a one-standard-deviation improvement in the quality of capital costs in terms of EU funds in euro per capita. In the area of ICT, a one-standard-deviation improvement was achieved with the least amount of EU funds spent. Interestingly, ICT was also the area that achieved both the largest absolute and relative improvement vis-à-vis the EU average. In contrast, the quality improvements in human capital as well as transport and energy infrastructure turned out to be the most costly ones.[21]

The results of our analysis as described above are supported by the 2017 EIBIS findings. The latter showed, inter alia, that skill mismatches seem to be an increasingly growing concern for firms in the CESEE region. As their main long-term obstacle to investment, 83% of CESEE firms mentioned availability of staff with the right skills, which is 72% above the EU average.

According to the EIBIS findings, about 41% of municipalities in the CESEE region furthermore reported that their past investment led to an underprovision of urban transport infrastructure, and they assessed the quality of their infrastructure to be weakest in urban transport and housing.

[20] *However, it has to be borne in mind that the investment costs in infrastructure and ICT and, accordingly, the marginal impact of equal-sized investments in the respective area differ significantly and may explain the finding above. While our results may indicate inefficiencies, poor targeting or even corruption in certain areas, as could be observed in other contexts (see e.g. Chvalkovksa et al., 2013), they do not allow such conclusions without further evidence.*

[21] *It is possible that measurable improvements in the area of human capital will only materialize with a longer lag.*

4 Conclusions

While it is rather difficult to quantify what the ideal investment level should be, gross fixed capital formation has lately been recovering vigorously in the CESEE region. There seems to be a broad consensus that there is currently no urgent need to boost investment due to cyclical underinvestment. However, noteworthy evidence suggests substantial investment gaps in terms of capital quality despite significant EU resources being allocated for the purpose of broadening and deepening the capital stock of the CESEE region. According to the EIB Investment Survey, firms in the CESEE region are more concerned about the quality of their capital stock than they are about its quantity. As could be demonstrated, the quality of capital in the CESEE countries is largely below the EU average.

The CESEE region witnessed a considerable convergence trend toward the rest of the EU with regard to income (Alcidi et al., 2018). However, regarding the quality of capital in CESEE, our analysis indicates that convergence toward the EU average has been negligible over the last decade, except in ICT. Moreover, the CESEE countries diverged slightly from the EU average with regard to the quality of human capital.

This lack of convergence in terms of capital quality is predominantly due to the progress made in other European countries. After all, the quality of capital improved in all areas in the CESEE region in absolute terms, even though not in every single country. The largest absolute improvements were in ICT as well as transport and energy network infrastructure, while the smallest absolute improvement was in the quality of human capital.

Contrary to what one would expect, higher amounts received from the Cohesion Policy's budget did not correlate positively with more significant capital quality improvements in almost all areas under study. Moreover, transport and energy infrastructure – the area that was allocated the highest amount of EU funds by far – experienced a comparatively large negative correlation between the absolute change in the quality of capital and the flow of EU funds during the 2007–2013 programming period.

In the area of ICT, improvements were achieved with the least EU funding per capita. ICT was also the area that achieved both the largest absolute and relative improvement vis-à-vis the EU average during the 2007–2013 programming period. The quality improvements in human capital as well as transport and energy infrastructure were the most costly ones.

The EIB Investment Survey underpins our findings regarding the insufficient convergence in terms of the quality of (human) capital and infrastructure in CESEE toward the EU. Currently, CESEE firms perceive skill mismatches as the main obstacle to investment. In addition, CESEE municipalities report significant investment gaps, particularly in urban transport infrastructure and housing infrastructure. These findings are crucial as they provide guidance for policy action and public investment decisions in the light of large availabilities of still unused financial resources in the current ESIF cycle. The European Commission's proposal for the 2021–2027 Multiannual Financial Framework indicates a reduction of resources directed toward Cohesion Policy, significantly downsizing allocations to a number of CESEE countries (in particular to the Czech Republic, Estonia,

Hungary, Poland and Slovakia). The proposal also envisages a stronger linkage between allocated resources and structural reforms, and an increase in national co-financing rates to overcome the issue of insufficient additionality. The overall strategy is based on stronger support to innovation and the transition to a low-carbon economy – areas in which the CESEE region registers substantial gaps vis-à-vis the rest of the EU. Consequently, it is crucial for CESEE countries to make the best use of current and future resources by better targeting investment gaps, focusing on the quality of projects, orienting public policy choices toward growth-enhancing expenditure, and building alternatives to grant financing, such as the promotion of financial instruments.

References

Alcidi, C., J. Núñez Ferrer, M. Di Salvo, R. Musmeci and M. Pilati. 2018. Income Convergence in the EU: A tale of two speeds. CEPS Commentary.

Atlantic Council and PwC. 2017. The Road Ahead. CEE Transport Infrastructure Dynamics. Joint Atlantic Council – PwC Report.

Bubbico, R.L., L. Gattini, Á. Gereben, A. Kolev, M. Kollár and T. Slačík. 2017. Wind of change: Investment in Central, Eastern and South Eastern Europe. Economics Department. European Investment Bank.

Chvalkovska, J., M. Fazekas, L. P. King, J. Skuhrovec and I. J. Tóth. 2013. Are EU funds a corruption risk? The impact of EU Funds on grand corruption in Central and Eastern Europe. In: Mungiu-Pippidi, A. (ed.). The Anticorruption Frontline. The Anticorruption Report, vol. 2. Berlin: Barbara Budrich Publishers. 68–89.

Commission on Growth and Development. 2008. The Growth Report: Strategies for Sustained Growth and Inclusive Development. The World Bank.

EBRD. 2017. Transition Report 2017-18: Sustaining Growth. European Bank for Reconstruction and Development.

EIB. 2017a. Investment Report 2017/2018: from recovery to sustainable growth. Economics Department. European Investment Bank.

EIB. 2017b. EIB Investment Survey 2017: European Union Overview. Economics Department. European Investment Bank.

EIB. 2017c. EIB Investment Survey 2017: CESEE Overview. Economics Department. European Investment Bank.

EIB. 2017d. EIB Investment Survey 2017: Municipal Infrastructure. European Union Overview. Economics Department. European Investment Bank.

EIB. 2017e. EIB Economics Conference 2017. Conference Report. http://www.eib.org/attachments/general/events/20171207-eib-suerf-economics-conference-report.pdf

European Commission. 2007. Cohesion policy 2007-13 – Commentaries and official texts. Luxembourg: Office for Official Publications of the European Communities.

European Commission. 2017a. My Region, My Europe, Our Future. Seventh report on economic, social and territorial cohesion. Luxembourg: Publications Office of the European Union.

European Commission. 2017b. Strategic report 2017 on the implementation of the European Structural and Investment Funds. Brussels: COM(2017) 755 final.

IMF. 2015. Central, Eastern, and Southeastern Europe. Reconciling Fiscal Consolidation and Growth. Regional Economic Issues. November 2015.

OECD. 2016. OECD Economic Surveys: Euro Area. June 2016.

Annex

For each of the five thematic areas we collected a representative selection of indicators from various sources for the two points in time under study, i.e. for the beginning and the end of the 2007–2013 ESIF programming period, respectively. As the beginning of the programming period, we thus chose the year 2007 or, if no data were available, the year closest to 2007. As the end of the programming period, we opted for the year 2016, as money could be tapped from the ESIF within the 2007–2013 programming period until the end of 2016. The table below reports and describes all the indicators, and lists the years for which they were available, the sources they were drawn from as well as the unit they were specified in before converting them into standard deviations from the EU average.

Table A1

Underlying structural indicators

Aggregate	Indicator	Description	Original unit of indicator	Source	Reference years
Human capital	Secondary education	Upper secondary and post-secondary nontertiary education	% of population aged 15–64	Eurostat	2007; 2016
	Tertiary education		% of population aged 15–64	Eurostat	2007; 2016
	Early leavers	Early leavers from education and training	% of population aged 18–24	Eurostat	2007; 2016
	Pisa score	Average score of mathematics, science and reading	Scale from 1 to 1,000	OECD	2006; 2015
	Quality of education		Scale from 1 (worst) to 7 (best)	WEF	2007; 2017
	Health expenditure		Health expenditure per capita, PPP (constant 2011 international $)	World Bank	2007; 2014
	Life expectancy		Years	WEF	2007; 2017
	On-the-job training		Scale from 1 (worst) to 7 (best)	WEF	2007; 2017
	Availability of scientists and engineers		Scale from 1 (worst) to 7 (best)	WEF	2007; 2017
Research and innovation capacity	R&D	Overall R&D expenditures	% of GDP	Eurostat	2007; 2017
	University-industry collaboration in R&D		Scale from 1 (worst) to 7 (best)	WEF	2007; 2017
	High-tech employment	Employment in technology and knowledge-intensive sectors	% of total employment	Eurostat	2008; 2016
	High-tech exports		% of total exports	Eurostat	2007; 2015
	Quality of scientific research institutions		Scale from 1 (worst) to 7 (best)	WEF	2007; 2017
	High-tech patent applications		Per million inhabitants	Eurostat	2007; 2013
Low-carbon economy/energy efficiency	CO_2 emissions		kg per 2011 PPP $ of GDP	World Bank	2007; 2014
	Electric power transmission and distribution losses		% of output	World Bank	2007; 2014
	Greenhouse gas emissions compared to 1990		% of 1990 levels	Eurostat	2007; 2015
	Greenhouse gas emissions from transportation		Thousand tons per 100,000 inhabitants	Eurostat	2007; 2015
	Renewable energy consumption		% of total final energy consumption	World Bank	2007; 2014
Network infrastructure in transport and energy	Rail density		Rail lines in km/1,000 km^2	World Bank	2007; 2016
	Logistics performance index: quality of trade and transport-related infrastructure		Scale from 1 (worst) to 5 (best)	World Bank	2007; 2016
	Energy dependence	Net energy imports	% of energy use	World Bank	2007; 2014
	Quality of electricity supply		Scale from 1 (worst) to 7 (best)	WEF	2007; 2017
Information and communication technology/technological readiness	Access to broadband internet		Fixed broadband subscriptions per 100 people	World Bank	2007; 2016
	Mobile subscriptions		Mobile cellular subscriptions per 100 people	World Bank	2007; 2016
	Internet bandwidth		kb/s per user	WEF	2011; 2017
	Availability of latest technologies		Scale from 1 (worst) to 7 (best)	WEF	2007; 2017
	Firm-level technology absorption		Scale from 1 (worst) to 7 (best)	WEF	2007; 2017
Environment protection and resource efficiency	Waste recycling		Share of recyclable waste in total waste	Eurostat	2006; 2014
	Air pollution	Urban population exposed to PM10 concentrations exceeding the daily limit value (50 $\mu g/m^3$ on more than 35 days in a year)	% of total population	Eurostat	2007; 2015
	Environment protection expenditure		% of GDP	Eurostat	2007; 2016