



# **BUSINESS RESILIENCE IN THE PANDEMIC AND BEYOND**

Adaptation, innovation, financing  
and climate action from  
Eastern Europe to Central Asia





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## **Business resilience in the pandemic and beyond: Adaptation, innovation, financing and climate action from Eastern Europe to Central Asia**

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### **About this publication**

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### **Contributors**

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### **Disclaimer**

The views expressed in this publication are those of the authors and do not necessarily reflect the position of the EIB, EBRD or IMF.

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# Foreword

The development of a more dynamic, innovative and globally integrated private sector lies at the heart of the transformation of the economies of Eastern Europe and Central Asia. Drawing on Enterprise Surveys conducted across this region, this report provides unique insights into the progress that the regions' firms have made, and the structural challenges they face. It also investigates the adaptation and resilience of firms during the coronavirus pandemic.

Just prior to the publication of this report, Russia launched an armed invasion of Ukraine. Aside from the tragic loss of human lives, this event marks a political turning point for the region and for the globe, affecting the geopolitical balance of power. It also comes just after two years of COVID-19, as economies were starting to recover from the pandemic and firms had to prove their resilience to a return to a normal policy framework. This report is published as the war spreads, sanctions are being imposed on Russia and Belarus, and the economic shocks are still being transmitted to the wider region. The analysis presented in this report therefore predates the war. It also predates the full unfolding of the economic consequences of the pandemic. However, it offers unique insights into the underlying situation and potential of firms in the region, which are key to designing appropriate policy actions from this point onward.

Analysing the early policy response to the pandemic, this report highlights the role played by government support measures, pre-existing credit lines and intra-group funding in enhancing firms' resilience and ability to adapt. Credit lines and intra-group funding complemented government intervention in the region, providing lifelines that helped firms to withstand the shock created by the pandemic. The report documents the existence of credit constraints and gaps in financing associated with both demand and supply factors. Many firms in the region are discouraged from any engagement with the financial sector and are financially autarkic, particularly small and medium-sized enterprises and young, innovative firms. The report notes that financial autarky and discouragement impair firms' growth and investment activity.

The report also notes that firms that are integrated in global value chains, that are more innovative and that are better managed were better able to withstand the effects of the pandemic. It highlights the positive role that participation in global value chains (GVCs) and trade had on firms' efficiency, profitability and strength. It shows how the European Union has acted as a trade facilitator and driver of innovation. The now heightened geopolitical risks and uncertainty have increased the risk of a retrenchment of cross-border flows. It is therefore essential to reflect on the cost that deglobalisation might have on the region, even beyond the direct disruption of trade.

In the changing geopolitical context, energy security and dealing with a protracted energy shock are new priorities. The report recognises the costs associated with the adverse incentives created by energy subsidies in the context of the net zero transition. It also notes the importance of external factors in driving firms' greening efforts. Customer and shareholder pressure and energy taxation, combined with firms' direct experience with climate risk and their specific characteristics, help to shape firms' efforts in terms of ESG standards, green managerial practices and ultimately green investment.

In short, the structural drivers and constraints on private sector transformation in Eastern Europe and Central Asia provide valuable insights to inform policy development as the region adapts to the new shock and geopolitical context emerging from the war in Ukraine.





# Executive summary

**The COVID-19 pandemic led to a sharp contraction in economic activity in Eastern Europe and Central Asia.**<sup>1</sup> On average, GDP in the region declined by 4% in 2020, with enterprises in contact-intensive service sectors being especially hard-hit. But the policy support was unprecedented, with fiscal measures amounting to around 6% of GDP. Thanks to this support, to date, corporate bankruptcies have remained limited, job losses contained and private sector balance sheets protected.

**The resilience of firms in the initial stages of the pandemic is a testament to the importance of productivity gains, innovativeness, managerial quality, global integration and access to finance.** To strengthen future resilience, firms will need to keep improving in these areas, as well as adapting to longer-term changes, such as global warming and shifting global value chains (GVCs). Supportive government policies, regulations, investments in key sectors, such as green and digital infrastructure, and continued development of the financial sector could all play important complementary roles.

**The war in Ukraine once again changes this landscape.** The loss of human lives in Ukraine and a massive humanitarian refugee crisis in Europe, combined with major physical disruptions to trade, the united response from a large part of the international community and the sanctions on Russia and Belarus, signal a reshaped geopolitical context and a turning point for the region. Economic consequences will be severe, and not only for those countries directly involved in the conflict or directly affected by sanctions. These effects will once again test firms' resilience and ability to adapt. Structural features characterising the business environment will continue to play a role in defining firms' capacity to transform.

**Global value chains have contributed to defining the growth model for the region and have remained resilient to date.** During the pandemic, firms in the region benefited from policy support, combined with credit and intra-group funding. The ability to draw on intra-group funding was an additional life-saving form of support. The growth of trade and the expansion of GVCs have been important drivers of economic development, especially in Eastern Europe and Central Asia. But the COVID-19 crisis disrupted economic activity across the globe, with global merchandise trade decreasing by 7% in 2020. While GVCs have remained resilient, many pandemic-induced mismatches of demand and supply have emerged during the recovery phase and have been transmitted globally via trade. These may lead to long-term effects on international trade and the organisation of GVCs. Firms' profitability, competitiveness and survival depend on cross-border trade, foreign direct investment (FDI), the availability (or migration) of skilled workers, and international flows of research and development (R&D) and innovation. The analysis presented in the report shows that export and global value chains have a causal effect on firms' innovation capacity in the region, through better management and the transfer of technology. The European Union thus emerges as a trade facilitator and a driver of innovation.

**Looking beyond the COVID-19 crisis, global warming remains one of the major challenges of our time, and the region still lags in terms of the transition toward a low-carbon economy.** Global warming is manifested in long-term changes in weather patterns, including rising sea levels and frequent extreme weather events. The Intergovernmental Panel on Climate Change has warned that only a few years remain to decarbonise economies radically if disastrous global warming is to be avoided. Business models will need to adapt and build around the economics of low-carbon emissions to mitigate potential losses from their exposure to physical and transition risks. At the start of its economic transition from central planning to market-based economies, the region was an outlier relative to countries with similar levels of development in terms of carbon emissions per capita. Since the 1990s, carbon emissions have decreased substantially. But despite a shift away from coal and oil towards nuclear power and renewables, the region still relied on fossil fuels to generate three-quarters of its electricity in 2018. Moreover, several countries continue to provide generous fossil fuel subsidies, thus slowing down decarbonisation.

<sup>1</sup> The region of Eastern Europe and Central Asia is made up of several sub-regions: Central Asia (CA), comprising Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan and Uzbekistan; Central and Eastern Europe (CEE), comprising Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia; the Eastern Neighbourhood (EN), comprising Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine; Russia (RUS); Turkey (TUR); and the Western Balkans (WB), comprising Albania, Kosovo, Montenegro, the Republic of North Macedonia and Serbia.

**To date, financial systems in the region have held up. But they remain biased towards bank lending, with only a limited role for equity markets and with signs of mismatch between demand and supply.**

While financial sectors across the region are at different stages of development, most remain bank-based. Bank credit is still by far the most important source of external finance for many firms, including small and medium-sized enterprises (SMEs). Alternative sources of finance are scarce. Capital markets remain underdeveloped and the availability of venture capital, private equity and leasing is very limited. In Central and Eastern Europe and the Western Balkans, foreign banks entered the market, bringing new banking practices and capital, and funding relatively fast, mostly foreign exchange-based, credit growth. But the global financial crisis of 2007-09 triggered a rebalancing, with more focus on domestically funded, and thus more moderate, growth. Similar paths have been followed in Turkey, Russia and Kazakhstan. In those countries, boom-bust phases have been somewhat more pronounced, while foreign banks were competing with domestic, often state-controlled banks. In the Eastern Neighbourhood and Central Asia, the transformation of the banking systems has been somewhat slower, resulting in lower levels of financial development.

## 1.1. The EBRD-EIB-WBG Enterprise Survey: providing an in-depth perspective on firms and the obstacles in their business environment

**This report uses a unique firm-level dataset.** Specifically, it analyses data from the latest wave of the EBRD-EIB-WBG Enterprise Survey (ES 2019), which collected data on more than 28 000 formal (registered) firms between 2018 and 2020. The survey was conducted just before the outbreak of the pandemic, providing a structural snapshot of firms in the region. The report also uses the first round of the COVID-19 Follow-up Enterprise Surveys (covering more than 16 000 firms), carried out by the World Bank to illustrate how firms have reacted and adapted during the crisis. The ES 2019 and the follow-up COVID-19 module (COV-ES) include a sample of countries in Southern Europe (SE), which are employed as a comparator group; the other comparators are firms in the lower-middle-income (LMI) and upper-middle-income (UMI) countries.<sup>2</sup> All statistics for regional aggregates are reported as simple averages of individual countries, whereby firms within countries are weighted with survey weights.

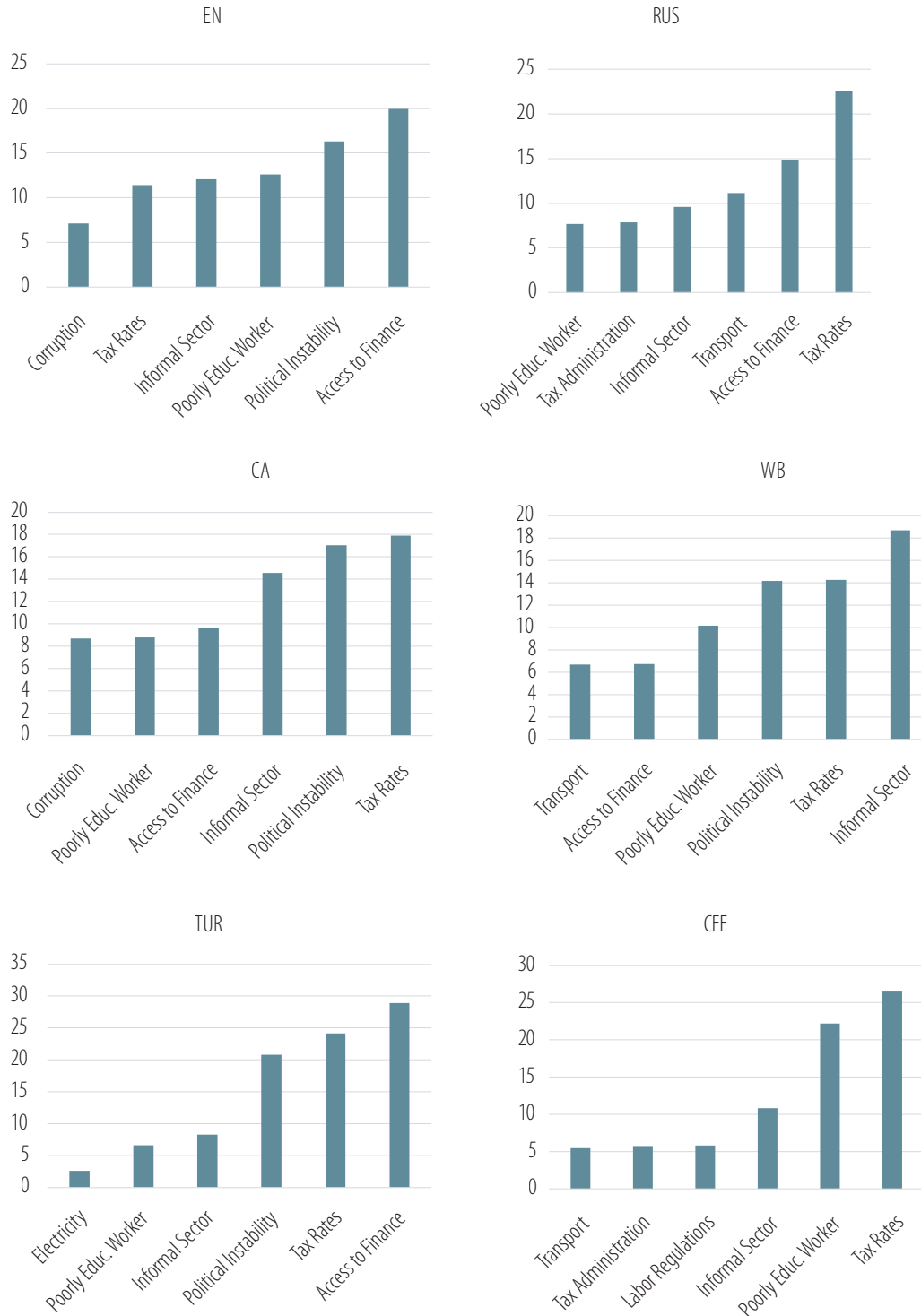
**The Enterprise Survey provides a rich source of information about firms and their business environment.** The questionnaire includes firm characteristics, annual sales, costs of labour and other inputs, performance measures, access to finance, workforce composition and participation in the labour market. There is also a special module on the green economy. The survey provides a representative sample of the non-agricultural, formal private sector for firms with at least five employees and operating in the manufacturing or services sectors.<sup>3</sup> The survey uses random sampling, stratified by firm size, sector of activity and regional location within each economy. Stratification ensures that there are enough observations for robust analysis within each stratum. The survey design, comprehensive sample frames and sampling weights together ensure that the surveys are statistically representative of the private sector in each economy.

**Firms continue to suffer mainly from unfair competition from the informal sector, a poorly educated workforce and limited access to finance.** Firms in the Enterprise Survey (ES) were asked to select the “top obstacle” from a list of 15 potential obstacles. Figure 1 shows the top six obstacles affecting the day-to-day operations and performance of firms across the region. These are tax rates, competition from the informal sector (labelled informal sector in Figure 1), a poorly educated workforce and difficulties with access to finance. Access to finance scores among the top obstacles in all regions except for Central and Eastern Europe. Political instability also matters although in fewer regions, notably the Eastern Neighbourhood, the Western Balkans, Central Asia and Turkey. Transport is less of an obstacle but is mentioned in the Western Balkans, Central and Eastern Europe, and Russia.

<sup>2</sup> Southern Europe (SE) comprises Cyprus, Greece, Italy, Malta and Portugal. The LMI and UMI aggregates are defined making use of the full sample of countries plus the countries covered by the EIB-EBRD-WBG Enterprise Survey 2019 in the Middle East and North Africa (MENA).

<sup>3</sup> “Services” include retail and wholesale trade, hospitality, repairs, construction, information and communication technology (ICT) and transport. Not included in the survey are agriculture, fishing and extractive industries, as well as utilities and some services sectors, such as financial services, education and healthcare. Firms with 100% state ownership are also not included.

**Figure 1**  
**Top six obstacles to business operations – share of firms in the sub-regions of Eastern Europe and Central Asia**



Source: Authors' calculations based on the EBRD-EIB-WBG Enterprise Survey.

## I.II. Enterprises in Eastern Europe and Central Asia during the pandemic

**Chapter 1 examines the performance and adaptation of enterprises in the region during the initial phase of the pandemic.** It explores key determinants of firms' survival and ability to adapt, foreshadowing discussion in the rest of the report of the structural characteristics of the sector during "normal" times. Finally, the chapter examines the complementarity between financial sector "lifelines," the structure of corporate ownership, and policy support.

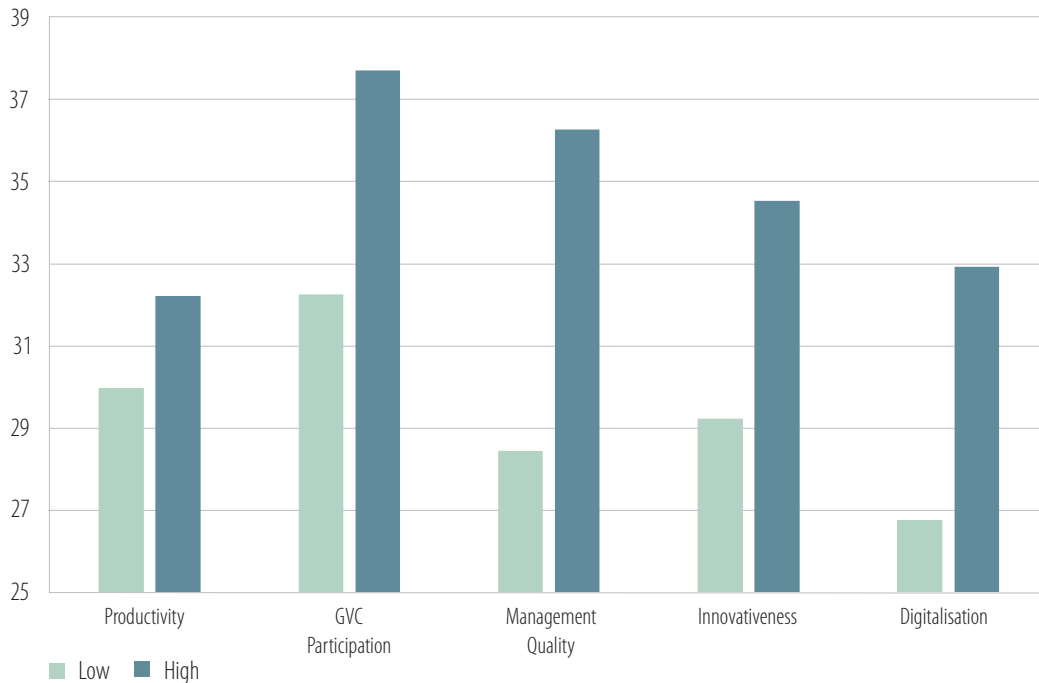
**To date, firms have come through the pandemic better than initially feared.** During the first wave, firms lost 25% of turnover and shed 11% of their labour force, with the pandemic hitting contact-intensive services and SMEs especially hard. But massive policy support helped to prevent large-scale bankruptcies, with only 4% of firms filing for insolvency or closing permanently at the time of the first wave of the COV-ES.

**Some firms have been more resilient than others, rapidly adapting their business models to the pandemic (Figure 2).** Firms that were more productive before COVID-19 were significantly less likely to close their businesses, to have arrears or to end up in bankruptcy. Instead, they expanded online business practices and switched to remote work. Firms that were integrated into GVCs, those that had been more innovative in the past, those that were more digitalised and those with better quality management also adapted better during the pandemic. They expanded their online presence, switched to remote work, adjusted production or took advantage of the available policy support more effectively.

**Financial lifelines as an insurance mechanism played an important role in firms' survival.** Firms with overdraft facilities and those operating in corporate groups with access to intragroup funding were less likely to experience bankruptcy, as they were able to draw down contingent liquidity under stress. Government programmes also played a stabilising role by mitigating the stress of vulnerable firms, such as SMEs, stand-alone firms and those lacking overdraft facilities.

Taken together, the findings in Chapter 1 suggest that many of the structural characteristics associated with stronger firm growth, job creation and innovation during normal times (as documented in Chapters 2-4 of this report) also helped enterprises during the pandemic.

**Figure 2**  
Adaptation during the pandemic and firm characteristics (percent)



Source: Authors' calculations based on COV-ES.

Note: The chart plots the average predicted probability of firms' adaptation during the pandemic based on separate logit regressions on relevant firm characteristics pre-COVID-19. For productivity and management quality, "High" firms are those at the 90th percentile of the distribution. For GVC participation, innovativeness and digitalisation, "High" firms are those for which the relevant indicator takes the value of 1. See Chapter 1, section 1.4 for details on definitions and methodology.

### I.III. Trade participation, innovation and competitiveness

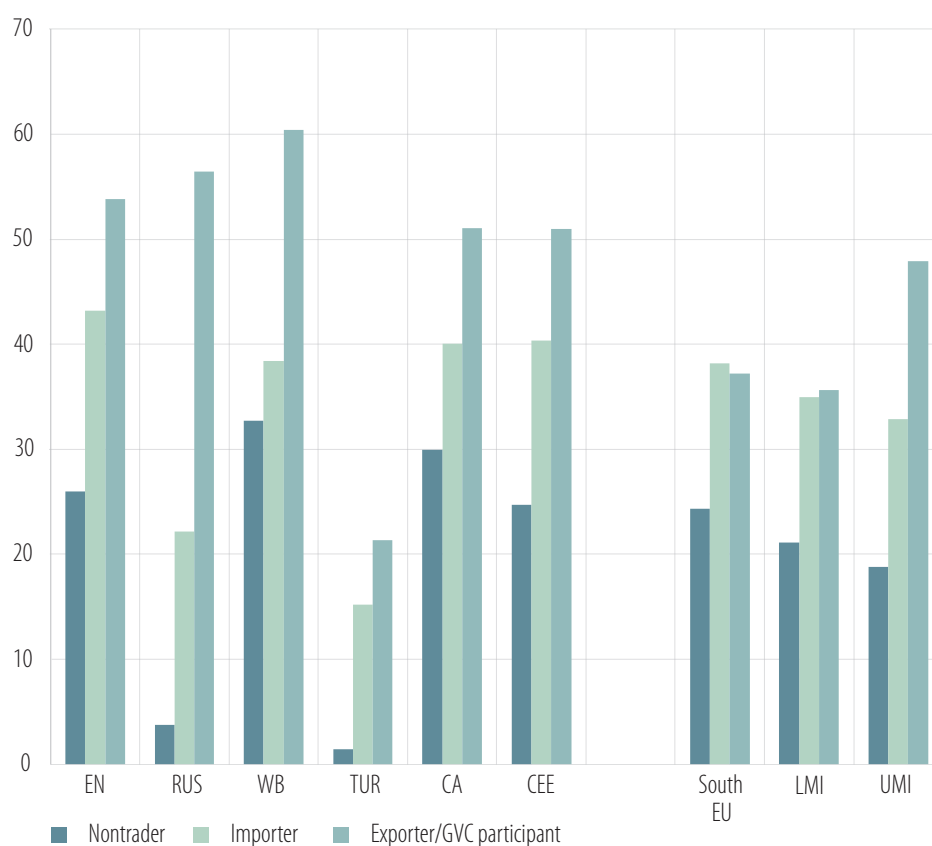
**The findings of Chapter 2 indicate that globalisation has been essential in enabling many countries in the region to leverage their comparative advantages and increase their competitiveness.** The chapter shows that firms participating in international trade, in particular in GVCs, tend to be more innovative, better managed and more productive.

**Most firms in Eastern Europe and Central Asia engage in trade activity, and engaging in trade is positively associated with innovation.** Overall, the breakdown of firms' trading profiles outlines the import dependence of most of the sub-regions. Moreover, most of the firms that export their goods or services also participate in GVCs by importing, transforming and adding value before re-exporting. But trade participation varies across regions. In Central and Eastern Europe and the Western Balkans, the share of firms that directly export goods abroad is significantly higher than the averages of lower- and upper-middle-income economies, while Central Asia and Russia lag significantly. An economic model oriented toward exports and industrialisation, supported by a proactive policy of attracting FDI, may enable transfer of technology and know-how, thereby supporting the rapid increase of productivity. The ES reveals that firms that trade in international markets tend to innovate more (see Figure 3). Among non-exporters, the share of innovative firms is about 30%, while it increases to around 40% for importers. Innovation is particularly prevalent among exporters and participants in GVCs (above 50% of firms).

**Firms in the region generally invest more in innovation than firms in comparator economies, even though the innovation process is led by adapting new technologies developed elsewhere.**

Innovative firms tend to be more productive when they trade, while exporters tend to grow faster when they also invest in innovation. Innovation and trade are thus closely intertwined and both are necessary elements for improving firms' competitiveness. Trade integration with developed economies, in particular the European Union, access to information and know-how through participation in GVCs, the use of foreign licensed technology and modern management practices all contribute to higher rates of innovation. Innovative firms and firms connected to international markets are more likely to adapt better and to be more resilient to COVID-19 shocks.

**Figure 3**  
Innovative firms (percentage of firms), by trading profile



Source: Authors' calculation based on the EBRD-EIB-WBG Enterprise Survey.

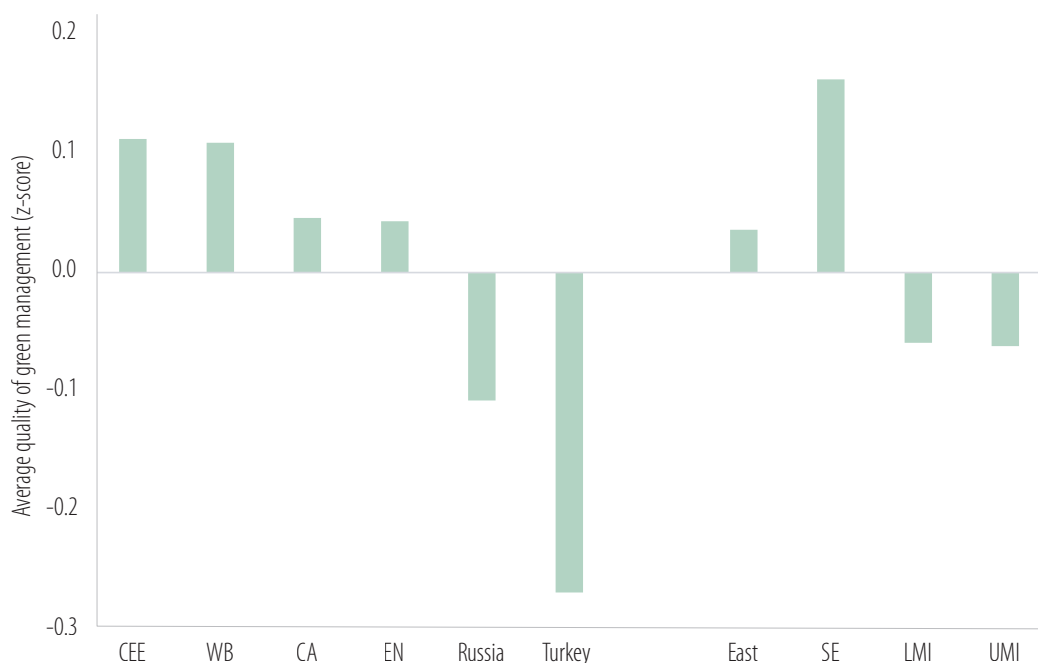
## I.IV. The green economy

**Firms can improve their environmental performance through the adoption of good green management practices (Chapter 3).** These include having clear, measurable and realistic environmental objectives, together with managers' incentives and expertise to achieve those targets. Firms in Eastern Europe and Central Asia lag those in Southern Europe in the average quality of their green management practices (see Figure 4), particularly in terms of specific targets for energy use and emissions. External factors, such as customer pressure and energy taxes, play a more important role in determining the quality of green management practices than firm-level characteristics, such as size and age.

**The ability to handle environmental issues in a proactive manner is just one aspect of effective management: the ability to handle social and governance issues is also important.** Information on firms’ environmental, social and governance (ESG) practices is often only available for listed companies. To fill this gap and shed some light on whether smaller firms in the region pay sufficient attention to ESG practices, Chapter 3 introduces a “Corporate ESG Responsibility” composite indicator. Firms in Eastern Europe and Central Asia lag those in Southern Europe on ESG practices too, with those with fewer than 20 employees, on average, the weakest in every sub-region.

**In addition to improving their green management practices and their broader ESG practices, firms can also invest in energy efficiency and/or reducing pollution or other negative environmental effects.** Firms are more likely to invest in a greater number of green measures if they experience fewer financial constraints and have better green management practices. Investments in energy efficiency are beneficial for the bottom line as well as for the environment. Policymakers should provide a business environment that is conducive to green investment and encourage all firms to improve their management practices and, more broadly, their corporate ESG responsibility.

**Figure 4**  
**The average quality of green management differs across sub-regions of Eastern Europe and Central Asia**



Source: Authors’ calculation based on the EBRD-EIB-WBG Enterprise Survey.

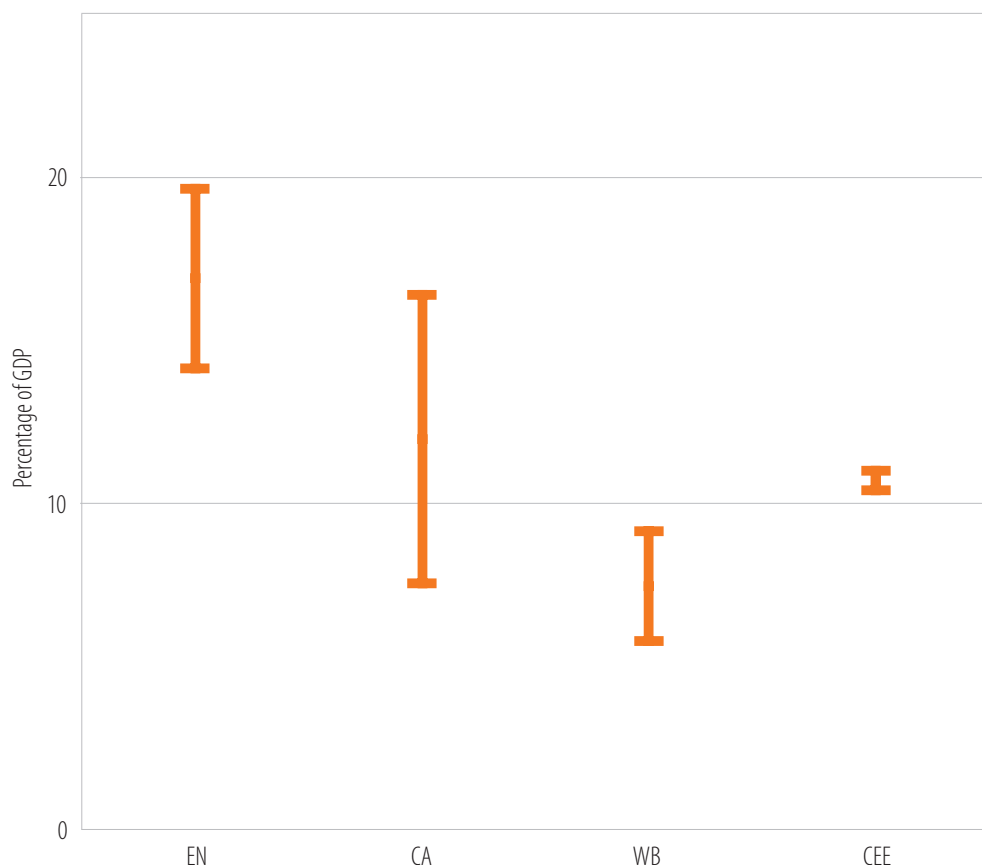
## I.V. Financial deepening and firms’ access to finance

**Chapter 4 documents substantial gaps in terms of financial deepening and firms’ access to finance, particularly affecting SMEs and young and innovative firms in the region.** About 55% of firms perceive access to finance as an obstacle. Credit constraints are particularly binding for SMEs and young firms: 24% of SMEs and 27% of young firms are credit-constrained. Innovative firms are also more likely to be credit-constrained, particularly young innovative SMEs. The chapter proposes a methodology for measuring credit gaps – the difference between desirable and actual levels of credit – making use of firm-level data. Figure 5 showcases the ranges of gaps as percentages of GDP for the major sub-regions investigated in the report.

**The chapter also analyses the operations of financially autarkic firms, those that rely solely on internal financing.** Financial autarky is more likely in less developed institutional frameworks: about 50% of firms in the Eastern Neighbourhood and Central Asia are autarkic, with a lower incidence in Central and Eastern Europe, Russia and the Western Balkans, and only 7% of firms in Turkey. Autarky is also a function of firm characteristics. More sophisticated, larger, older and more export-oriented firms are less likely to be financially autarkic. Autarkic firms are particularly present among SMEs and young firms.

**Credit availability for firms is associated with higher investment and faster growth.** While fully disentangling the impact of demand and supply factors on access to finance is challenging, the analysis establishes that credit availability for firms is associated with investment and growth, thus showing the practical benefits of being supported by and connected to the financial system. This implies the need for policies that promote financial sector development, such as improvements in collateral frameworks, and targeted financial and advisory support – for example, financial literacy and improvements in audit and accounting standards – in conjunction with a genuine reform agenda geared to improving institutional quality. These can help to reduce information asymmetries and increase firms’ capacity, appetite and confidence in engaging with the banking sector.

**Figure 5**  
**Estimated credit gaps as percentages of GDP for the major sub-regions in Eastern Europe and Central Asia**



Source: Authors’ calculations based on the EBRD-EIB-WBG Enterprise Survey.

Note: These figures represent the total credit gap in a given region (as a percentage of GDP). They are computed making use of the methodology explained in Chapter 4: see Section 4.4 and Annex D for a methodological description of the key stages for determining a credit gap. The bands are determined applying different parametrisations, thus reflecting alternative risk aversion parameters.



## I.VI. Conclusions and policy implications

**The COVID-19 outbreak put businesses in Eastern Europe and Central Asia through a severe test. Their resilience has been enhanced by effective policy support, as well as by their achievements before the pandemic.** To date, the corporate sector has been resilient to the COVID-19 crisis, supported by the unprecedented policy response that eased the financial strains facing firms through a wide array of measures. Banks and other financial intermediaries also played a critical role by maintaining the flow of credit to the economy. As the analysis in this report demonstrates, firms with access to bank lifelines prior to the pandemic or with support from a corporate group could absorb the cash flow shock more easily and were significantly less likely to experience bankruptcy. Government policies played a stabilising role, especially for firms that lacked access to formal and informal lifelines before the pandemic (Chapter 1). The COVID-19 outbreak also demonstrated clearly that firm characteristics associated with stronger growth and productivity prior to the pandemic, namely their integration into global markets, as well as their innovativeness, managerial quality and digitalisation, helped businesses to adapt to the new economic circumstances. These findings underscore the important role that government policies can play in further strengthening business resilience in the region.

**Engaging in trade and integration via global value chains is important for firms in the region, as trade is positively linked to productivity, innovation and growth.** The findings in Chapter 2 indicate the importance of policy measures aimed at further strengthening trade integration and innovation. Improving customs and trade regulations, which lowers entry costs for firms seeking to engage in trade, will increase access to international markets for a larger share of firms, especially smaller ones. Policymakers should prioritise investment in digital infrastructure and facilitate improvements in management practices and investment in workers' skills. Governments could encourage intensive training programmes, in particular aimed at improving the management of SMEs and enhancing incentives to reskill the workforce, including in less well-connected areas so as to attract innovative firms. Combined with investment in digital infrastructure, this could help to rebalance discrepancies within the region in terms of development and to improve resilience and adaptability to shocks, such as the COVID-19 crisis.

**Policymakers should prioritise investment in green infrastructure, and strive to provide a business environment that encourages all firms to improve their management practices and, more broadly, their corporate ESG responsibility** (Chapter 3). The transition to sustainable growth and a green economy will only be a success if the private sector applies its ingenuity, investment and entrepreneurship to that endeavour. Firms can improve their environmental performance through the adoption of good green management practices and by making green investments. Green management practices are important for all types of green investments, and external factors, such as customer pressure or energy taxes, are more important determinants of the quality of green management practices than firm characteristics. This suggests that there is a role for government guidance and stricter regulation.

**Continued development of the financial sector will be essential not only to improve firms' access to formal lifelines when faced with liquidity shocks, but also to relieve credit constraints that limit firms' growth during normal times** (Chapter 4). The report documents the persistence of gaps mostly linked to a mismatch between demand and supply: realigning the two requires increased institutional focus on credit market infrastructure. Improvements in collateral frameworks can help to tackle inefficiencies in the allocation of credit, to reduce risks and to increase the accessibility of credit. Targeted financial and advisory support can reduce constraints and increase firms' investment opportunities, particularly for SMEs, young and innovative firms. Further diversification in terms of financial instruments and products is warranted. For example, the deployment of guarantee schemes can boost the risk-taking appetite of banking sectors, while their effectiveness can be enhanced via better risk assessment and screening capabilities. Moreover, financial literacy as well as improvements in audit and accounting standards, in conjunction with a genuine reform agenda geared to improving institutional quality, can reduce information asymmetries and increase firms' capacity, appetite and confidence in engaging with the banking sector.



CHAPTER I

Enterprises in Eastern Europe  
and Central Asia during  
the pandemic

## Summary

*The COVID-19 outbreak left many enterprises around the world at risk of insolvency, as economies weakened under the disruptions to supply and reduced consumer demand. This chapter uses firm-level data from the EBRD-EIB-WBG Enterprise Survey to assess the direct impact of the COVID-19 shock on firms in Eastern Europe and Central Asia, their adaptation strategies and the effectiveness of mitigating policies during the early stages of the pandemic.*

*The findings show that firms were severely affected by the first wave of the pandemic. Average sales dropped by a quarter, leading firms to shed one-tenth of their workforce. But bankruptcies and permanent exit of firms remained relatively limited, amounting to about 4% of the surveyed firms. More productive firms often fared significantly better and were more likely to adopt mitigation strategies, such as increasing online business or remote work. Firms that were integrated in global markets, were more innovative, had better management practices, were more digitalised and/or were run or owned by women also proved more dynamic during the pandemic.*

*This chapter also documents the important role played by formal and informal “lifelines” in the face of a severe liquidity shortfall. Firms with access to bank lifelines prior to the pandemic or with support from a corporate group could absorb the cash flow shock more effectively and were significantly less likely to experience bankruptcy. Government policies also played a stabilising role, especially for firms that lacked pre-pandemic access to formal and informal lifelines.*

*Taken together, the chapter’s findings suggest that many of the structural characteristics associated with stronger firm growth, job creation and innovation during normal times, as documented in Chapters 2-4 of this report, also helped enterprises in the region during the extraordinary shock of the pandemic.*

## 1.1. Introduction

**Growth in most of the world ended abruptly in 2020 due to the pandemic – and Eastern Europe and Central Asia were no exception.** Economic activity across economies in the region contracted, on average, by 4% in 2020, with contact-intensive services being hit the hardest. The policy support in response to this shock was unprecedented in many countries in the region. Aid granted to households and firms in the form of job retention schemes, grants, tax relief and loan guarantee programmes amounted to around 9% of GDP with large cross-country variation, which may reflect differences in policy space and levels of development. Debt moratoriums and changes to insolvency frameworks also protected enterprises and households in the face of significant liquidity pressures.

**Thanks to the unprecedented policy support, corporate bankruptcies have remained subdued to date, but enterprises in the region remain fragile.** As policy support is withdrawn and new variants raise uncertainty about how quickly the pandemic can be overcome, it is crucial to analyse the vulnerability of the corporate sector, to assess its near-term prospects, to evaluate the potential for longer-term “scarring,” and to understand enterprises’ ability to adapt to the extraordinary situation of the pandemic and the role of policy support.

**Against this backdrop, this chapter examines firm performance and adaptation in Eastern Europe and Central Asia during the initial waves of the pandemic.**<sup>1</sup> The chapter addresses four main questions: (i) How did firms in the region perform during the COVID-19 crisis? (ii) How did they adapt to the pandemic? (iii) What are the key determinants of firm performance and adaptation strategies? and (iv) What was the role of lifelines – both formal and informal – from banks and governments in stabilising firms? More concretely, the analysis focuses on the survival likelihood and management actions taken by firms to weather the COVID-19 crisis. It examines the role of various firm characteristics prior to the pandemic, including firm size, sector, productivity, participation in global trade, innovativeness, management quality, digital footprint and access to finance.

**To answer these four questions, the chapter relies mainly on the first wave of the COVID-19 Follow-up Enterprise Surveys (COV-ES).** The analysis focuses on the 16 000 firms surveyed across 23 countries in Eastern Europe and Central Asia, plus five countries in Southern Europe, during the first wave of the follow-up surveys conducted between May 2020 and April 2021.<sup>2</sup> Results from the second wave of the follow-up surveys are used for robustness. Country-level information on government aid schemes granted to corporates during the pandemic, compiled by the IMF, complements the firm-level database when analysing policy effectiveness.

**The findings contribute to two strands of research: the drivers of firm performance; and the effects of the pandemic on firms.** First, a large body of literature examines drivers of firm performance, such as productivity (Aghion et al, 2005), global integration (De Loecker et al, 2016, Bloom et al, 2016), management quality (Bloom and Van Reenen, 2010), and access to finance (Rajan and Zingales, 1998 and 2003). Chapters 2 and 4 in this report leverage the richness of the full Enterprise Survey to build on this literature and analyse the role of these factors for firm performance in “normal” (pre-COVID-19) times in Eastern Europe and Central Asia. This chapter sheds light on whether factors associated with improved performance in normal times also improved firm resilience during the pandemic. Second, a growing body of literature explores the effects of the pandemic on firms in various parts of the world (see, among others, Banerjee et al, 2020, Maurin and Pál, 2020, Ebeke et al, 2021a, IMF Global Financial Stability Report, 2020b, and the Bank of England’s Financial Stability Review, 2020). This literature examines the effects of supply shocks from disruptions in production and depressed demand during the pandemic on firm

1 The terms firm, establishment and enterprise are used interchangeably in this chapter.

2 Of the 33 economies in Eastern Europe and Central Asia, data from the COVID-19 Follow-up Enterprise Surveys were available for 23 countries, plus five countries in Southern Europe, at the time of analysis. These 28 countries are the basis for the analysis for the remainder of the chapter except for the stylised facts section, which excludes Southern Europe, unless otherwise specified (Annex, Table A.1).

revenues, employment, business closures and bankruptcies in various parts of the world.<sup>3</sup> Overall, the findings indicate stark differences across countries and sectors, with contact-intensive sectors being especially hard-hit. Most of these studies rely on financial statements and income statements of firms prior to the pandemic to simulate the impact of the shock and policy measures. In contrast with this literature, this chapter is among a group of studies that document the actual experience of firms during the initial waves of the pandemic and analyse the determinants of their resilience.<sup>4</sup>

**The rest of this chapter is organised as follows.** Section 1.2 provides an overview of the pandemic in the region and the macro shock that it engendered. Section 1.3 documents the performance of firms during the initial waves of the pandemic, focusing on firm survival and adaptation strategies, based on COV-ES data. Section 1.4 analyses the key drivers of firms' resilience and adaptation during the pandemic, while Section 1.5 assesses the role of firms' capital structure for their survival, and its interplay with access to lifelines from the financial sector, government and within corporate groups. Section 1.6 concludes and discusses the policy implications of the findings.

## 1.2. Context: the pandemic in Eastern Europe and Central Asia

### 1.2.1. Evolution of the pandemic

**The pandemic is exacting a heavy human toll in the region.** Most countries were spared from the initial wave of the virus. But infections rose sharply in the autumn of 2020, and surged again in the spring and autumn of 2021. Infection rates vary notably across the region: countries in Central Asia have managed to keep infection rates rather subdued to date, in contrast with the dramatic surges experienced in the Western Balkans, Central and Eastern Europe, the Eastern Neighbourhood and Turkey.<sup>5</sup> The death toll from the pandemic has been high: by mid-September 2021, nearly 800 000 people in the region had lost their lives due to COVID-19, with some countries registering the highest cumulative number of deaths in the world, adjusted by population size (Figure 1).

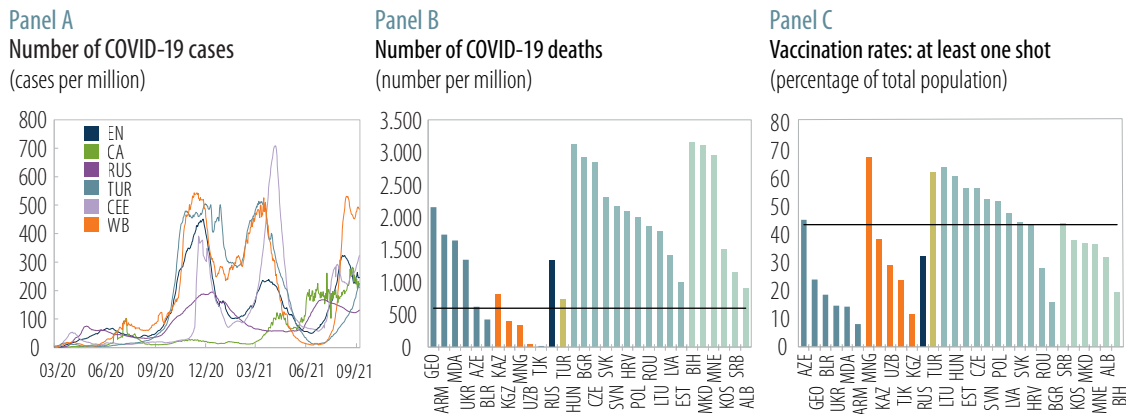
**The arrival of vaccines has improved the pandemic outlook, but vaccination rates remain uneven across the region.** After a slow start to the vaccination campaign, over 40% of the region's population had received at least one dose of the vaccine by September 2021. But vaccination rates in some countries remain well below the global average and below the goal of vaccinating at least 40% of the population by the end of 2021, as recommended by the Multilateral Leaders Task Force on vaccines. The slow progress reflects a combination of factors, including supply and procurement bottlenecks, logistical obstacles and vaccine hesitancy. The uneven vaccination rates across the region amplify the health and economic ramifications of potential future waves of infection.

3 See Adams-Prassl et al (2020); Apedo-Amah et al (2020), Balleer et al (2020); Bartik et al (2020); and Zhang et al (2020).

4 Studies documenting the actual impact of the pandemic on firms based on Enterprise Survey data include Apedo-Amah et al (2020), Amin and Viganola (2021), Cirera et al (2021), Karalashvili and Viganola (2021), and Muzi et al. (2021). Other papers on COVID-19 impact include Bartlett and Morse (2020), Bloom et al (2021), Fernández and Huneus (2021) and Humphries et al (2020).

5 The variability of COVID-19 infection rates across countries in the region could also reflect differences in containment measures and levels of testing.

**Figure 1**  
**COVID-19 in Eastern Europe and Central Asia**

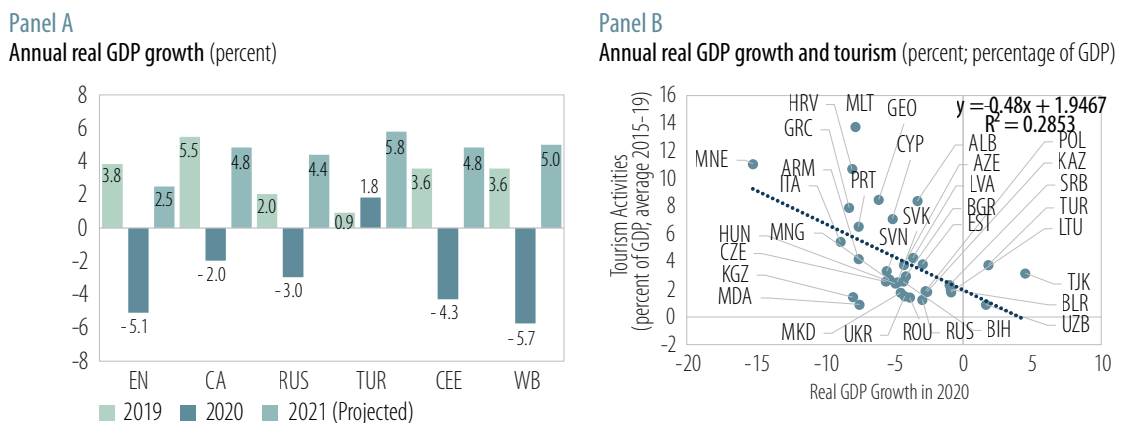


Source: Authors' calculations based on Our World in Data.  
 Note: Data as of 20 September 2021. EN: Eastern Neighbourhood, CA: Central Asia, RUS: Russia, TUR: Turkey, CEE: Central and Eastern Europe, WB: Western Balkans. See Table A.1 for country ISO codes.

### 1.2.2. The collapse in economic activity and the policy response

**The impact of the pandemic on aggregate activity in 2020 was severe.** In most sub-regions, economic activity contracted by around 4% in 2020, close to the global average of 3.2%. But the variation across countries is again notable. Countries in the Western Balkans, the Eastern Neighbourhood and Central and Eastern Europe experienced deeper recessions, in line with the high infection rates and death toll of the pandemic. Countries in Central Asia weathered the crisis with more limited economic damage, while Turkey was one of the handful of countries in the world where activity continued to expand in 2020. Many factors are likely to have been at play, but part of the heterogeneity in countries' experiences can be attributed to differences in economic structure, the severity of the pandemic and associated containment measures. For example, countries where tourism has a large footprint on the economy experienced significantly deeper output contractions, as did countries that implemented more stringent pandemic containment measures (Figure 2).

**Figure 2**  
**The collapse in economic activity**

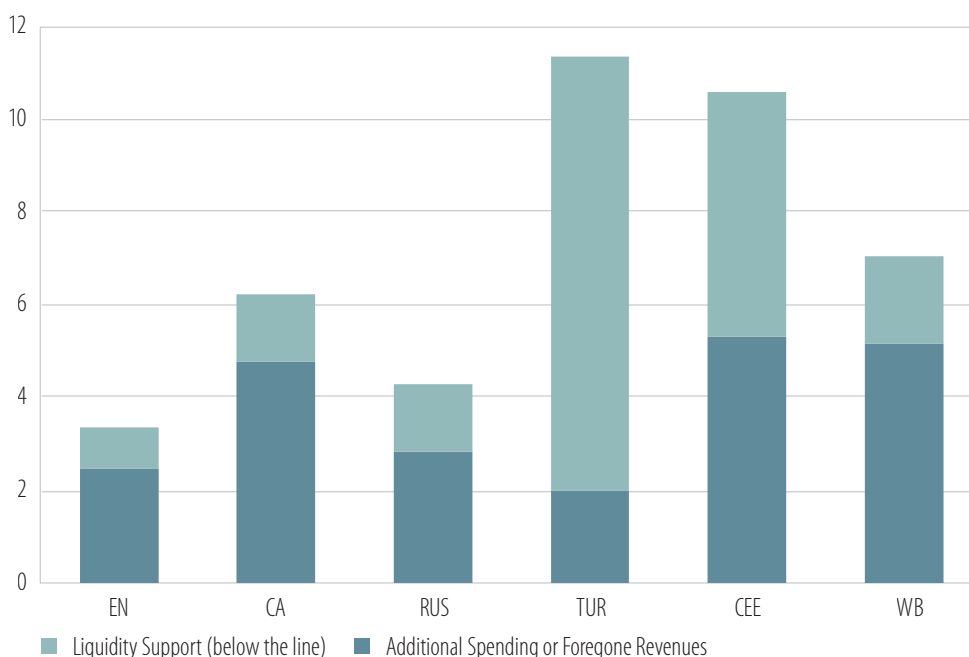


Source: Authors' calculations based on IMF World Economic Outlook, July 2021, and World Travel and Tourism Council via the World Bank.  
 Note: EN: Eastern Neighbourhood, CA: Central Asia, RUS: Russia, TUR: Turkey, CEE: Central and Eastern Europe, WB: Western Balkans. Projections for 2021. See Table A.1 for country ISO codes.

**Sizeable policy support was deployed.** In an effort to tackle the effects of COVID-19 on the economy, governments provided temporary aid to households and firms that faced a sudden shortage of liquidity. The policy response was unprecedented in its size and breadth. Firms received aid in the form of job retention schemes, grants, debt moratoriums, guarantees, tax advantages and interest rate subsidies (Figure 3). Focusing on major programmes, the support was particularly large in the European part of the region. Central and Eastern Europe and Turkey announced packages worth 11% of GDP, with sizeable guaranteed loan programmes.

**Figure 3**

**Fiscal measures to support households and firms in response to the pandemic (percentage of GDP)**



Source: Authors' calculations based on IMF Fiscal Monitor Database, July 2021.

Notes: EN: Eastern Neighbourhood, CA: Central Asia, RUS: Russia, TUR: Turkey, CEE: Central and Eastern Europe, WB: Western Balkans.

**Evidence from past crises indicates that government support for firms can limit firm exit effectively.**

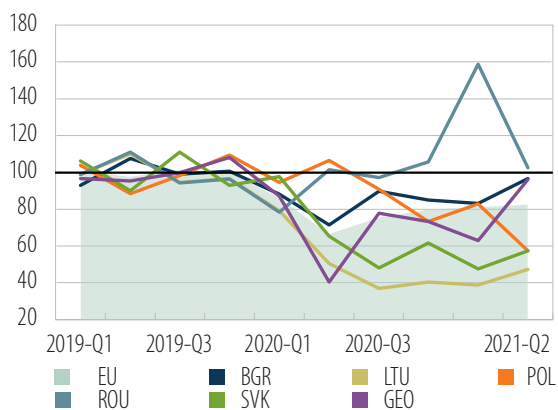
Early evidence from the pandemic suggests that government support schemes helped to mitigate business closures and employment declines in the current crisis too. Simulation results using the balance sheets and income statements of 2.5 million firms in 13 countries across Central and Eastern Europe, the Western Balkans, the Eastern Neighbourhood, Russia and Turkey from the Orbis dataset suggest that corporate policies helped to reduce the share of illiquid and insolvent firms due to COVID-19 in 2020 (Box 1).<sup>6</sup> For the limited set of countries for which up-to-date data are available, bankruptcies rates declined substantially in 2020 (Figure 4, Panel A). But vulnerabilities remain high and bankruptcies could rise when corporate support policies expire and insolvency moratoriums are lifted. Unemployment has also increased modestly to date. For almost all sub-regions, the increase was significantly smaller than that observed after the global financial crisis (Figure 4, Panel B).

<sup>6</sup> See De Mel et al (2012) for evidence on past crises, and Bruhn (2020), Bartlett and Morse (2020), Chen et al (2020) and Humphries et al (2020) for early evidence on the COVID-19 crisis.

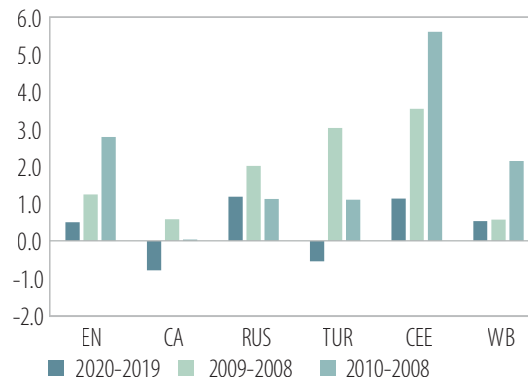


**Figure 4**  
**Corporate and household distress during the pandemic**

**Panel A**  
 Bankruptcy declarations (index 2019=100; seasonally adjusted)



**Panel B**  
 Change in unemployment rates: COVID-19 versus the global financial crisis (percentage points)



**Source:** Authors' calculations based on Eurostat, Haver Analytics, and IMF World Economic Outlook, July 2021.  
**Note:** The spike in Romania in 2021Q1 could be partly due to some backlog in processing (as new business registrations also surged in the same period), and to some clean-up due to EU standards becoming mandatory in 2021Q1. Despite the sharp increase in bankruptcies, only around 500 registered insolvencies were filed in Romania in 2021Q1. EN: Eastern Neighbourhood, CA: Central Asia, RUS: Russia, TUR: Turkey, CEE: Central and Eastern Europe, WB: Western Balkans. See Table A.1 for country ISO codes.

**Box 1****The effect of the pandemic and policy support on the corporate sector: evidence from simulations**

This box uses simulation analysis to assess the impact of COVID-19 on the corporate sector in the region and the adequacy of announced policy support.<sup>7</sup> The simulation analysis, which draws on Ebeke et al (2021a), gauges the impact of the pandemic on corporate liquidity and solvency in 2020, using the balance sheets and income statements of 2.5 million firms in 13 countries across Central and Eastern Europe, the Western Balkans and the Eastern Neighbourhood from the Orbis dataset.<sup>8</sup> Using a structural approach, the analysis simulates the evolution of firms' cash and equity, taking account of the decline in turnover triggered by the pandemic at the sectoral level,<sup>9</sup> and firms' operational and other financial obligations. The impact of the policy response is assessed by mapping policy interventions (for example, wage subsidy schemes, debt moratoriums, guaranteed loans, etc.) at a granular level to individual firms' financials, taking account of schemes' eligibility criteria in terms of firm size, financial position, corporate type, economic sector and turnover loss, and the maximum amount of compensation. The effectiveness of policy measures is measured by the share of firms that would have failed because of illiquidity or insolvency triggered by COVID-19 but were saved by policy interventions. Three key findings emerge from the simulation analysis:<sup>10</sup>

- The COVID-19 shock would have had a dire effect on enterprises in the region had supportive policies not been deployed. Simulations suggest that the share of illiquid firms would have increased by 24 percentage points, and the share of insolvent firms would have risen by 8 percentage points in a no-policy scenario. This scenario assumes that (i) firms had no access to any form of government support; (ii) they were unable to roll over any of the debt obligations coming due in 2020; and (iii) they could not sell their accumulated inventories, due to a credit markets freeze.
- The announced policies mitigated significantly liquidity risks in the region. The announced policy packages almost halved the rise in the share of illiquid firms, under the assumption that firms took advantage of the aid granted and were able to access capital markets. As a result, policies could have saved 17% of employment in firms that were saved from illiquidity. At the sub-regional level, policies were most supportive in terms of addressing liquidity shortfalls in Central and Eastern Europe and the Western Balkans (Figure 1.1, Panel A).
- Policies appear less effective in addressing solvency risks. This is not surprising as many of the announced policy measures, such as debt moratoriums, tax deferrals and guaranteed loans, help firms to cover liquidity shortages, but they do not have a direct impact on equity or they may intensify future solvency risk by increasing interest payment expenses and firm leverage. Even with this scale of support, insolvent firms as a share of total firms increased by almost 5 percentage points in the region in 2020 (Figure 1.1, Panel B).<sup>11</sup> On average, the effectiveness of support across the region, at two-fifths, is similar to other regions in Europe, albeit with large variation across sub-regions.

7 This box applies the findings of IMF (2020a) and Ebeke et al (2021a) to Eastern Europe and Central Asia, using the Orbis database. Due to data constraints, the results are based on the following subset of countries in the region: Eastern Neighbourhood (Ukraine), Russia, Western Balkans (Serbia), Turkey, Central and Eastern Europe (Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Poland, Romania, Slovakia and Slovenia), and Southern Europe (Greece, Italy and Portugal).

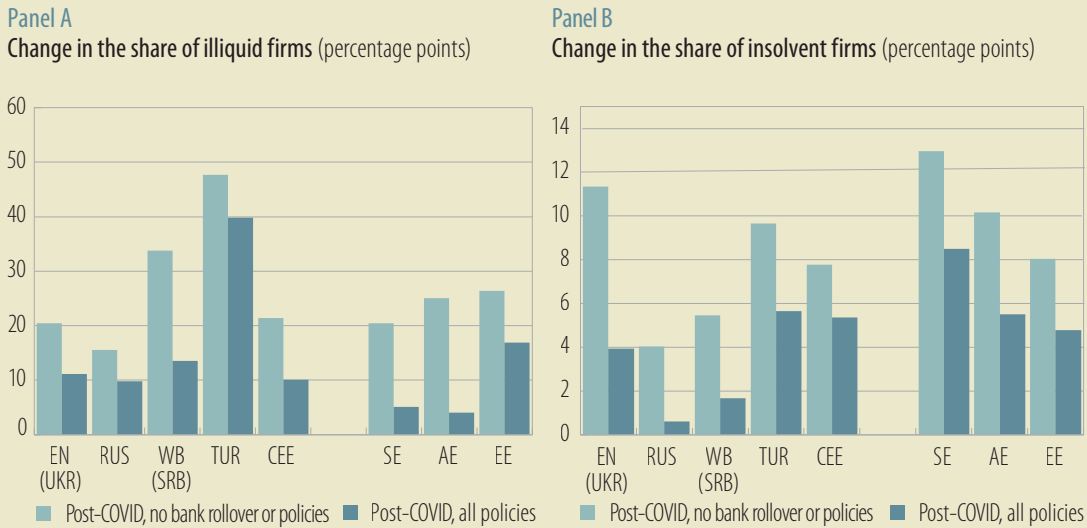
8 A benefit of using the Orbis database over Enterprise Survey data is that it has a broad coverage of firms and provides detailed balance sheet and income statement variables, which can be used to compute measures of financial distress. At the same time, Enterprise Survey data is timelier and reports survey responses of distress during the pandemic.

9 Turnover shocks are simulated at the country and sector level taking into account the pace and severity of containment measures and the pace of reopening across 96 economic sectors.

10 These results are consistent with the findings reported in IMF (2021).

11 The simulation projects the share of firms that would have become insolvent in the absence of insolvency moratoriums. While the suspension of the duty to file for insolvency during the pandemic provided temporary relief to insolvent firms in some countries, bankruptcies could rise again once policy measures expire, particularly under a protracted COVID-19 crisis.

**Figure 1.1**  
**Simulated change in the share of illiquid and insolvent firms in 2020 and the role of policies**



*Source:* Authors' calculations based on Orbis and Ebeke et al (2021).  
*Note:* Light shading corresponds to a scenario assuming no policy response, while dark shading incorporates announced policies. Policies include wage subsidies, grants, debt moratoriums, guarantees, tax deferrals, tax rebates and changes to policy rates. EN: Eastern Neighbourhood, UKR: Ukraine, RUS: Russia, WB: Western Balkans, SRB: Serbia, TUR: Turkey, CEE: Central and Eastern Europe, SE: Southern Europe, AE: Advanced European Economies, and EE: Emerging European Economies.

### 1.3. Firm performance during the pandemic: stylised facts

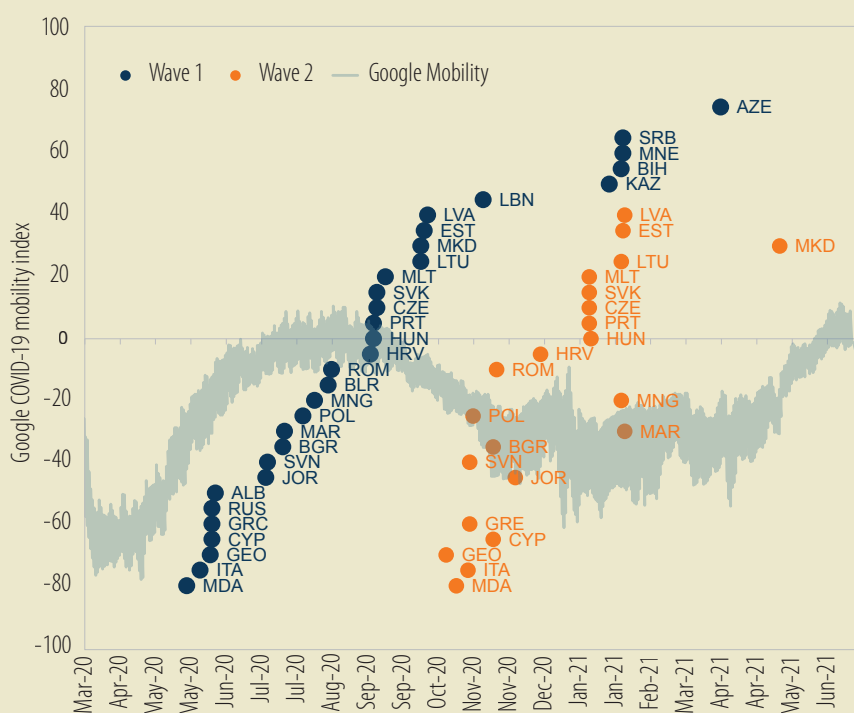
**How did firms cope with the unprecedented shock?** This section documents the impact of the shock and policy support on the corporate sector, examining differences across firms based on COV-ES data (Box 2). The analysis focuses on the 23 countries in Eastern Europe and Central Asia where the first wave of the COVID-19 follow-up surveys was completed by April 2021 with data from five countries in Southern Europe included for comparison. Data from the second wave surveys covering 19 countries in the region are used for robustness checks.

## Box 2

### Data description

**This chapter is built on firm-level surveys conducted during the pandemic by the World Bank.** The COVID-19 Follow-up Enterprise Surveys (COV-ES) were launched in May 2020, with subsequent rounds, which revisit the same set of firms, still in progress. At the time of the preparation of this report, two rounds of COV-ES data collection had been completed. The available data were combined with pre-pandemic information from the Enterprise Surveys used in subsequent chapters of the report.

### Timing of follow-up COVID-19 surveys by country and mobility in Eastern Europe and Central Asia



Source: Author's calculations based on Google Mobility Report and COV-ES. Note: the chart shows the timeline of follow-up surveys on COVID-19 conducted in each country during the first wave (in blue), and second wave (in orange). See Table A.1 for country ISO codes.

**The first wave of COV-ES covered a range of countries and firms in the region.** Central and Eastern Europe is the most represented sub-region with 11 countries: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia. The survey covers four countries in the Eastern Neighbourhood: Azerbaijan, Belarus, Georgia and Moldova; five countries in the Western Balkans: Albania, Bosnia and Herzegovina, Montenegro, North Macedonia and Serbia; two countries in Central Asia: Kazakhstan and Mongolia; in addition to Russia. Survey responses from five countries in Southern Europe (Cyprus, Greece, Italy, Malta and Portugal) are used for comparison purposes and to gain observations in the baseline regressions.

**The baseline Enterprise Survey dataset includes 15 988 firms.** Although the number of firms declines in the COVID-19 follow-up survey, three-quarters of firms are included in the first wave of the COVID-19 survey, and one-half of firms are included in the second wave. The average number of firms included in the Enterprise Survey by country is 571, with the least number of firms surveyed in Montenegro (150), and the largest number in Kazakhstan (1 446). For each country, the sample of firms was selected using stratified random sampling, and individual observations are therefore weighted when making inferences about the population, using survey weights. Table A.1 provides a detailed summary of the sample coverage.

### 1.3.1. Firm resilience to the COVID-19 crisis

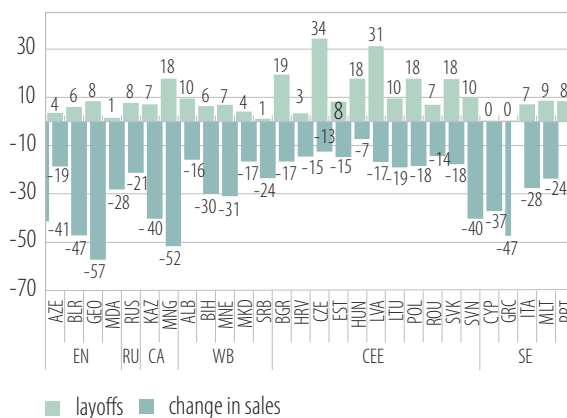
**The COVID-19 outbreak led many firms to reduce operations, resulting in a large drop in sales and adjustments to employment.** Over 40% of surveyed enterprises had to close temporarily due to the pandemic. Sales fell by about 25% on average in the region, but with significant dispersion across sub-regions (Figure 5). Average sales fell by more than 40% relative to the same month in 2019 in the Eastern Neighbourhood, but by about 15% in Central and Eastern Europe. The sales decline had adverse consequences for jobs and households, with firms shedding around 11% of their workforce. Across sectors, the accommodation and food services sector was hit the hardest with turnover losses of 50% (exceeding the average of 24%).

**Bankruptcies and permanent closures remained contained.** Despite the large decline in sales, only 4% of firms in the region filed for insolvency since the outbreak or closed permanently at the time of the survey, albeit with substantial variation across countries (Figure 6).<sup>12</sup> This cross-country variation could be driven by various factors, including temporary protection schemes, firm size, sectoral structure and survey timing. Firms in economic distress may exit the market through bankruptcy proceedings, voluntary liquidation or mergers. In some sub-regions, bankruptcies were almost twice as many as firm closures (for example, Russia and the Western Balkans), while in others, firm closures far exceeded court-driven procedures. For example, in Central and Eastern Europe and Southern Europe, firm closures often exceeded bankruptcies among small firms due to the typically higher cost of initiating insolvency procedures for single entrepreneurs and small and medium-sized enterprises (SMEs) compared with large firms. Across sectors, the accommodation and food services sector (Hotels/Rest in the chart) was the most negatively affected sector, with 12% of firms permanently closing and 8% going bankrupt. Differences in timing of the COVID-19 follow-up surveys across countries, as depicted in Box 2, may have also caused part of the variation in firm exit rates across countries.

**Figure 5**  
**COVID-19 and enterprises in Eastern Europe and Central Asia: sales and employment**

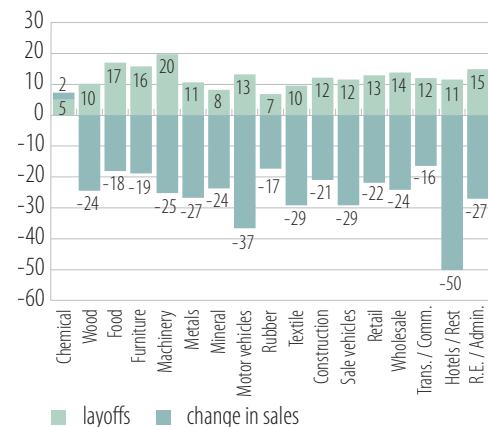
**Panel A**

Change in sales and layoffs by country (percent; year-on-year, since COVID-19)



**Panel B**

Change in sales and layoffs by sector (percent; year-on-year, since COVID-19)



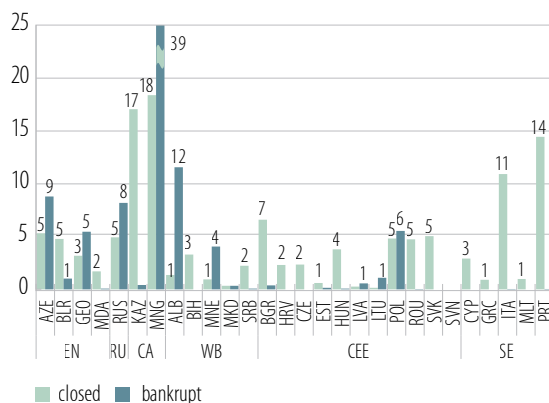
Source: Authors' calculations based on COV-ES. EN: Eastern Neighbourhood, CA: Central Asia, RU: Russia, CEE: Central and Eastern Europe, WB: Western Balkans, SE: Southern Europe. See Table A.1 for country ISO codes.

12 This is in line with the projected increase in the share of insolvent firms due to COVID-19 in the simulations presented in Box 1.

**Figure 6**  
**COVID-19 and resilience of enterprises in Eastern Europe and Central Asia**

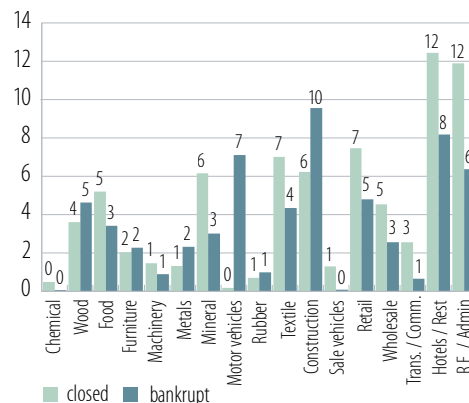
Panel A

Insolvency rate by country (percent)



Panel B

Insolvency rate by sector (percent)



Source: Authors' calculations based on COV-ES. EN: Eastern Neighbourhood, CA: Central Asia, RU: Russia, CEE: Central and Eastern Europe, WB: Western Balkans, SE: Southern Europe. See Table A.1 for country ISO codes. The bankruptcy rate is since the outbreak while closure is at the time of the survey.

**Firms expect that it will take some time for business activity to rebound.** Around 30% of firms expect that they may fall into arrears on their outstanding liabilities in the six months following the survey. Firms expect that it will take on average five months for sales to get back to normal and two months for the workforce to go back to pre-pandemic levels. Countries in Central Asia are expected to be more severely affected. Among those enterprises permanently closed, only 4% of firms expect that they will reopen in the future, with large heterogeneity across affected sectors, ranging between 3% in accommodation and food services and 27% in retail trade.

### 1.3.2. Firm adaptation to the COVID-19 crisis

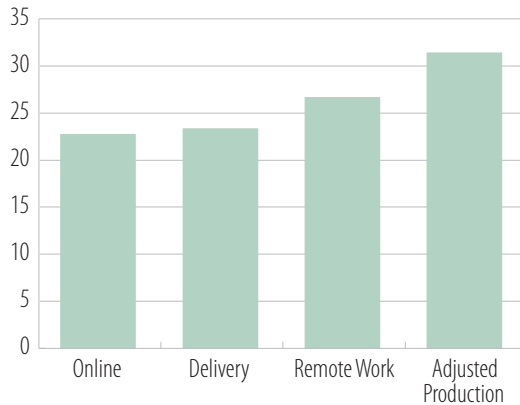
**Firms responded in a variety of ways to the pandemic (Figure 7).** One in five firms started or increased online business or delivery of goods and services, while one in four firms initiated or increased remote work. The pandemic also accelerated business transformation, with over 30% of firms adjusting or converting their production. Firms operating in the manufacture of chemicals and wholesale trade were faster to adapt, with one in three firms increasing online business activity, starting or increasing delivery of goods and services, stepping up remote work and adjusting production. Across sub-regions, firms operating in Russia reported the highest share of digital transformation with over 50% of firms starting or increasing online activity, delivery of goods and remote work.<sup>13</sup> In Central and Eastern Europe, four in five firms adjusted their production processes in response to the pandemic. Most firms received or expected to receive some policy support after the outbreak of COVID-19, with three in four receiving wage subsidies. By contrast, only 15% of firms were granted access to new credit.

<sup>13</sup> This could be partly explained by industry composition effects. For example, in Russia 40% of the surveyed firms operate in wholesale trade – the industry most likely to start/increase online work – compared with 10% for other countries. Also, digital transformation is a key priority of the Russian government's flagship national projects. For example, the platform all.online (все.онлайн) integrates information on up to 500 services including tools for remote business management.

**Figure 7**  
**COVID-19 and adaptation of enterprises in Eastern Europe and Central Asia**

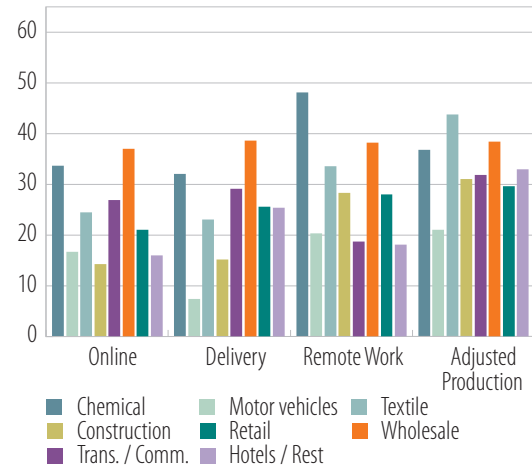
Panel A

Firm adaptation to the pandemic by type of action (percent)



Panel B

Firm adaptation to the pandemic by industry (percent)



Source: Authors' calculations based on COV-ES.

**SMEs were at particular risk as they suffered deeper losses and were less likely to adapt to the COVID-19 crisis.**<sup>14</sup> SMEs have been more affected than large firms by the pandemic, with an average sales loss of 26% compared with the 23% average loss for large firms. Despite the severity of the shock, SMEs were more agile in adjusting their production during the pandemic. One-third of large firms adjusted their production or services in response to the crisis compared with 37% of SMEs. But large firms embraced digitalisation to a larger extent than smaller firms, with 26% increasing their online delivery of goods and services, exceeding the 22% share for SMEs. The greatest wedge in adaptation measures was observed in the likelihood of increasing remote work, which increased by 25% among SMEs but by 50% among large firms.

## 1.4. Firm characteristics and performance during the pandemic

**Which firms in the region performed better during the pandemic?** Using regression analysis, this section sheds light on the role of several firm characteristics highlighted as important in prior studies and analysed in depth in subsequent chapters of this report.<sup>15</sup> First, it examines whether firms that were more productive prior to the pandemic were better performers during the crisis. It then analyses the roles of firms' integration with global markets, their management practices, innovativeness and digitalisation, and the gender of their owners and managers.<sup>16</sup>

**The analysis focuses on two aspects of firm performance, namely resilience and adaptation to the pandemic.** As discussed in the previous section, the survey captures these aspects of performance through multiple questions. For example, firms' resilience during the pandemic could be gauged by

<sup>14</sup> Enterprises are classified by size according to the Enterprise Survey definition. SMEs include firms that employ fewer than 100 employees (except in the policy analysis of Section 1.5 where the SME definition follows the European Commission definition to align with the policy schemes targeting SMEs).

<sup>15</sup> See Bloom et al. (2013), Bloom et al. (2016), Bloom and Van Reenen (2007), Bruhn et al. (2018), Cetto et al. (2020), Giorcelli (2019), Schivardi and Schmitz (2020) and Schivardi et al. (2021).

<sup>16</sup> Logistic regressions, which control for firm's age, size (using the Enterprise Survey's classification of small/medium/large firms), sectoral classification and the country of the surveyed firm, are used to establish key correlates of firms' survival and adaptation responses (see Annex, Tables A.2–A.7). Based on these regressions, average predicted probabilities are computed.

whether the firm filed for insolvency, closed operations permanently or temporarily, or expected to fall into arrears. Firms could also mitigate the impact of the crisis by adjusting their production and increasing online delivery of production and services, performing work remotely and taking advantage of policy support. As firms' responses are likely to go in a similar direction within a group of outcomes, to avoid drawing inferences based on selected questions, the analysis relies on an index, constructed as the average across responses within a group (Kling et al, 2007). Specifically, the "Resilience index" is constructed as a simple average across firms' responses to questions indicating potential distress, namely whether the firm had to file for bankruptcy, close permanently or temporarily, and whether it expected to fall into arrears, where each indicator takes the value of 1 if the firm did not experience distress and 0 otherwise. In the same spirit, the "Adaptation index" is constructed as the simple average across firms' responses to questions about business activity online, delivery of goods and services, increase in remote work, adjustment in production or services, and access to policy support. The estimated effects using these indicators as dependent variables could be interpreted as the average effect on firm resilience and adaptation.

### 1.4.1. The role of productivity

**The pandemic could affect firm and aggregate productivity via several channels.** As argued by Fuentes and Moder (2021), the pandemic could lock resources into unproductive sectors, slowing down the reallocation of inputs towards fast-growing firms and industries. Innovation might be impaired through lower spending on research and development (R&D) due to heightened uncertainty in the private sector and consolidation needs in the public sector, while the spread of knowledge within and across countries could weaken due to reduction in travel and in-person interactions. On the positive side, the increased use of digital technologies, remote work or the adoption of other innovative management and production practices could improve productivity, including by spurring on the digital transformation. The Enterprise Survey data provide useful insights into the interplay between firm productivity and the pandemic, and the likely implications for future developments in productivity.

**More productive enterprises weathered the crisis significantly better.**<sup>17</sup> Multivariate regressions uncover a strong correlation between the productivity of a firm prior to the pandemic and its resilience to the shock during the pandemic. Firms at the 90<sup>th</sup> percentile of the productivity distribution prior to the pandemic were 7-9 percentage points less likely to close down their business permanently or temporarily than firms at the 10<sup>th</sup> percentile (Figure 8, Panel A). Furthermore, the most productive firms were less likely to expect to fall into arrears. They were also three times less likely to file for bankruptcy or insolvency, though this difference is statistically insignificant.

**Firms that were more productive were also better at adapting to the pandemic.** They were more likely to make use of digital technologies – introducing or extending online sales and switching to remote work – as well as to access policy support than their less productive peers (Figure 8, Panel B). As discussed in Harasztosi and Savšek (forthcoming), they were also less likely to lay off employees or adjust production by reducing weekly working hours compared with low productivity firms, even after taking account of differences across sectors.

**Taken together, these findings indicate that the pandemic may have important consequences for corporate sector productivity.** The initial evidence is consistent with a cleansing effect of the COVID-19 crisis, which forced out firms with lower labour productivity, although the full impact of the pandemic on firm exit can only be gauged once the virus is under control and policy support has been withdrawn. The findings to date indicate that the pandemic may also widen the gap between more and less productive firms. The most productive enterprises were less hit by the COVID-19 shock and made more efforts to leverage digital technologies. The productivity gains from the digitalisation of the already more productive enterprises may amplify the difference between the least and most productive firms both across and within sectors.

<sup>17</sup> Firm-level productivity is measured as real sales per employee. The reason for this choice is twofold. First, statistics on real sales per employee are reported by all firms whereas total factor productivity (TFP) is only reported by manufacturing firms in the sample. Second, reporting of labour productivity or TFP appears to be non-random across firms – firms with higher sales per employee are more likely to report TFP, which introduces selection bias (Harasztosi and Savšek, forthcoming).



## 1.4.2. The role of integration into global markets

**Firms with links abroad were more likely to adapt to the pandemic.** The analysis for firms integrated into global value chains (GVCs) is not conclusive in terms of resilience despite the slightly lower likelihood of these firms reporting having to close temporarily, file for insolvency or expecting to fall into arrears (Figure 8, Panel C).<sup>18</sup> At the same time, participants in GVCs scored significantly better than domestically oriented firms in terms of adaptation (Figure 8, Panel D). Globally integrated firms were more likely to start or increase remote working arrangements, adjust production or obtain policy support than firms that did not import or export. EBRD (2021) finds that while internationally active firms were more vulnerable to supply chain disruptions, they were more likely to receive government support. Majority foreign-owned firms were 77% more likely to start or increase remote work during the pandemic than similar domestic firms.

## 1.4.3. The role of management quality, innovativeness and digitalisation

**Firms with higher management quality, those that had been more innovative in the past and those which already had a digital footprint proved better able to adapt during the pandemic (Figure 8, Panels E-J).** While there is no clear-cut pattern in terms of the differences in resilience based on the above-mentioned characteristics of firms, better managed, more innovative and more digitalised firms were significantly more likely to take proactive actions to mitigate the impact of pandemic.<sup>19</sup> For example, firms at the 90<sup>th</sup> percentile in terms of management quality prior to the pandemic were 11 percentage points more likely to increase remote work and 5 percentage points more likely to expand their online presence compared with firms at the 10<sup>th</sup> percentile (Figure 8, Panel F). Likewise, innovative firms were 11 percentage points more likely to start or increase remote work and 6 percentage points more likely to adjust production than firms that were not classified as innovative (Figure 8, Panel H). Firms that had a website in 2019, a crude proxy of digitalisation, were about 7 percentage points more likely to increase remote work and start or increase business activity online than firms that did not have a website (Figure 8, Panel J). Better managed, more innovative firms and digitalised firms were also significantly more likely to access policy support than their peers.<sup>20</sup>

## 1.4.4. The role of gender

**Firms that were owned or managed by women responded proactively to the crisis, despite some evidence of lower resilience.** A sizeable body of literature has documented a positive association between the share of women on corporate boards and in senior management and firm performance during normal times (see Christiansen et al, 2016, among others). But there is little evidence on whether women-led businesses react differently in extraordinary circumstances, such as during the COVID-19 crisis. In terms of resilience, the analysis reveals that firms owned or managed by women were significantly more likely to file for bankruptcy or expect to fall into arrears – a pattern similar to findings by Bloom et al (2021) for US small businesses and by Hyland et al (2021) for firms in 41 countries. At the same time, enterprises owned or managed by women were significantly more likely to adapt by starting or increasing delivery services, conducting remote work, and adjusting production. Further analysis would be needed to identify the reasons for their lower usage of policy support, and the extent to which it might reflect demand versus supply factors (Figure 9).

<sup>18</sup> Participants in GVCs are defined as firms that both import and export at least 10% of their sales – see more in Chapter 2 of this report.

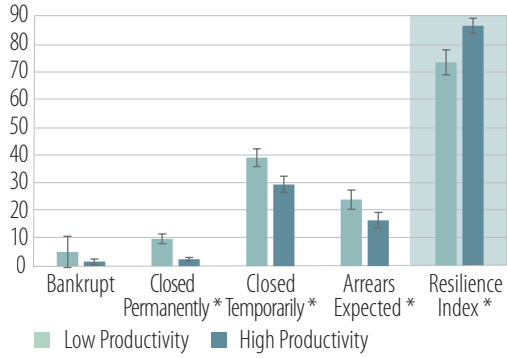
<sup>19</sup> Management quality is defined as the z-score of firms' abilities to fix problems in the production process, monitor performance indicators, have production targets and provide incentives for managers, as reported in the most recent Enterprise Survey conducted prior to the pandemic. Innovativeness is an indicator that equals 1 if a firm has introduced a new product, service or process in the three years prior to the COVID-19 crisis. Digitalisation is an indicator taking the value of 1 if a firm had a website before the pandemic began.

<sup>20</sup> Figure 8 shows results from separate regressions based on the relevant firm characteristics. Results from an integrated regression including all firm characteristics as regressors suggest that for firm resilience, firm productivity is more material, whereas for firm adaptation, productivity, innovation and digitalisation appear to be more important.

**Figure 8**  
**Determinants of resilience and adaptation of enterprises in Eastern Europe and Central Asia**

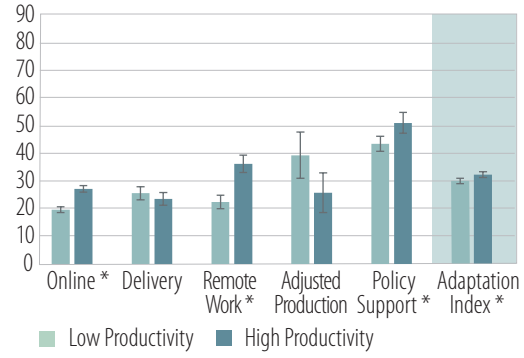
**Panel A**

Productivity and resilience (percent)



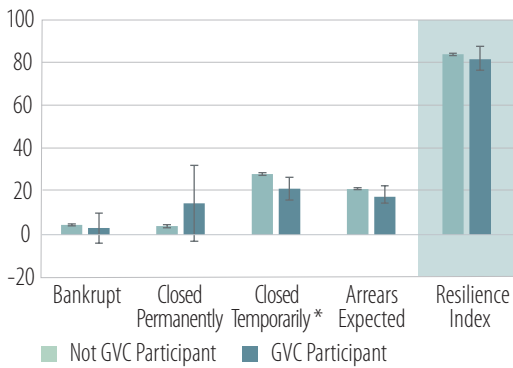
**Panel B**

Productivity and adaptation (percent)



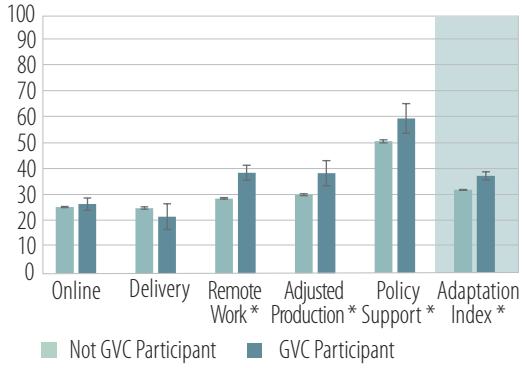
**Panel C**

GVC integration and resilience (percent)



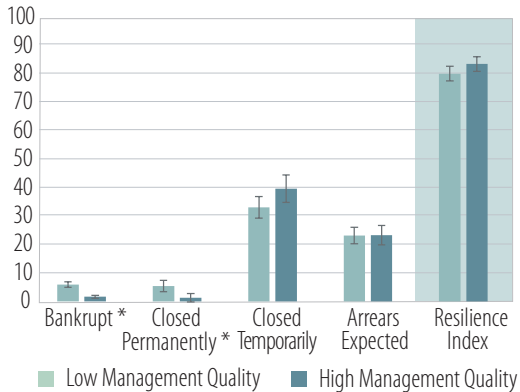
**Panel D**

GVC integration and adaptation (percent)



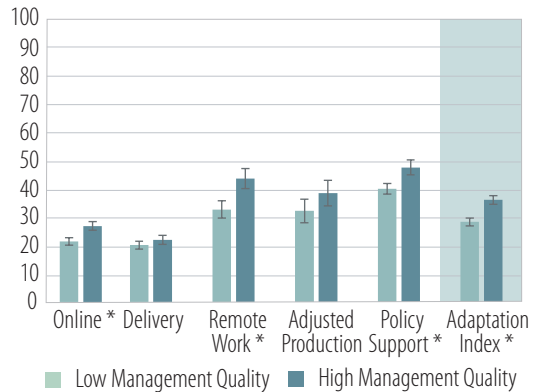
**Panel E**

Management quality and resilience (percent)

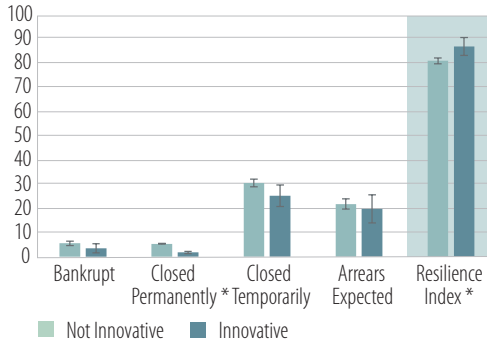


**Panel F**

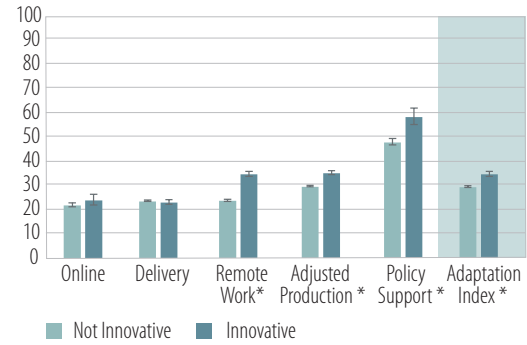
Management quality and adaptation (percent)



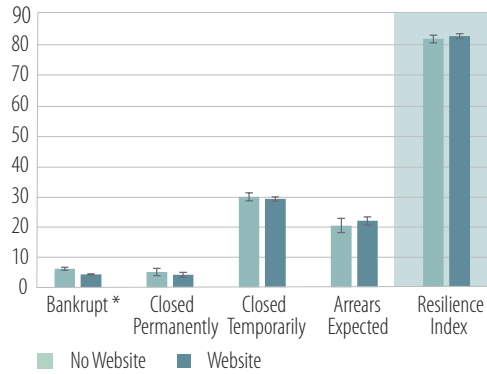
**Panel G**  
Innovativeness and resilience (percent)



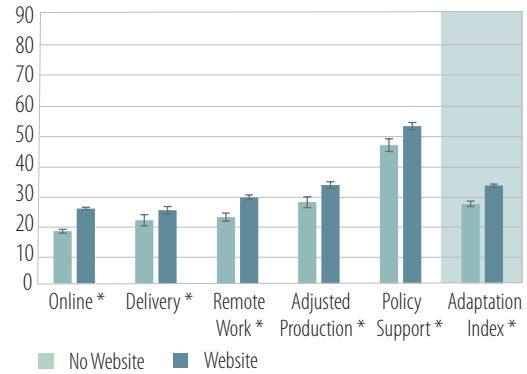
**Panel H**  
Innovativeness and adaptation (percent)



**Panel I**  
Digitalisation and resilience (percent)



**Panel J**  
Digitalisation and adaptation (percent)



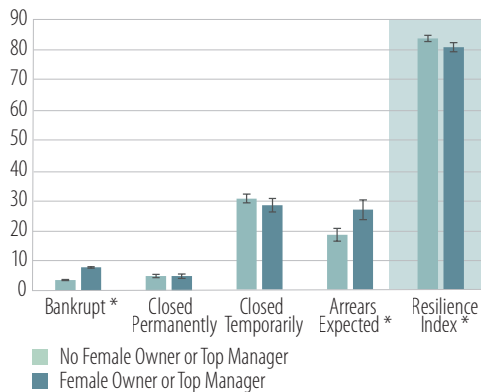
Source: Authors' calculations based on COV-ES.

Notes: The charts plot the average predicted probability of the outcome of interest based on separate logit regressions on the relevant firm characteristic (indicated in each panel), country and sector fixed effects, and controls for firm size and age. Standard errors are clustered at the country level. The error bands denote the 90% confidence interval around the predicted outcome of interest. Stars indicate statistical significance at the 10% level or better. "High productivity" firms are those at the 90th percentile of the productivity distribution, and "low productivity" firms are those at the 10th percentile of the productivity distribution. Similarly, "high management quality" firms are defined as those at the 90th percentile the distribution of management quality, while "low management quality" firms are defined as those at the 10th percentile. See footnotes 17, 18, 19 and main text for details on the definition of productivity, GVC, management quality, innovation, digitalisation, Resilience index and Adaptation index.

**Figure 9**  
**Resilience and adaptation of women-owned/led enterprises in Eastern Europe and Central Asia**

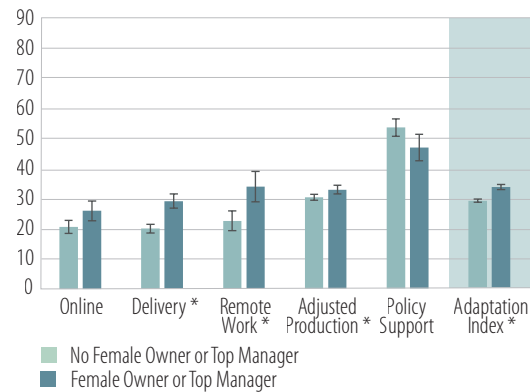
**Panel A**

Gender and resilience (percent)



**Panel B**

Gender and adaptation (percent)



Source: Authors' calculations based on COV-ES.

Notes: The charts plot the average predicted value of the outcome of interest based on logit regressions on an indicator for women ownership or top management, country and sector fixed effects, and controls for firm size and age. Standard errors are clustered at the country level. The error bands denote the 90% confidence interval. Stars indicate that the variable for women is statistically significant at the 10% level or better.

### 1.4.5. Robustness

**Several robustness exercises broadly corroborate the baseline results.** The main findings are qualitatively similar in a restricted sample, which excludes, in turn, large firms, some of the most affected services sectors (such as transport, hotels and restaurants, and real estate), and countries where the first COV-ES wave was conducted in early 2021 (for example, Bosnia and Herzegovina, Serbia and Montenegro). The results are also broadly robust to restricting the sample to Eastern Europe and Central Asia (for example, dropping firms from Southern Europe, which were included in the baseline regressions to increase the sample size).

**The key findings are generally confirmed when using data from the second wave of the COVID-19 Follow-up Enterprise Surveys.** The data from these surveys cover the period from November 2020 to February 2021 and are available for all but nine of the countries included in the regression analysis. Combining firms' responses from the first and second COV-ES waves produces broadly similar results. This finding suggests that, in general, the aforementioned patterns of firm resilience and adaptation are likely to have persisted beyond the early months of the pandemic.

## 1.5. Access to finance and policy support

**This section takes a deeper dive into how the capital structure of firms shaped their resilience during the pandemic.** In a frictionless financial environment without transaction costs or information asymmetries, a firm's capital structure – namely whether it chooses to finance its operations through debt or internal sources (equity) – does not affect its value (Modigliani and Miller, 1958). Yet in the real world, there are many different frictions that make capital structure matter (Bodie and Merton, 2000). Such frictions could be amplified in periods of economic and financial stress, when the firm's capital structure matters not only through the cost at which it can obtain funds but, more importantly, through its ability to tap funding for business continuity. For example, firms without a pre-established relationship with a bank or liquidity facilities may be unable to resort to external funding due to a deterioration in creditworthiness. The experience of enterprises in the region during the pandemic confirms this was indeed the case.

**The COVID-19 crisis tested firms' capacity to absorb a severe liquidity shock.** In the beginning of the pandemic, many firms faced an acute lack of liquidity as sales plunged and creditors shied away from corporates amid high uncertainty.<sup>21</sup> Liquidity shortages can adversely affect the financial situation and operating ability of otherwise healthy firms, especially if they rely on external finance for their operations. For example, firms relying on bank funding may be unable to roll over their maturing debt, which could trigger insolvency procedures. On the other hand, firms funding their working capital with internal equity may be able to draw on their retained earnings to continue operations during the pandemic.

**This section provides several pieces of evidence that illustrate the importance of firms' capital structure for their resilience in the pandemic.**<sup>22</sup> It begins by documenting how enterprises typically fund themselves in the region. It then examines whether firms' likelihood of survival during the pandemic, given the turnover shocks they experienced, is shaped by their funding strategy. In particular, it assesses whether firms with access to liquidity lifelines, either from informal sources, such as the corporate group to which they belong, formal sources, such as bank overdraft facilities, or governments, in the form of various types of policy support, had lower likelihood of bankruptcy.

**Firms in the region mostly use internal funds for their working capital needs.**<sup>23</sup> The share of day-to-day operations financed by internal equity averages about 75%, with two in five firms reporting 100% internal funding. Debt instruments used by enterprises are split roughly equally between bank loans (at 11% of total firm finance), and credit from suppliers (at 12% of the total). Financing from bonds accounts for only 0.03% of working capital funding. While large firms and SMEs draw on equity, loan funding and credit from suppliers to a similar extent, large firms rely significantly more on bonds (0.2% compared with 0.02% for SMEs).

**A significant share of firms belongs to a corporate group and receive substantial intragroup funding.** In the full sample, one in five firms belong to a corporate group, with the share rising to over a half among large firms. Firms that are part of a corporate group cover between two-thirds and three-quarters of their total working capital needs with funds received from the group.<sup>24</sup>

### 1.5.1. The role of internal funds and informal financial lifelines

Table 1 presents the odds ratios based on a logit regression in which firm outcomes are regressed on various measures of access to formal and informal lifelines. All regressions account for pre-pandemic use of bank finance, country and sector fixed effects, firm size category and firm age.

21 It has been argued that excessive uncertainty, tail risks and asymmetric information on firms' viability may deter banks from granting credit during the pandemic, particularly to firms operating in affected sectors or to small businesses without established lending relationships before the crisis (Ebeke et al, 2021b).

22 The interaction between solvency and liquidity risk is a key area of focus of the recent literature on bank stress testing – see, among others, BIS (2015) and Cont et al (2020).

23 For a more detailed discussion of firms' access to finance in a larger sample of firms and covering a broader set of indicators, see Chapter 4 of this report.

24 Some studies have examined the role of bank ownership in credit growth during the global financial crisis – see, for example, De Haas et al (2012). But the literature on corporate ownership and firm resilience is scarce.

**Table 1**  
**The role of internal funds, informal, and formal lifelines**

Probability of bankruptcy (Y/N)	(1)	(2)	(3)	(4)	(5)
Internal finance (Y/N)	0.314*** (0.135)				
Group (Y/N)		0.341*** (0.046)			
Overdraft (Y/N)			0.651** (0.114)		
Checking (Y/N)				0.165*** (0.011)	
Income gearing					1.404 (0.511)
Medium	1.573 (1.615)	1.065 (0.412)	1,244 (0.240)	1.074 (0.135)	0.143*** (0.106)
Large	0.586 (0.301)	0.343*** (0.042)	6.720*** (1.024)	3.048*** (0.127)	0.141* (0.142)
Firm age	0.527*** (0.006)	0.346*** (0.067)	0.441*** (0.045)	0.546*** (0.017)	0.674 (0.435)
Observations	6,073	8,399	8,963	9,104	1,268

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions, where a value lower than 1 means a less likely outcome. The dependent variable is the probability of bankruptcy. Independent variables include "Internal finance" (1 if the firm funds 100% of its working capital and investment with internal funds or does not invest; 0 otherwise); "Group" (1 if the firm belongs to a corporate group; 0 otherwise); "Overdraft" (1 if the firm has access to an overdraft facility; 0 otherwise); "Checking" (1 if the firm has a checking/savings account; 0 otherwise); and "Income gearing" defined as the ratio of total outstanding credit to sales pre-COVID-19. The constant term is omitted. For firm size, the omitted category is "small". All regressions include country and sector fixed effects. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

**Regression analysis confirms the significant advantage of belonging to a group in terms of firm resilience during the pandemic.** The marginal probability of bankruptcy decreases by 0.4 percentage points when a stand-alone firm becomes part of a corporate group and is statistically very significant. This is also reflected in the odds of bankruptcy, which is 34% that of a stand-alone firm (Table 1, column 2). Moreover, firms that experienced larger turnover shocks benefited more from belonging to a group, as did firms that did not have access to more formal liquidity lifelines, such as bank overdrafts.

**It is notable that firms that relied fully on internal funding prior to COVID-19 were also less likely to exit during the initial phase of the crisis.** Consistent with the findings of Chapter 4, firms that relied on internal funding for both their working capital needs and their purchases of fixed assets pre-pandemic were less likely to become insolvent during the pandemic (Table 1, column 1). One interpretation of this finding is that these firms had better liquidity risk management or lower liquidity risk from existing buffers. Access to finance could play a double role during periods of acute stress. While banked establishments with a checking or savings account were more resilient, as their pre-existing relationship with a bank helped them access external finance to close liquidity gaps, firms that used bank credit to fund their daily operations were more exposed to liquidity stress from rollover risk (Table A.8). Likewise, firms with higher income gearing pre-pandemic were more likely to become insolvent due to higher leverage, although the effect is not statistically significant.

## 1.5.2. The role of formal financial lifelines

**Firms with financial lifelines from the banking sector are also likely to be more resilient as they could draw down contingent liquidity to weather the crisis.** In the region, over 40% of firms had overdraft facilities in 2019. This includes firms that use external financing – of those, half of the firms had overdraft facilities – as well as firms that fund their working capital needs exclusively with internal financing – of those, 25% also had access to overdraft facilities.

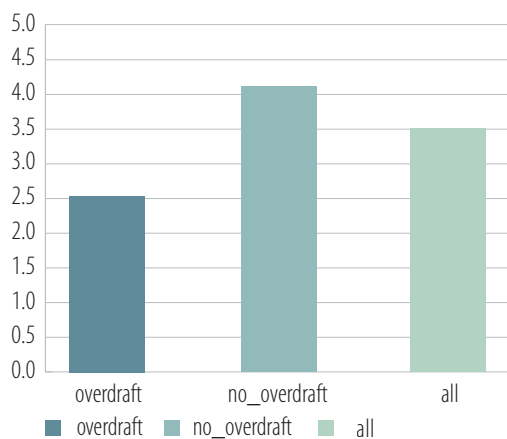
**One of the key characteristics shared by resilient firms is their access to overdraft facilities pre-COVID-19.** As shown in Figure 10, Panel A, the average predicted likelihood of bankruptcy declines from 4.1% for firms without an overdraft facility to 2.5% for firms with overdraft facilities. Overdraft facilities especially helped firms that use bank finance to fund their working capital needs, as they are more vulnerable to liquidity shocks due to higher rollover risk (Table A.8).

**Figure 10**

### Access to finance and firm resilience: predicted probability of bankruptcy

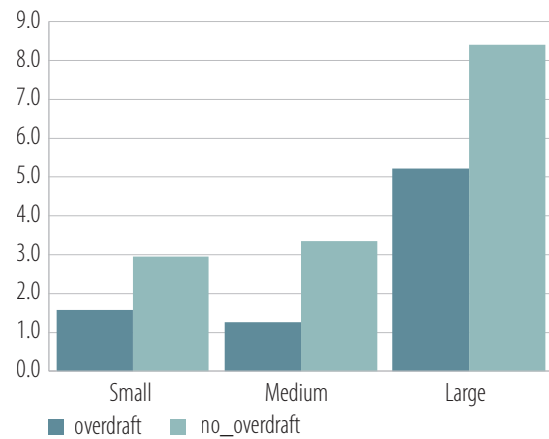
#### Panel A

Overall (percent)



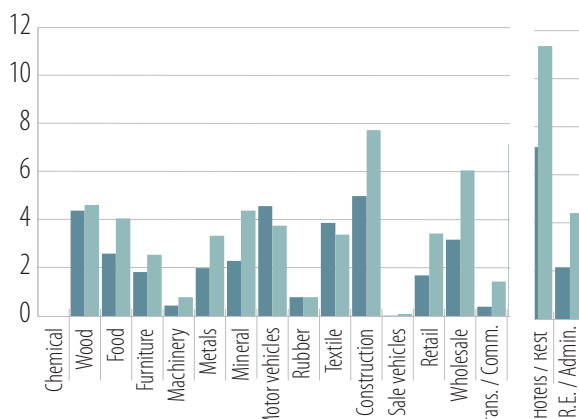
#### Panel B

By firm size (percent)



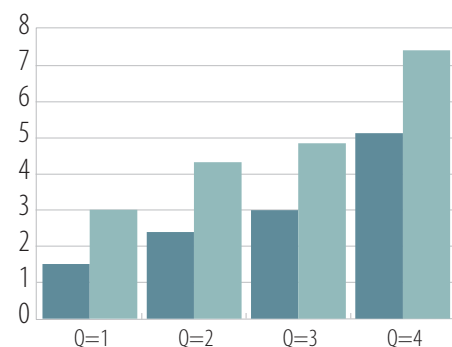
#### Panel C

By industry (percent)



#### Panel D

By quartile of sales decline due to COVID-19 (percent)



Source: Authors' calculations based on COV-ES.

Note: The charts plot the average predicted probability of bankruptcy based on logit regressions on overdraft, country and sector fixed effects, and controls for firm size and age. Panel D segments firms in quartiles in terms of the COVID-19 shock reported at the time of COV-ES in 2020 relative to the same month in 2019 with Q=1, Q=2, Q=3, and Q=4 denoting the sales drop quartiles.

**Overdraft facilities help to build stronger firms across key performance metrics.** The odds of bankruptcy of a firm with an overdraft is 65% that of a firm with no overdraft (Table 1, column 3)<sup>25</sup>. The findings hold for different types of firms (Figure 10, Panels B-D) and measures of resilience (Table 2). Focusing on large firms, the decline in the likelihood of bankruptcy for firms with overdraft facilities is larger, at 3.2 percentage points. Results hold across industries, with the accommodation and food services sector registering the largest drop in predicted bankruptcy at 4.2 percentage points. When the firm-specific size of the COVID-19 shock is factored in, firms in the upper quartile of the shock distribution saw the largest decline in bankruptcy rates: by 2.3 percentage points. Firms with overdraft facilities were also less likely to close temporarily, to be overdue on obligations to financial institutions, to delay payments to suppliers, landlords or tax authorities, or to expect to fall into arrears. Having an overdraft facility is associated with a lower number of months for sales to get back to normal and higher expected survival rates if sales were to stop by one week.

**Table 2**  
**The impact of overdraft facilities on firm resilience**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Temp. closed (Y/N)	Normal sales	Survival	Sales decline	Overdue (Y/N)	Delayed (Y/N)	Expect. arrears (Y/N)
Overdraft (Y/N)	0.938* (0.036)	-0.322*** (0.093)	1.296 (1.368)	-2.956*** (0.594)	0.968 (0.075)	0.837 (0.101)	0.885 (0.183)
Medium	1.140 (0.128)	-1.196*** (0.417)	-0.255 (0.372)	-1.456 (4.037)	1.170** (0.083)	0.914 (0.129)	1.024 (0.209)
Large	2.095** (0.689)	-1.444*** (0.215)	-2.956 (2.069)	-7.767*** (2.034)	2.174*** (0.170)	1.464** (0.280)	1.547*** (0.225)
Firm age	0.773*** (0.026)	-0.448** (0.180)	1.887 (1.139)	-1.147** (0.441)	0.764*** (0.029)	0.733** (0.108)	0.788** (0.095)
Constant	1.217 (0.711)	6.295*** (0.702)	14.274*** (3.956)	52.368*** (2.704)	0.134 (0.164)	1.021 (0.753)	0.557 (0.207)
Observations	10,867	9,475	9,147	6,744	10,810	11,024	10,450
R-squared		0.112	0.081	0.225			

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions, where a value lower than 1 means a less likely outcome, except columns (2), (3), and (4) which report estimates from OLS. The dependent variables include "Temp. closed" (1 if the firm closed temporarily due to COVID-19; 0 otherwise); "Normal sales" is the number of months that the firm expects sales will get back to normal. "Survival" is the number of weeks that the firm expects to remain open if sales stopped. "Sales decline" is the change in sales in the last month preceding the survey relative to the same period in 2019, conditional on the firm experiencing a sales decline. "Overdue" (1 if the firm has been overdue on its obligations to any financial institution since the outbreak; 0 otherwise). "Delayed" (1 if the firm has delayed payments for more than one week to its suppliers, landlords, or tax authorities (excluding moratoriums); 0 otherwise); "Expect. arrears" (1 if the firm expects to fall into arrears in the next six months; 0 otherwise). For firm size, the omitted category is "small". All regressions include country and sector fixed effects. Robust standard errors are clustered by country. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

### 1.5.3. The role of corporate support policies

**Large-scale policies were deployed to support corporates and ensure that firms had sufficient liquidity.** Such schemes focused predominantly on SMEs, which were deemed to be particularly at risk and enterprises hit disproportionately by the pandemic. For example, the European Commission amended the EU State Aid Temporary Framework in June 2020 and again in October 2020 to support micro, small and start-up firms further, and those facing a decline in turnover of at least 30%, by enabling governments to contribute to firms' fixed costs. Likewise, many governments in Europe provided additional support for firms that suffered significant damage because of COVID-19.

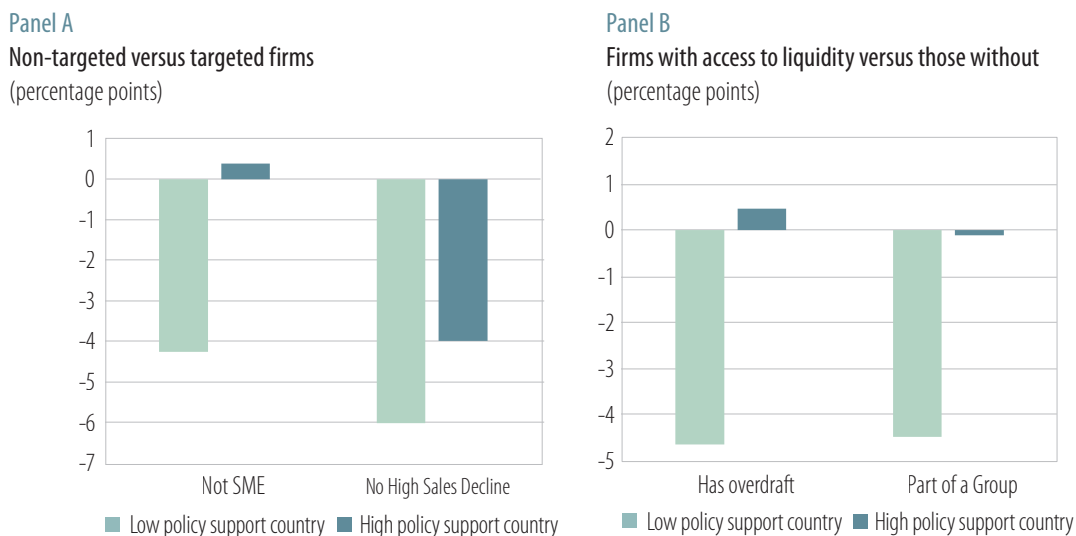
25 In a horse race with the five drivers of bankruptcy shown in Table 1, only financial lifelines (i.e. group, overdraft) remain statistically significant.



**The analysis takes advantage of the targeting embedded in the design of most corporate support policies to examine whether policies were effective in boosting firm resilience.** The highly endogenous take-up of government support schemes makes assessing the causal impact of policies, based on firms' reported use of government schemes, very challenging. To circumvent this challenge, the analysis employs a difference-in-difference strategy. Given the targeted nature of the support, one would expect the resilience of firms eligible for policy support, as captured by the likelihood of not filing for bankruptcy, to be higher in countries that deployed larger policy packages. Targeted firms are defined as micro, small and medium-sized enterprises, and firms experiencing at least a 30% decline in turnover during the last month preceding the survey, based on the definition laid out in the EU State Aid Temporary Framework.<sup>26</sup> Because the role of policies is evaluated at the country level, the analysis circumvents potential endogeneity problems from policies reaching weaker firms.

**The findings indicate that policies were broadly effective, especially in supporting SMEs (Figure 11, Panel A).** Even though SMEs were on average more likely to experience bankruptcy even after controlling for the size of the shock, the use of bank finance, country and sector fixed effects, the results suggest that in countries with larger fiscal packages, the gap in bankruptcy rates between SMEs and non-SMEs was significantly smaller. The ratio between the odds of a non-SME and an SME experiencing bankruptcy is 2.7 times when policy support increases by 1% of GDP (Table 3). The picture is more mixed for distressed firms. The analysis suggests that the bankruptcy gap between firms that were hit by larger sales declines and the rest is narrower in countries with larger policy support. But focusing on firms that suffered extraordinary turnover losses (exceeding 30%), the findings indicate that policies were less able to support firms that were especially hard-hit by the pandemic. Specifically, the ratio between the odds of bankruptcy of a firm with no high sales decline relative to a firm hit by extreme losses is 97% when corporate relief increases by 1% of GDP.

**Figure 11**  
Differences in predicted bankruptcy rates in high versus low corporate support countries



Source: Authors' calculations based on COV-ES, and IMF Regional Economic Outlook database on national corporate policy measures during COVID-19.

Notes: The charts plot the difference in the average predicted bankruptcy between firms not targeted by policy support versus those targeted by policy support (Panel A), and firms with access to formal or informal liquidity versus those without it (Panel B). Targeted firms for policy support are proxied by whether the firm is considered an SME according to the European Commission classification (that is, has less than 250 employees), or whether it has experienced a sales decline greater than 30%. Access to liquidity is proxied by having an overdraft facility or being part of a group in Panel B. A low policy support country is a country at the 10th percentile of the distribution of corporate support. A high policy support country is one at the 90th percentile of the distribution of corporate policy support. Predicted bankruptcy rates are based on logit regressions on the relevant firm characteristic (indicated in each panel), country and sector fixed effects, controlling for firm size and age. See also notes to Tables 3 and 4.

<sup>26</sup> This section uses the European Commission category of micro, small and medium-sized enterprises, which comprises firms with fewer than 250 employees. This is to be consistent with eligibility criteria for SMEs under the EU State Aid Temporary Framework measures to support the economy during the COVID-19 outbreak.

**Table 3**  
**The impact of policies on the likelihood of bankruptcy**

Probability of bankruptcy (Y/N)	(1)	(2)	(3)
SME (Y/N)	32.668*** (41.418)		
Not SME *policy support	2.690*** (0.503)		
High sales decline (Y/N)		8.159*** (0.671)	
No high sales decline* policy support		0.973** (0.013)	
Sales decline			1.062*** (0.003)
Sales decline*policy support			0.996*** (0.001)
Firm age	0.510*** (0.026)	0.594*** (0.019)	0.637*** (0.025)
Observations	6,408	6,537	3,849

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions, where a value lower than 1 means a less likely outcome. The dependent variable is the probability of bankruptcy. Independent variables include "SME" (1 if the firm employs fewer than 250 persons according to the European Commission definition under the Temporary Framework for state aid; 0 otherwise); "High sales decline" (1 if the change in sales is  $\leq -30\%$ , and 0 otherwise; this threshold is used by the Commission to define a firm especially hit by the coronavirus crisis under the EU temporary framework for state aid); "Sales decline" is the change in sales in the last month preceding the survey relative to the same period in 2019, conditional on the firm experiencing a sales decline; and "Policy support" is the size of the corporate aid schemes that were announced in 2020 as a share of GDP (they includes wage subsidies; grants; and guarantees). Results are robust to considering each aid scheme separately. All regressions include other firm specific variables (use of bank finance; size), country and sector fixed effects. Results are robust to an OLS specification. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively."

**Government lifelines played a stabilising role by helping firms that lacked support from other sources (Figure 11, Panel B).** Corporate sector policies limited bankruptcies of firms that did not have overdraft facilities to a greater extent than for firms with overdraft facilities. For example, the ratio of the odds of a firm experiencing bankruptcy with no overdraft facilities relative to a firm with an overdraft facility is 0.621 when policy support increases by 1% of GDP (Table 4). Among the firms that do have overdraft facilities, government support seems to have helped SMEs more than large firms, suggesting an effective use of policies to alleviate financial constraints for SMEs even when they had lifelines from the banking sector.

**Corporate sector policies were also more effective in supporting firms that were not part of a corporate group.** The analysis suggests that in countries with large-scale policies, the odds of a stand-alone firm experiencing bankruptcy vis-à-vis a firm belonging to a group is about three-quarters of that in countries with smaller packages (Table 4). These findings are consistent with the view that government policies helped firms that lacked mechanisms that they could draw on for liquidity support in times of need.

**Table 4**  
**The stabilising role of government policies**

Probability of bankruptcy (Y/N)	(1)	(2)
Overdraft (Y/N)	0.052** (0.061)	
No overdraft* policy support	0.612*** (0.092)	
Group (Y/N)		0.138*** (0.041)
No group* policy support		0.751*** (0.037)
Firm age	0.567*** (0.007)	0.549*** (0.006)
Observations	6,440	6,104

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions, where a value lower than 1 means a less likely outcome. The dependent variable is the probability of bankruptcy. Independent variables include "Overdraft" (1 if the firm has access to overdraft facilities; 0 otherwise); "Group" (1 if the firm belongs to a group; 0 otherwise); and "Policy support" is the size of the corporate aid schemes that were announced in 2020 as a share of GDP (they include wage subsidies; grants; and guarantees). Results are robust to considering each aid scheme separately. All regressions include other firm specific variables (use of bank finance; size), country and sector fixed effects. Results are robust to an OLS specification. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10, 5 and 1 per cent levels respectively."

## 1.6. Conclusions and policy implications

### **The initial wave of the pandemic was a major shock for firms in Eastern Europe and Central Asia.**

The pandemic led to a sharp contraction in economic activity in the region, with growth plunging to -4% in 2020. According to the Enterprise Survey, during May-October 2020, firms lost 25% of turnover relative to the same period in 2019 and had to shed 11% of their labour force. Enterprises in contact-intensive services sectors were hit especially hard, with the decline in sales reaching 50% in the accommodation and food services sector.

**To date, enterprises have come through the pandemic better than initially feared.** Massive policy support helped to prevent large-scale business failures and a spike in unemployment. Despite the large decline in sales, only 4% of firms in the region have filed for insolvency since the outbreak or were closed permanently at the time that the first wave of the COVID-19 Follow-up Enterprise Surveys was conducted. For the limited set of countries for which up-to-date data are available, bankruptcy rates declined quite substantially in 2020 consistent with the policy support and temporary relief on filing for insolvency. But vulnerabilities remain high and bankruptcies could rise when fiscal and monetary support is phased out and banks tighten funding conditions, particularly for firms with weak balance sheets or operating in risky sectors.

**The analysis in this chapter reveals that firms' resilience and their ability to adapt to the pandemic were shaped by several firm characteristics.** Firm productivity, integration into global markets, management quality, digitalisation and innovativeness all played a role in firms' ability to weather the crisis and adapt to the new circumstances. Firms that were more productive before COVID-19 were less likely to close their businesses, expect to fall into arrears or end up in bankruptcy when the pandemic hit. Instead, they proactively expanded online business activity, switched to remote work and availed themselves of policy support. Firms that were integrated into GVCs, those that had been more innovative in the past and those that were more digitalised and had higher management quality also proved more adaptive during the pandemic. They expanded their online presence, switched to remote work, adjusted production or took better advantage of the policy support at hand.

**Financial lifelines provided by banks or corporate groups played a crucial role in enhancing survival.** There is strong evidence that a firm's funding structure matters for its resilience during times of stress. Firms that were able to fund their day-to-day operations internally pre-pandemic and those that belonged to a corporate group and could rely on intragroup funding were less likely to experience bankruptcy during the initial phase of COVID-19. Yet access to formal financial markets, such as having an overdraft facility with a bank, proved to be a powerful insurance tool.

**While causal interpretation is challenging, the analysis in this chapter finds evidence that the policies deployed by governments to support the corporate sector were effective in mitigating stresses on vulnerable firms.** SMEs, firms lacking overdraft facilities and stand-alone firms operating in countries with larger corporate support programmes, in the form of wage subsidies, grants and guarantees, fared better than their peers. This is consistent with the view that government programmes played a stabilising role by helping more those firms that were in greater need and had fewer outside options, such as SMEs and firms without a contingent liquidity source. At the same time, there is no evidence that policies helped more firms hit by extraordinary turnover losses.

**Taken together, these findings point to several steps that governments could take to build firms' resilience.** First, it will be important to provide an enabling business environment conducive to higher firm productivity, further integration into global markets, better management practices, higher innovation and faster adoption of digital technologies. Helping enterprises to improve in these areas will not only lead to better firm performance during normal times, as argued in Chapter 2 of this report, but will also help firms to withstand and adapt to severe shocks they might face in the future. Second, supporting access to credit for firms remains a priority. As discussed in Chapter 4, the region still has significant gaps in terms of firms' access to finance, and removing credit constraints can boost aggregate growth significantly. Moreover, as the findings in this chapter suggest, improving access to finance can strengthen the resilience of enterprises before the next downturn hits. Finally, while the initial evidence on bankruptcies is not alarming, the full impact of the pandemic on firm exit and the potential for scarring can only be gauged once the virus is fully under control and policy support measures have been withdrawn. It will therefore be important to continue providing targeted support to the most affected viable firms to limit unwarranted bankruptcies, while containing fiscal costs, minimising moral hazard and encouraging resource reallocation. Providing support in the form of equity or hybrid capital instruments and encouraging equity mobilisation particularly for SMEs and firms in hard-hit sectors can help to strengthen firms' balance sheets and reduce future solvency risks.

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## 1.8. Annex

**Table A.1**  
Country coverage and publication timing of ES COVID-19 surveys

Country	ISO code	Region	Number of firms ES Baseline	ES Baseline	COV-ES Round-1	COV-ES Round-2
Albania	ALB	Western Balkans	377	05-2019	06-2020	-
Azerbaijan	AZE	Eastern Neighborhood	225	07-2019	04-2021	-
Belarus	BLR	Eastern Neighborhood	600	04-2019	08-2020	-
Bosnia and Herzegovina	BIH	Western Balkans	362	09-2019	03-2021	-
Bulgaria	BGR	Central and Eastern Europe	772	03-2020	09-2020	12-2020
Croatia	HRV	Central and Eastern Europe	404	11-2019	09-2020	01-2021
Cyprus	CYP	Southern Europe	240	07-2019	06-2020	12-2020
Czech Republic	CZE	Central and Eastern Europe	502	03-2020	10-2020	02-2021
Estonia	EST	Central and Eastern Europe	360	01-2020	10-2020	02-2021
Georgia	GEO	Eastern Neighborhood	581	01-2020	06-2020	11-2020
Greece	GRC	Southern Europe	600	07-2019	06-2020	11-2020
Hungary	HUN	Central and Eastern Europe	805	03-2020	09-2020	02-2021
Italy	ITA	Southern Europe	760	07-2019	06-2020	12-2020
Kazakhstan	KAZ	Central Asia	1,446	02-2019	01-2021	
Latvia	LVA	Central and Eastern Europe	359	01-2020	09-2020	02-2021
Lithuania	LTU	Central and Eastern Europe	358	01-2020	10-2020	02-2021
Malta	MLT	Southern Europe	242	09-2019	09-2020	01-2021
Moldova	MDA	Eastern Neighborhood	360	11-2019	05-2020	11-2020
Mongolia	MNG	Central Asia	360	05-2019	08-2020	02-2021
Montenegro	MNE	Western Balkans	150	07-2019	02-2021	-
North Macedonia	MKD	Western Balkans	360	10-2019	11-2020	-
Poland	POL	Central and Eastern Europe	1,369	12-2019	08-2020	12-2020
Portugal	PRT	Southern Europe	1,062	01-2020	10-2020	02-2021
Romania	ROU	Central and Eastern Europe	814	06-2020	09-2020	12-2020
Russia	RUS	Russia	1,323	07-2019	06-2020	-
Serbia	SRB	Western Balkans	361	10-2019	02-2021	-
Slovak Republic	SVK	Central and Eastern Europe	429	03-2020	10-2020	02-2021
Slovenia	SVN	Central and Eastern Europe	409	11-2019	08-2020	12-2020

Source: Authors' calculations based on COV-ES.

Note: The month displayed is the month the survey was completed, not when it started.



**Table A.2.**  
**Productivity and firm performance**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Bankruptcy	Perm. closed	Temp. closed	Expect. arrears	Online	Delivery	Remote work	Adj. production	Policy support
Productivity	0.737 (0.218)	0.731*** (0.042)	0.886** (0.042)	0.899* (0.051)	1.106*** (0.020)	0.974 (0.037)	1.169*** (0.045)	0.860 (0.097)	1.093* (0.054)
Firm size: medium or large	0.718 (0.198)	1.047 (0.344)	0.829 (0.220)	0.933 (0.199)	1.372*** (0.124)	1.012 (0.071)	1.916*** (0.429)	1.075 (0.118)	0.807 (0.229)
Firm age	0.676 (0.384)	0.695*** (0.068)	0.827** (0.063)	0.919 (0.050)	0.765*** (0.075)	0.834*** (0.054)	1.073 (0.227)	0.960 (0.097)	0.817** (0.070)
Observations	7,745	10,307	9,964	9,603	10,371	10,355	10,390	9,090	10,315

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions where a value lower than 1 means a less likely outcome. The dependent variables include "Bankruptcy (1 if the firm filed for bankruptcy since the pandemic; 0 otherwise); "Perm. closed" (1 if the firm closed permanently since the pandemic; 0 otherwise); "Temp. closed" (1 if the firm closed temporarily since the pandemic; 0 otherwise); "Expect. arrears" (1 if the firm expects to fall in arrears in the next 6 months; 0 otherwise); "Online" (1 if the firm has started/increased online business; 0 otherwise); "Delivery" (1 if the firm has started/increased delivery activities; 0 otherwise); "Remote work" (1 if the firm has started/increased remote work; 0 otherwise); "Adj. production" (1 if the firm has adjusted its production or services; 0 otherwise); "Policy support" (1 if the firm has received policy support; 0 otherwise). The independent variable "Productivity" is labour productivity measured as sales per permanent employee. For firm size, the omitted category is 'small'. Constant is omitted. All regressions include country and sector fixed effects. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

**Table A.3.**  
**Trade and firm performance**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Bankruptcy	Perm. closed	Temp. closed	Expect. arrears	Online	Delivery	Remote work	Adj. production	Policy support
GVC participant	0.657 (1.052)	4.869 (5.740)	0.615* (0.172)	0.760 (0.218)	1.073 (0.103)	0.818 (0.171)	1.699*** (0.173)	1.516*** (0.241)	1.689** (0.426)
Firm size: medium or large	0.673 (0.649)	0.669 (0.301)	0.890 (0.095)	0.771 (0.138)	1.670*** (0.174)	1.177 (0.167)	1.908** (0.539)	0.874 (0.126)	0.771 (0.181)
Firm age	0.366** (0.144)	0.806 (0.151)	0.896 (0.090)	0.829 (0.135)	0.959 (0.044)	0.887*** (0.028)	1.056 (0.096)	1.035 (0.072)	0.790*** (0.044)
Observations	4,623	7,081	7,199	6,872	7,488	7,474	7,501	6,410	7,441

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions where a value lower than 1 means a less likely outcome. The dependent variables include "Bankruptcy (1 if the firm filed for bankruptcy since the pandemic; 0 otherwise); "Perm. closed" (1 if the firm closed permanently since the pandemic; 0 otherwise); "Temp. closed" (1 if the firm closed temporarily since the pandemic; 0 otherwise); "Expect. arrears" (1 if the firm expects to fall in arrears in the next 6 months; 0 otherwise); "Online" (1 if the firm has started/increased online business; 0 otherwise); "Delivery" (1 if the firm has started/increased delivery activities; 0 otherwise); "Remote work" (1 if the firm has started/increased remote work; 0 otherwise); "Adj. production" (1 if the firm has adjusted its production or services; 0 otherwise); "Policy support" (1 if the firm has received policy support; 0 otherwise). The independent variable "GVC participant" is defined as 1 if the firm has direct exports and imports greater than 10% of sales and material inputs, respectively; 0 otherwise. For firm size, the omitted category is 'small'. Constant is omitted. All regressions include country and sector fixed effects. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

**Table A.4.**  
Innovation and firm performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Bankruptcy	Perm. closed	Temp. closed	Expect. arrears	Online	Delivery	Remote work	Adj. production	Policy support
Innovative	0.595 (0.288)	0.315*** (0.056)	0.714 (0.172)	0.869 (0.291)	1.145 (0.131)	0.970 (0.046)	1.829*** (0.085)	1.316*** (0.045)	1.723*** (0.281)
Firm size: medium or large	1.319 (0.420)	0.978 (0.247)	0.888 (0.143)	1.023 (0.204)	1.442*** (0.122)	1.010 (0.051)	1.679** (0.402)	0.997 (0.107)	0.618 (0.202)
Firm age	0.365*** (0.031)	0.700*** (0.080)	0.865*** (0.020)	0.832* (0.089)	0.790*** (0.056)	0.713*** (0.034)	0.934 (0.055)	1.051* (0.032)	0.979 (0.055)
Observations	9,065	11,571	11,007	10,575	11,480	11,462	11,498	9,948	11,418

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions where a value lower than 1 means a less likely outcome. The dependent variables include "Bankruptcy" (1 if the firm filed for bankruptcy since the pandemic; 0 otherwise); "Perm. closed" (1 if the firm closed permanently since the pandemic; 0 otherwise); "Temp. closed" (1 if the firm closed temporarily since the pandemic; 0 otherwise); "Expect. arrears" (1 if the firm expects to fall in arrears in the next 6 months; 0 otherwise); "Online" (1 if the firm has started/increased online business; 0 otherwise); "Delivery" (1 if the firm has started/increased delivery activities; 0 otherwise); "Remote work" (1 if the firm has started/increased remote work; 0 otherwise); "Adj. production" (1 if the firm has adjusted its production or services; 0 otherwise); "Policy support" (1 if the firm has received policy support; 0 otherwise). The independent variable "Innovative" is defined as 1 if the firm has introduced a new product/service or new/improved process in the past three years; 0 otherwise. For firm size, the omitted category is 'small'. Constant is omitted. All regressions include country and sector fixed effects. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

**Table A.5.**  
Digitalisation and firm performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Bankruptcy	Perm. closed	Temp. closed	Expect. arrears	Online	Delivery	Remote work	Adj. production	Policy support
Website	0.655*** (0.060)	0.812 (0.233)	0.956 (0.077)	1.108 (0.174)	1.690*** (0.075)	1.239* (0.153)	1.487*** (0.125)	1.349*** (0.126)	1.381*** (0.157)
Firm size: medium or large	1.301 (0.467)	0.965 (0.247)	0.875 (0.145)	1.007 (0.203)	1.378*** (0.131)	0.983 (0.055)	1.666** (0.345)	1.008 (0.119)	0.615 (0.194)
Firm age	0.407*** (0.008)	0.740** (0.089)	0.872*** (0.035)	0.833 (0.095)	0.731*** (0.071)	0.696*** (0.049)	0.870*** (0.041)	0.988 (0.046)	0.910*** (0.030)
Observations	9,116	11,633	11,070	10,632	11,546	11,528	11,564	9,999	11,484

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions where a value lower than 1 means a less likely outcome. The dependent variables include "Bankruptcy" (1 if the firm filed for bankruptcy since the pandemic; 0 otherwise); "Perm. closed" (1 if the firm closed permanently since the pandemic; 0 otherwise); "Temp. closed" (1 if the firm closed temporarily since the pandemic; 0 otherwise); "Expect. arrears" (1 if the firm expects to fall in arrears in the next 6 months; 0 otherwise); "Online" (1 if the firm has started/increased online business; 0 otherwise); "Delivery" (1 if the firm has started/increased delivery activities; 0 otherwise); "Remote work" (1 if the firm has started/increased remote work; 0 otherwise); "Adj. production" (1 if the firm has adjusted its production or services; 0 otherwise); "Policy support" (1 if the firm has received policy support; 0 otherwise). The independent variable "Website" is defined as 1 if the firm has its own website prior to the pandemic; 0 otherwise. For firm size, the omitted category is 'small'. Constant is omitted. All regressions include country and sector fixed effects. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

**Table A.6.**  
Management quality and firm performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Bankruptcy	Perm. closed	Temp. closed	Expect. arrears	Online	Delivery	Remote work	Adj. production	Policy support
Management quality (z-score)	0.477*** (0.078)	0.499* (0.210)	1.209 (0.166)	1.004 (0.129)	1.185*** (0.059)	1.064 (0.063)	1.304*** (0.116)	1.168 (0.157)	1.243** (0.121)
Firm size: medium or large	5.145*** (0.902)	1.810 (2.130)	0.755 (0.181)	1.172** (0.095)	1.724*** (0.167)	1.251 (0.405)	1.076 (0.085)	0.823 (0.132)	0.499** (0.166)
Firm age	0.463* (0.184)	1.075 (0.261)	0.594** (0.148)	1.228 (0.230)	0.749 (0.264)	0.687 (0.201)	1.346* (0.209)	0.768 (0.161)	0.908 (0.077)
Observations	4,127	5,381	6,174	5,879	6,360	6,347	6,373	5,531	6,316

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions where a value lower than 1 means a less likely outcome. The dependent variables include "Bankruptcy" (1 if the firm filed for bankruptcy since the pandemic; 0 otherwise); "Perm. closed" (1 if the firm closed permanently since the pandemic; 0 otherwise); "Temp. closed" (1 if the firm closed temporarily since the pandemic; 0 otherwise); "Expect. arrears" (1 if the firm expects to fall in arrears in the next 6 months; 0 otherwise); "Online" (1 if the firm has started/increased online business; 0 otherwise); "Delivery" (1 if the firm has started/increased delivery activities; 0 otherwise); "Remote work" (1 if the firm has started/increased remote work; 0 otherwise); "Adj. production" (1 if the firm has adjusted its production or services; 0 otherwise); "Policy support" (1 if the firm has received policy support; 0 otherwise). The independent variable "Management quality" is the overall management z-score over operations, monitoring, targets, and incentives, weighted equally. For firm size, the omitted category is 'small'. Constant is omitted. All regressions include country and sector fixed effects. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

**Table A.7.**  
Gender and firm performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Bankruptcy	Perm. closed	Temp. closed	Expect. arrears	Online	Delivery	Remote work	Adj. production	Policy support
Female owner or top manager	2.669*** (0.120)	0.981 (0.180)	0.871 (0.126)	1.737** (0.392)	1.417 (0.302)	1.749*** (0.248)	1.913** (0.552)	1.137* (0.087)	0.711 (0.166)
Firm size: medium or large	1.261 (0.444)	0.950 (0.292)	0.889 (0.147)	1.012 -0.189	1.460*** (0.152)	1.030 (0.063)	1.753** (0.405)	1.061 (0.105)	0.670 (0.202)
Firm age	0.392*** (0.010)	0.719*** (0.086)	0.867*** (0.027)	0.851* (0.072)	0.798*** (0.063)	0.720*** (0.034)	0.934 (0.051)	1.030 (0.035)	0.949 (0.041)
Observations	9,068	11,558	10,992	10,559	11,467	11,450	11,485	9,930	11,407

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions where a value lower than 1 means a less likely outcome. The dependent variables include "Bankruptcy" (1 if the firm filed for bankruptcy since the pandemic; 0 otherwise); "Perm. closed" (1 if the firm closed permanently since the pandemic; 0 otherwise); "Temp. closed" (1 if the firm closed temporarily since the pandemic; 0 otherwise); "Expect. arrears" (1 if the firm expects to fall in arrears in the next 6 months; 0 otherwise); "Online" (1 if the firm has started/increased online business; 0 otherwise); "Delivery" (1 if the firm has started/increased delivery activities; 0 otherwise); "Remote work" (1 if the firm has started/increased remote work; 0 otherwise); "Adj. production" (1 if the firm has adjusted its production or services; 0 otherwise); "Policy support" (1 if the firm has received policy support; 0 otherwise). The independent variable "Female owner or top manager" is defined as 1 if the firm has a female owner or top manager; 0 otherwise. For firm size, the omitted category is 'small'. Constant is omitted. All regressions include country and sector fixed effects. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

**Table A.8.**  
**Overdraft and likelihood of bankruptcy**

Probability of bankruptcy	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Overdraft	0.651** (0.114)	-0.017*** (0.005)	0.651** (0.114)	0.651 (0.338)	0.919 (0.241)	0.516*** (0.054)	1.691 (0.944)
Change in sales					0.975** (0.012)		
High sales decline						1.807 (0.986)	
Overdraft*high sales decline						1.473 (0.995)	
Share of financial credit							1.016* (0.009)
Overdraft*share of financial credit							0.948*** (0.004)
Medium	1.244 (0.240)	0.014** (0.006)	1.243 (0.241)	1.244 (0.326)	1.028 (0.273)	1.263 (0.270)	1.417 (0.957)
Large	6.720*** (1.024)	0.162*** (0.051)	6.716*** (1.030)	6.720 (8.157)	0.278*** (0.089)	9.230*** (1.470)	0.507*** (0.103)
Firm age	0.441*** (0.045)	-0.034** (0.013)	0.441*** (0.045)	0.441*** (0.138)	0.509*** (0.050)	0.434*** (0.053)	0.543*** (0.007)
Constant	0.000*** (0.000)	0.053** (0.026)	0.002*** (0.002)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Observations	8,963	11,339	7,820	8,963	8,456	8,963	8,197
R-squared		0.078					

**Source:** Authors' calculations based on COV-ES.

**Note:** The table reports odds ratios from logit regressions where a value lower than 1 means a less likely outcome, except column (2) which reports estimates from OLS. The dependent variable is the probability of bankruptcy. "Change in sales" is defined as the change in sales in the last month preceding the survey relative to the same period in 2019. "High sales decline" (1 if the change in sales  $\leq$  -30 percent based on threshold used by the Commission to define a firm especially hit by the coronavirus crisis under the EU temporary framework for state aid; 0 otherwise). "Overdraft" (1 if the firm has an overdraft facility; 0 otherwise). "Share of financial credit" is defined as the share of working capital funded by credit from banks or other non-bank financial institutions in 2019. For firm size, the omitted category is 'small'. The sample includes all countries in the East region, except column (3) that excludes countries in Southern Europe. All regressions include country and sector fixed effects. Robust standard errors are clustered by country, except column (4) clustered by country/sector. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

**Table A.9.**  
**Access to finance and likelihood of bankruptcy**

Probability of bankruptcy	(1)	(2)	(3)	(5)	(6)
Management quality (z-score)	0.314*** (0.135)				
Checking		0.165*** (0.011)			
Loan/Credit line			1.805*** (0.330)		
Share of financial credit				1.059** (0.028)	
Share of financial credit (squared)				0.999 (0.001)	
Income gearing					1.404 (0.511)
Medium	1.573 (1.615)	1.074 (0.135)	1.282 (0.294)	1.440 (1.021)	0.143*** (0.106)
Large	0.586 (0.301)	3.048*** (0.127)	6.710*** (1.262)	0.634 (0.279)	0.141* (0.142)
Firm age	0.527*** (0.006)	0.546*** (0.017)	0.464*** (0.042)	0.564*** (0.011)	0.674 (0.435)
Constant	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Observations	6,073	9,104	9,006	8,316	1,268

Source: Authors' calculations based on COV-ES.

Note: The table reports odds ratios from logit regressions where a value lower than 1 means a less likely outcome. The dependent variable is the probability of bankruptcy. Independent variables include: "Internal finance" (1 if the firm funds 100% of its working capital and investment internally or did not invest in 2019; 0 otherwise); "Checking" (1 if the firm has a checking/savings account in 2019; 0 otherwise); "Loan/Credit line" (1 if the firm had a loan/credit line in 2019; 0 otherwise); "Share of financial credit" is defined as the share of working capital funded by credit from banks or other non-bank financial institutions in 2019; and "Income gearing" is the ratio of outstanding balance of loans to sales in 2019 winsorised at 1 percent. For firm size, the omitted category is 'small'. All regressions include country and sector fixed effects. Robust standard errors are clustered by country. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.



CHAPTER II

# Trade participation, innovation and competitiveness

## Summary

*The economies of Eastern Europe and Central Asia generally invest more in innovation than comparator economies, although the process is led by adapting new technologies developed elsewhere. Opening up the global economy has been essential for enabling many developing countries to improve their comparative advantages and increase their competitiveness. The industrial composition of more integrated regions in global value chains (GVCs) is clearly focused more on higher value added products, while those that are less integrated are trading mainly manufacturing products with lower value added or raw materials.*

*The evidence in this chapter indicates that trade integration with developed economies, in particular the European Union, access to information and know-how through participation in GVCs, foreign licensed technology and modern management practices are among the most important ingredients for boosting innovation in Eastern Europe and Central Asia.*

*Innovation and trade are closely intertwined. On the one hand, there are significant size and productivity premiums for “traders” – firms engaged with foreign customers and suppliers. Moreover, traders tend to grow faster (in terms of sales) when they also invest in innovation, confirming the idea of self-selection of more productive, larger and innovative firms into trading activities. At the same time, participation in trade has a positive impact on the process of innovation, in line with the “learning-by-exporting” effect.*

*Innovation activities also depend on the places in which firms are located, such as more populated urban centres, where digital infrastructure and skilled labour are available. Consequently, investment in digital infrastructure and improvements in management practices and workers’ skills are key elements of innovation-driven development. This could also help to rebalance discrepancies in terms of development across the region as a whole, and improve business resilience and adaptability to shocks, such as the COVID-19 crisis.*



## 2.1. Introduction

**Over the past three decades, globalisation has been rapidly intensifying, generating opportunities for firms in many countries to enter new markets.** The growth of international trade and the expansion of global value chains (GVCs) have proved to be a powerful means of economic development. Incomes and productivity have increased, while poverty has fallen in many developing countries (World Bank, 2020). Opening up the global economy and the fragmentation of production have been instrumental in enabling these firms to develop comparative advantages in the manufacture of certain products. This has been facilitated by trade liberalisation and declining trade costs, especially after the 1980s.

**More recently, the COVID-19 crisis has disrupted economic activity across the globe.** In particular, global merchandise trade fell by 7% in 2020. The pandemic forced governments to impose strict containment measures, generating international supply and demand shocks across many countries (Baldwin, 2020). While GVCs have remained quite resilient to date, it is an open question whether COVID-19 will have a long-term impact on international trade and the organisation of GVCs.

**International trade is a key determinant of firms' competitiveness and innovation.** Trade participation, profitability and survival are driven by different aspects of the business environment in which firms operate. These include the export capacity of domestic firms in an industry, foreign direct investment, trade costs and barriers, the quality of infrastructure and the availability (or migration) of skilled workers. Trade integration also plays a critical role in shaping the incentives for firms to innovate through various channels, including larger market size, increased competition, induced specialisation and the international spread of knowledge (Melitz and Redding, 2021; Buera and Oberfield, 2020; De Loecker, 2013; Gorodnichenko et al, 2010).

**This chapter examines trade participation and innovation, and how they are intertwined for firms in Eastern Europe and Central Asia.** By analysing cross-sectional and panel data on more than 20 000 private firms in manufacturing and services across more than 30 countries, it explores structural determinants of trade participation and innovation activities. It provides a detailed perspective on firms' competitiveness, labour productivity and management practices, as well as the business environment in which they operate. It also takes a closer look at the importance of innovation hubs close to urban development centres in the context of trading and innovating firms' response to the COVID-19 crisis.

**The analysis puts a special emphasis on firms that participate in global value chains.** As firms' products mature and become more standardised, production processes can be moved from developed countries at the frontier of innovation to countries at lower levels of development. The lag in technological diffusion gives rise to international trade through GVCs (Vernon, 1966; Krugman, 1979) and, at the same time, facilitates the adaptation of new technologies. This, in turn, can raise firm productivity and an economy's aggregate rate of growth (Perla et al, 2021).

**The results show that economies in Eastern Europe and Central Asia generally invest more in innovation activities than comparator economies, even though the innovation process is led by adapting new technologies developed elsewhere.** Innovation and trade are closely intertwined. Trade integration with developed economies, in particular the European Union, access to information and know-how through participation in GVCs, foreign licensed technology and modern management practices are among the most important ingredients for boosting innovation in the region. Innovativeness and connectivity to international markets are important for adapting better and being more resilient to economic shocks such as the COVID-19 crisis.

**Taken together, the findings suggest several measures that policymakers might implement for accelerate economic development, by improving productivity through deeper trade integration and increasing incentives to invest in innovation.** First, improving customs and trade regulations, which will lower entry costs for firms to engage in trade, will increase access to international markets for a larger share of firms, especially smaller ones. But these measures should not only target small firms or give preference to certain groups of firms. Instead, improving the incentives to invest in innovation, in particular for small firms, might be more effective, as small and innovative firms have higher growth prospects and better chances of surviving in international, competitive markets. Second, it will be important to guard against the introduction of restrictions on imports that serve as inputs of production and intermediary goods for domestic firms, in particular for firms participating in GVCs. Third, to increase the participation of local firms in GVCs, reforms to the business environment, through reducing informality and political uncertainty, should be promoted: this will help to create a more stable and predictable operating environment for trading partners and foreign investors, and facilitate the acquisition of foreign licensed technologies by both trading and domestic firms. Finally, policymakers should prioritise investment in digital infrastructure and facilitate improvements in management practices and workers' skills. Governments could encourage intensive training programmes, in particular aimed at improving the management of small and medium-sized enterprises (SMEs) and incentives to reskill the workforce, including in less well connected areas to attract innovative firms. Combined with investment in digital infrastructure, this could help to rebalance discrepancies within the region as a whole, and improve resilience and adaptability to shocks, such as the COVID-19 crisis.

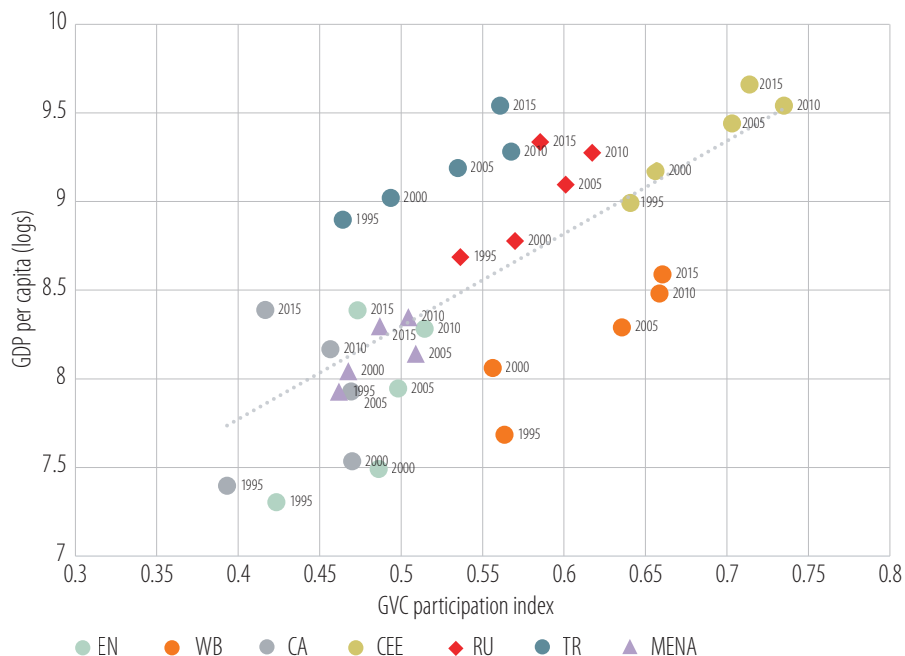
**The rest of this chapter is organised as follows.** Section 2.2 provides an overview of trade integration, economic development and barriers to trade of different sub-regions within Eastern Europe and Central Asia. Section 2.3 discusses innovation activities, management practices and firms' competitiveness, while Section 2.4 explores the interrelationships of trade participation and innovation. Section 2.5 presents evidence on the role of the European Union as a trade facilitator and driver of innovation for the regions, using a gravity model of trade. Section 2.6 concludes with policy implications for fostering private sector development.

**The chapter also includes three boxes.** Box 1 shows the analyses on the effects of trade on innovation activity. Box 2 presents a gravity model of trade combining bilateral data on trade flows and the Enterprise Surveys. Box 3 focuses on location-based measures of development that use the intensity of night-time light and population density.

## 2.2. Trade integration, economic development and barriers to trade

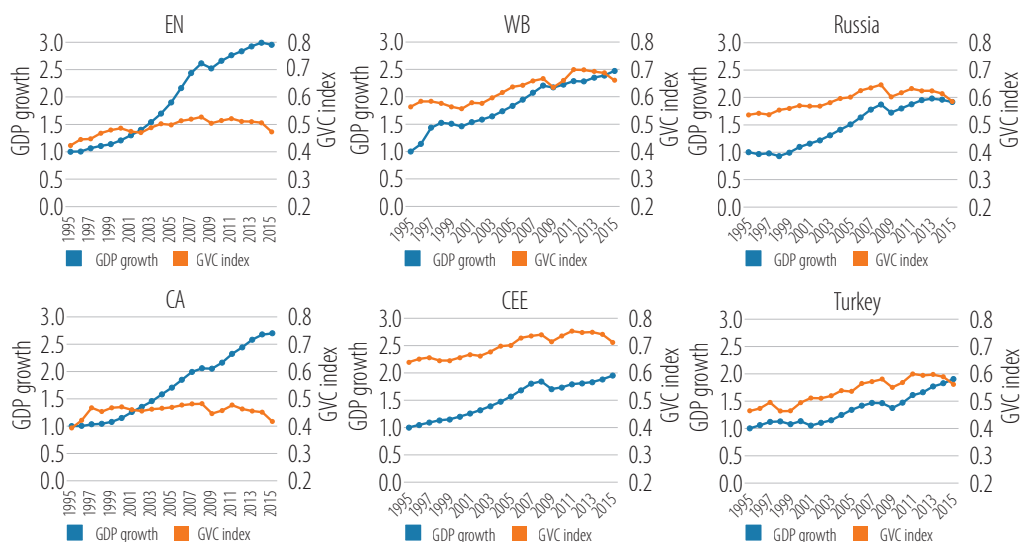
**The rapid rise in economic growth for most countries in Eastern Europe and Central Asia over the past three decades has been accompanied by deeper trade integration.** In particular, there is a positive dynamic of trade integration for firms in Central and Eastern Europe and the Western Balkans, whereas the Eastern Neighbourhood and Central Asia are lagging (Figures 1 and 2). While international trade has benefited from technological developments and concerted efforts to reduce trade barriers globally, some countries have been further supported by deeper economic and institutional integration with more developed countries through EU integration – either by becoming an EU member or through being a candidate for future EU enlargement with a clear path of future accession. Compared with other sub-regions, Central and Eastern Europe has been able to benefit the most from trade integration, in particular with EU economies, following the transition from socialism to a market economy (IMF, 2014). The process of transition and trade integration in the Western Balkans was delayed by a decade due to the Yugoslav wars and the disruption of previously existing trading routes.

**Figure 1**  
Levels of real GDP per capita and participation in GVCs, 1995-2015



Source: Authors' calculations based on UNCTAD-Eora and World Bank World Development Indicators.  
 Note: The figure shows the GVC participation indices and GDP per capita in 2010 US dollar terms (in logs) for five selected years from 1995 to 2015. The regional statistics are calculated as unweighted averages from country level figures.

**Figure 2**  
Growth of real GDP per capita and level of participation in GVCs, 1995-2015



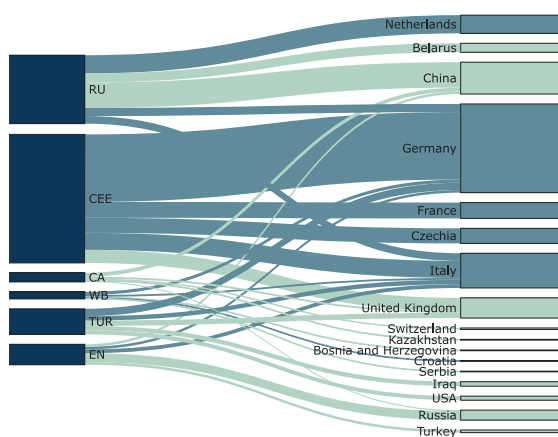
Source: Authors' calculations based on UNCTAD-Eora and World Bank World Development Indicators.  
 Note: The figure shows the average GVC participation index<sup>1</sup> (in orange, right axis) and the growth in the average GDP per capita of the region compared to 1995 (in blue, left axis). The regional statistics are calculated as unweighted averages from country level figures.

1 The GVC participation index is calculated as the sum of forward and backward participation rates. The backward participation rate is the share of exported value added that is imported for further processing from another country. The forward participation rate is the share of exported value added that will be used for further processing by another importing country. The calculations are based on the UNCTAD-Eora dataset (Casella et al, 2019).

**EU countries are key export markets for firms in Eastern Europe and Central Asia.** Germany, Italy and France are among the top five export destinations of both Central and Eastern Europe and the Western Balkans, while the Western Balkans also include some neighbouring countries in Central and Eastern Europe among its top destination countries (Figure 3). The Eastern Neighbourhood and Central Asia are more exposed to neighbouring countries that are outside the European Union: Russia is the top export destination for the Eastern Neighbourhood and China for Central Asia. Russia's top export destination country is China, but other key trading partners include Germany and the Netherlands – the latter mostly because it is an organisational and logistical connection hub for other EU countries.

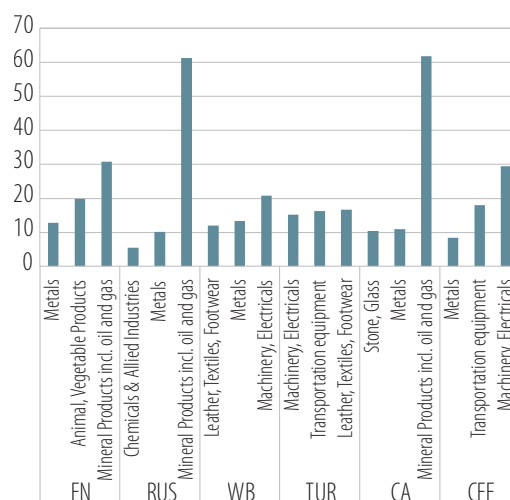
**The industrial composition of economies that are more deeply integrated into GVCs comprises higher value added products.** Economies less integrated in GVCs are trading mainly manufacturing products with lower value added or raw materials, while those integrated into GVCs are able to diversify away from commodities toward higher value added manufactured goods and services. Even though developing countries are mainly involved in the production process of parts and assembly of high-tech products, this contributes to a significant share of value added of the products, and it provides jobs for a large number of low-skilled workers – thereby contributing to economic growth and reducing poverty (Dollar, 2019). The exporting commodities in Central and Eastern Europe are concentrated in the automotive sector and related industries, such as electrical equipment and electronics (Figure 4). The sub-region has been able to increase the quality of its exports over time, notably through FDI (Gorodnichenko et al, 2021; Pellenyi, 2020; Javorcik, 2004). The top exporting products of the Western Balkans are increasingly moving from lower value added products, such as clothing and metallurgy, towards higher value added products, such as machinery and electrical equipment. Although textiles remain the top export commodity in Turkey, transport equipment and machinery are now also among the top exported products. The three sectors have similar shares and together represent almost 50% of total exports. Russia, Central Asia and the Eastern Neighbourhood stand out from the other sub-regions, with a high share of mineral products, including petroleum oil and gas (around 60% of total exports from Russia and Central Asia) and metalliferous products (around 10%).

**Figure 3**  
Top five export markets in 2019



Source: Authors' calculations based on Comtrade.  
Note: The figure shows the relative trade flows of the top five export destinations for each region. The flows from each exporting block (left side in red) add up to 100%. The EU trade partners are coloured in blue, while trade with other partners are in green.

**Figure 4**  
Top three export commodities in 2019  
(percentage of total exports)

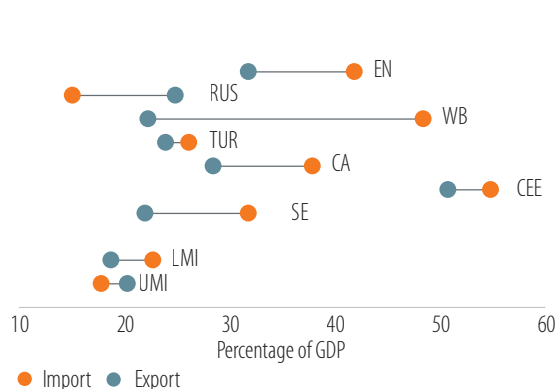


Source: Authors' calculations based on Comtrade.

**As a share of GDP, the economies in the region tend to import more goods than they export, with relatively large trade deficits for three out of the six sub-regions.** As the trade balance is the major driver of the current account balance, large deficits might be a source of a macro risk.<sup>2</sup> The current account deficit also implies an excess of investment over domestic savings, which could reflect the catching-up process of the less developed economies (Gosh and Ramakrishnan, 2020; Carranza, 2002). In 2019, all sub-regions except Russia had a negative trade balance, whereas the Central and Eastern Europe and Turkey had a relatively low deficit (Figure 5).<sup>3</sup> Central and Eastern Europe stands out, with trade integration at above 50% of GDP for both exports and imports of goods, significantly above the average of upper- and lower-middle-income benchmarks, which are around 20% of GDP. Imports represent 48% of GDP in the Western Balkans and are significantly higher than exports, which are at 22% of GDP. In the Eastern Neighbourhood and Central Asia, exports amount to 32% and 28% of GDP, while imports are at 42% and 38% of GDP – which is above the average for upper-middle-income countries.

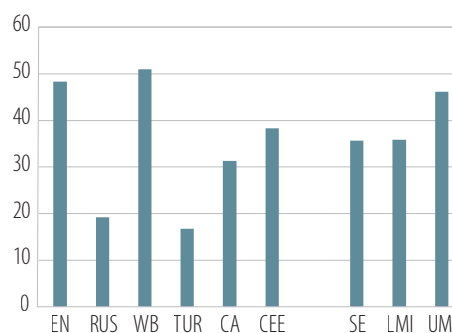
**According to the Enterprise Survey, most firms in the region engage in trade.** Overall, the breakdown of firms’ trading profiles outlines the import dependence of most sub-regions, in particular in the Eastern Neighbourhood and the Western Balkans, where manufacturers report that half of their inputs are of foreign origin (Figure 6).<sup>4</sup> This may reflect the relatively small size of the economy in these countries. It may also indicate that firms are unable to find inputs on the domestic market or it may reflect policies overvaluing currencies, for example, due to pegged exchange rates to hard currencies in most countries in the Western Balkans. The share of non-traders is particularly large in Central Asia, Turkey and Russia. For Turkey and Russia, this needs to be interpreted in light of the size of the economy, as they are significantly larger than countries in other sub-regions, such as the Western Balkans.<sup>5</sup>

**Figure 5**  
Imports and exports of goods in 2019  
(percentage of GDP)



Source: Authors’ calculations based on World Bank World Development Indicators.  
Note: Regional share calculated as simple average of the countries.

**Figure 6**  
Inputs of foreign origin  
(percentage of total inputs)



Source: Authors’ calculations based on EBRD-EIB-WBG Enterprise Survey.  
Note: Sample of manufacturing sector only.

2 A current account deficit is considered unsustainable when it may trigger a drastic policy shift or when it leads to a crisis, for example, an exchange rate collapse that prevents the country from servicing its external obligations.

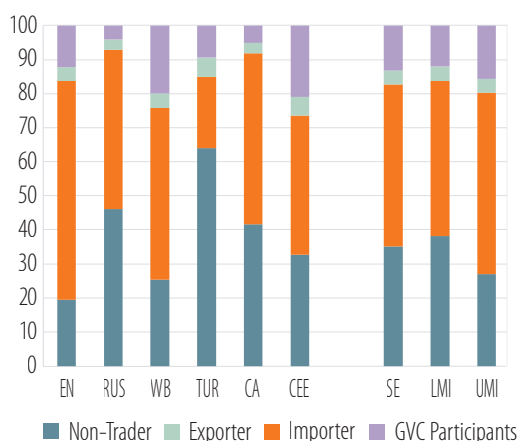
3 A slightly different picture emerges when taking account of trade of services: Central and Eastern Europe, Turkey and Southern Europe are net exporters (positive trade balance) in terms of trade in both goods and services, while the Western Balkans, the Eastern Neighbourhood and Central Asia have a relatively high trade deficit (17%, 7% and 13% of GDP, respectively). Turkey had sizeable current account (on average 5% over 2010–18) and trade deficits in the last decade while 2019 was an exceptional year of surplus due to lower imports stemming from the economic crisis.

4 Importers are defined as firms that purchase more than 10% of material inputs or supplies of foreign origin. Exporters are defined as firms exporting more than 10% of their sales directly.

5 For example, Turkey’s GDP is seven times larger and Russia’s GDP 15 times larger than the total GDP of the Western Balkans.

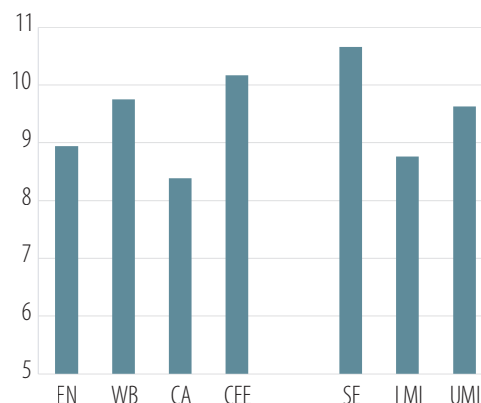
**Most firms that export their goods or services also import at the same time, indicating that they participate in GVCs by importing, transforming and adding value before re-exporting.** But the share of firms that participate in global trade varies across regions. Around one in four manufacturers in Central and Eastern Europe and the Western Balkans directly export goods abroad, a share that is significantly higher than the averages of lower- and upper-middle-income economies (Figure 7). For the Eastern Neighbourhood and Turkey, this share is above 15%, and in line with the average of comparable lower-middle-income countries, while Central Asia and Russia lag significantly, with a lower share of exporters in manufacturing, at around 7% of all firms. The share of participants in GVCs – which is proxied throughout this chapter by firms that both import and export – in Central and Eastern Europe and the Western Balkans is above comparator countries (OECD 2019). Firms in these sub-regions also tend to have higher labour productivity than in other sub-regions (Figure 8). Most economies in Central and Eastern Europe and the Western Balkans have opted for an economic model that is oriented toward exports and industrialisation supported by a proactive policy of attracting FDI (Hagmejer and Muck, 2019). This has enabled the transfer of technology and know-how, thereby supporting the rapid increase of total factor productivity (Bajgar and Javorcik, 2020; Damijan et al, 2013). For example, Central and Eastern Europe has become an important part of GVCs in the automobile industry (Delanote et al, 2021). Telecommunications, ICT and outsourcing service activities of large international corporations have also been among the fastest growing industries in Central and Eastern Europe.

**Figure 7**  
Trading profiles in 2019 (percentage of firms)



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

**Figure 8**  
Median labour productivity in 2019 (log)



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

Note: Labour productivity is calculated as value added per employment. Weighted median values are calculated for the manufacturing sector.

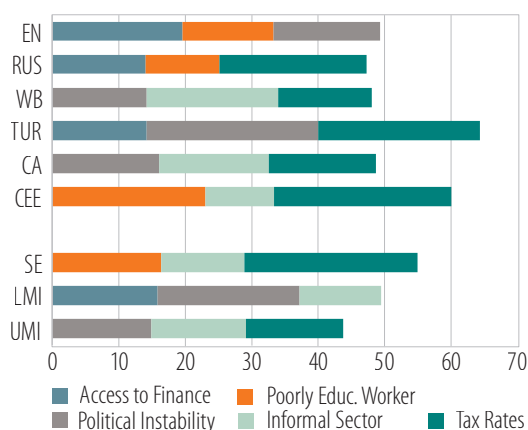
**The business environment can be a constraint for firms that engage in international trade.**

Many productive firms might not be able to reap the scale and efficiency benefits from trade because of constraints in the business environment. The obstacles most often identified by traders include: practices of competitors in the informal sector; an inadequately educated workforce; access to finance; and political instability (Figure 9). Looking at cross-regional aspects, the traders in Central and Eastern Europe complain in particular about an inadequately educated workforce and tax rates, while traders in the Western Balkans and Central Asia more often mention political instability and competition from the informal sector as a major obstacle. Firms in the Eastern Neighbourhood mention access to finance as an obstacle, in addition to political instability and an inadequately educated workforce. For example, financial constraints can restrain the ability of domestic firms to export and invest in innovation, especially for small firms (Petrovito and Pozzolo, 2021; Gorodnichenko and Schnitzer, 2013).<sup>6</sup>

<sup>6</sup> See Chapter 4 of this report for in-depth analysis of financing constraints.

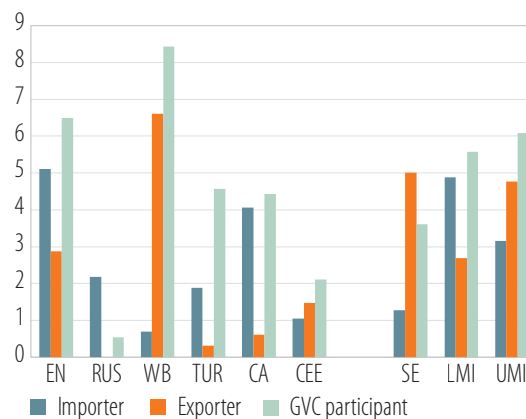
**The presence of barriers and obstacles to trade, either through non-tariff or tariff measures, can reduce overall trading activity and volumes, both for importers and exporters.** Compared with other trader profiles, customs and trade regulations appear to be particularly binding for participants in GVCs, especially in the Western Balkans and the Eastern Neighbourhood (Figure 10). Via its effects on volume and shipping frequency, the efficiency of customs is an important trade facilitator (Volpe et al, 2015, Hornok and Koren, 2015). Barriers to trade may reduce market competition and erode the gains from international trade. This may decelerate the growth of efficient firms, and even result in lower value added production (UNCTAD, 2005; Porter, 2000).

**Figure 9**  
**Top three business environment obstacles for traders (percentage of firms)**



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.  
 Note: Share of firms reporting that a given obstacle represents the biggest obstacle they face.

**Figure 10**  
**Customs and trade regulation are the top business environment obstacle (percentage of firms)**



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.  
 Note: Share of firms reporting customs and trade regulation as the biggest obstacle they face.

**The average time to clear customs is lower in Eastern Europe and Central Asia than in comparator economies.** Russia appears to be an exception, with more than 15 days on average to clear exports and more than 20 days to clear imports from customs – which is significantly above the average of upper- or lower-middle-income economies (Table 1). The share of firms that report making informal payments to export or import is closer to the average for comparator economies – outside Central and Eastern Europe and Turkey, where few firms report it being an obstacle. Likewise, there are indirect costs to trading, such as the quality of domestic infrastructure and logistic services (Iimi, 2011). One proxy for indirect costs is the percentage of products lost due to breakage or spoilage, which is relatively higher in Russia and Central Asia. Moreover, in large economies such as Russia and Turkey, internal distance from borders can add further time and costs.

**Table 1**  
**Business environment for traders**

	Customs and trade regulations as a major obstacle (% of firms)	Days to clear exports through customs	Days to clear imports from customs	Informal payment to export (% of firms)	Informal payment to import (% of firms)	Export loss due to breakage and spoilage (% of sales)
EN	11.8	4.0	7.3	7.5	5.1	0.3
RUS	6.5	15.6	20.4	6.3	22.5	1.2
WB	13.9	1.9	2.7	7.9	13.5	0.3
TUR	9.8	2.6	2.8	2.9	2.2	0.4
CA	6.9	3.0	6.4	10.8	12.7	0.6
CEE	6.7	3.10	5.2	1.2	1.5	0.4
SE	7.7	7.3	6.3	3.4	0.9	0.7
LMI	17.7	4.6	10.5	8.7	14.1	1.1
UMI	12.3	4.0	5.4	5.8	8.1	0.3

Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

**The profile of the traders in developing and emerging economies is typically characterised by a large number of firms engaging in low-level trade, with a few “superstar” exporters facing few competitors.** Firms can be classified in different categories based on their export sales: superstar exporters, big player exporters and small players (EBRD, EIB, World Bank, 2016).<sup>7</sup> There are wide differences in terms of exporters' productivity premiums – the average difference in productivity between exporters and non-exporters (Table 2).<sup>8</sup> In particular, superstar exporters tend to have significantly higher labour productivity, while small players are not necessarily more productive than non-exporters. Similarly, the size-exporter and growth sales-exporter premiums are significantly larger for superstar exporters. The large premiums for superstar exporters may be explained by policies favouring large exporters and privileging capital-intensive firms – for example, through lines of credit by the banking sector, but also direct public support, such as land and energy subsidies. While economies of scale should be the major driver, large firms or multinationals may also receive subsidies, protection and privilege that make it difficult for smaller domestic firms to access export markets and reap the scale and efficiency benefits from trade.

<sup>7</sup> Superstar exporters are defined as firms above the 95th percentile of the distribution of export sales; big player exporters are firms between the 50th and 94th percentile; and small player exporters are firms below the median.

<sup>8</sup> The estimates corresponding to Table 2, but for each sub-region separately, are reported in Tables A.1, A.2 and A.3 in the Annex.



**Table 2**  
**Productivity, size and growth of sales premiums of exporters, by exporters' size categories**

	(1) Labour productivity	(2) Firm size (log labour)	(3) Sales growth
<i>Omitted category: firms that do not export</i>			
Superstar	0.939*** (0.183)	2.924*** (0.211)	0.320* (0.183)
Big player	0.431*** (0.119)	1.408*** (0.075)	0.086 (0.143)
Small player	-0.007 (0.139)	0.184*** (0.050)	0.037 (0.112)
Observations	8,043	8,043	6,448

Note: OLS regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Superstar exporters are defined as firms above the 95th percentile of the distribution of export sales, big player exporters are firms between the 50th and 94th percentile, and small player exporters are firms below the median. Other firm characteristics included in the regression but not reported in the table include: country, industry, a binary variable whether the firm is foreign-owned (defined as those with foreign capital share of more than 10%), firm size (included as explanatory variables in columns 1 and 3), and labour productivity (in column 2).

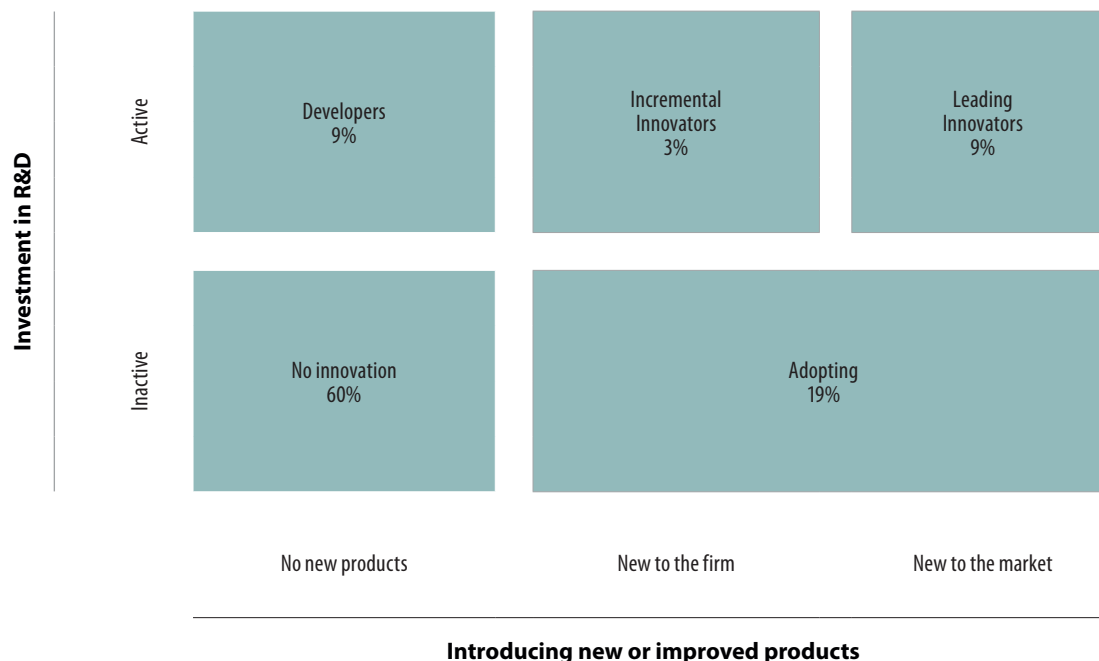
## 2.3. Innovation, management practices and firms' competitiveness

**To be able to compete in global markets, firms need to invest in innovation to deliver continuous improvement in their productivity.** This can be achieved in different ways, such as decreasing production costs, introducing new products and services, adopting new technologies and improving the process of production and delivery. Throughout this process, the availability of a qualified labour force and the quality of management practices are indispensable for firm performance, notably for firms in developing economies that engage in trade (Bloom et al, 2021; McKenzie and Woodruff, 2018; Bastos et al, 2018).

**Beyond the new technologies that advance the global production frontier, innovation is a broader concept, which includes the introduction of new or improved products and processes.** It can be in the form of improvements in technical specifications, components and materials, software development, design, user-friendliness, and other functional characteristics of existing goods and services (OECD Frascati Manual, 2015). It can also entail new or significantly improved production and delivery methods, such as the automation of work or organisational improvements through software to manage inventories or improve delivery. This will be considered to be innovation, even when it is only new to the firm but not necessarily to its market.

**Firms can be classified under different innovation profiles based on investment research and development (R&D) and innovation activities.** Following Veugelers et al (2019), the five innovation profiles are: basic firms that do not innovate; adopters; developers; incremental innovators; and leading innovators (Table 3). Basic firms do not invest in R&D (neither in-house nor acquired from other firms) and do not introduce new or improved products. Adopters do not invest in R&D but introduce new or improved products by adapting innovation developed elsewhere. Developers invest in R&D but do not (yet) introduce new products. The difference between incremental and leading innovators is based on whether the new or improved products are also new for the firm's main market – as opposed to being new only to the firm but not to its competitors in the same market.

**Table 3**  
**Innovation profiles**

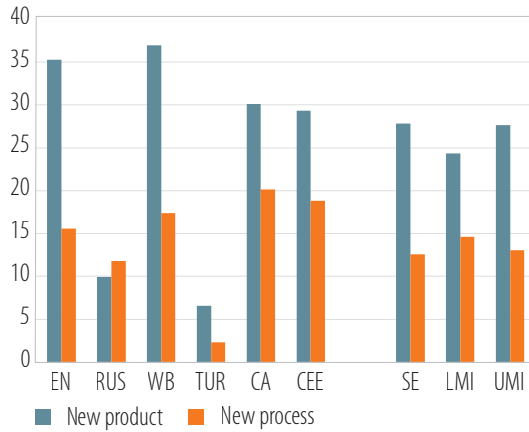


**Around two-fifths of firms in the region invest in innovation, positioning them above the economies of comparable lower- and upper-middle-income countries (at around one-third).** In addition to the product innovators (around 31% of firms), there are also 17% of firms that are introducing processes that are new or significantly improved (Figure 11).<sup>9</sup> The majority of the firms in all sub-regions are not engaged in any type of innovation activity (Table 3 and Figure 12). The share of firms that innovate by introducing new or improved products through the adoption of existing technologies developed elsewhere (the adopters) range from 17% in Central Asia to 25% in the Western Balkans – Russia and Turkey lag considerably, with shares of 6% and 2%, respectively. While a relatively low share of firms engage in innovation by both investing in R&D and developing new products, most of them report that the new or improved products are new to their main market, and not only to their firm.

**The adoption of new products and processes is particularly important for emerging markets and developing economies, where firms have considerable room for improvement relative to the technological frontier.** The adoption and adaptation of technologies developed elsewhere is the fastest way to catch up with more advanced economies (Hausmann and Rodrik, 2003). Investing in R&D activities could even allow them to move up the value added scale and close the gap with developed economies. The low share of innovative firms in Russia and Turkey is noteworthy: 80% of Russian and 87% of Turkish firms do not introduce new products and do not invest in R&D. This could be explained mainly by cyclical factors, although some structural problems may also persist, most notably due to the worsening financing constraints and a deterioration in the business environment given the financial and economic crises since 2018, which discouraged firms to invest and innovate.

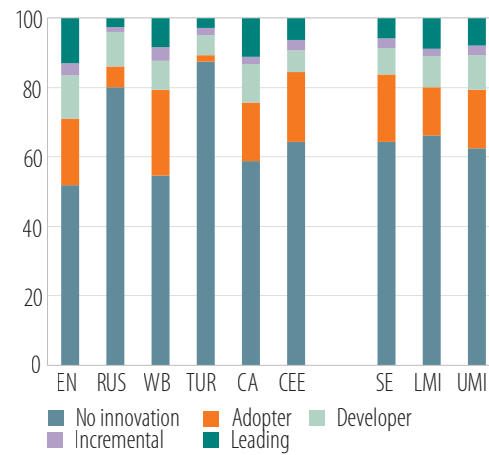
<sup>9</sup> Firms can introduce product and process innovations at the same time. The definition of innovation profiles in Table 3 and Figure 12 only focus on product innovation. In the rest of this chapter, innovators are firms that invest in R&D or introduce new products or processes.

**Figure 11**  
Innovation rates (percentage of firms)



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

**Figure 12**  
Innovation profiles (percentage of firms)



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

Note: Innovation profiles are defined in Table 3.

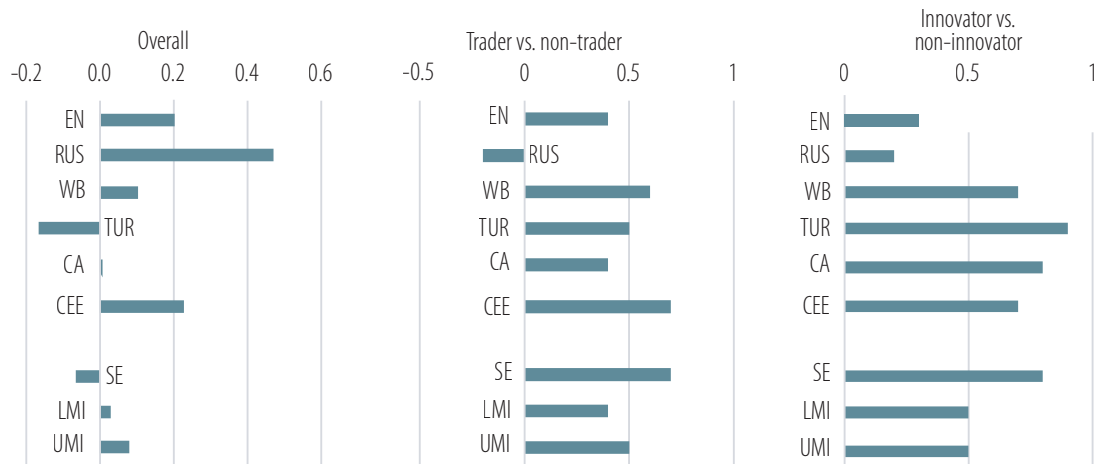
**The availability of a qualified labour force and the quality of management practices are critical for improving firm productivity and competitiveness.** Various studies show that there is a strong correlation between the quality of management practices, investment in innovation and firm performance in the region (Bartz-Zuccala et al, 2018; Veugelers, 2011). Furthermore, the lack of management skills has been shown to be one explanation for the lower performance of state-owned firms (Bloom et al, 2012; Estrin et al, 2009; Brown et al, 2006).

**Enterprise Survey data show that, on average, firms that invest in innovation and engage in trade are better managed.** The survey includes detailed questions on core management practices related to addressing problems arising in operations, monitoring of performance indicators, production targets and incentives rewarding staff performance.<sup>10</sup> This information is summarised in a normalised management index, where a higher score reflects better practices. Firms engaging in trade or investing in innovation clearly have higher scores in all sub-regions – with the exception of traders in Russia (Figure 13).<sup>11</sup> The average difference in the index between traders and non-traders across countries is highest in Central and Eastern Europe. In the other sub-regions, this difference is similar to those in upper- and lower-middle-income countries. Furthermore, compared with similar economies, the average difference between innovators and non-innovators is particularly high in Central Asia and Turkey.

<sup>10</sup> The question on operations focuses on how the firm takes action when a problem in the production process arises. The question on monitoring covers the number of performance indicators. The questions on production targets (such as production volume, quality, efficiency, waste or on-time delivery) focus on the time frame for production targets and the difficulty of achieving them, as well as the awareness of managers and staff workers. The questions on incentives cover criteria for performance bonuses for managers, promotion practices for non-managers and measures to address under-performance of non-managers.

<sup>11</sup> The evidence for Russia is in line with the results of Schweiger and Friebel (2013), who find that management practices explain relatively little in terms of firm performance in the country.

**Figure 13**  
**Management practices (z-score)**



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

Note: The z-score is based on management practices in the areas of operations, monitoring of performance indicators, production targets, and incentives rewarding staff performance. Only manufacturing firms with at least 20 employees were asked all these questions. The scores of the four different management practices are converted into z-scores, by normalising each practice so that the mean is 0 and the standard deviation is 1. The management index is based on an average of the z-scores of the four management practices.

## 2.4. International trade and innovation

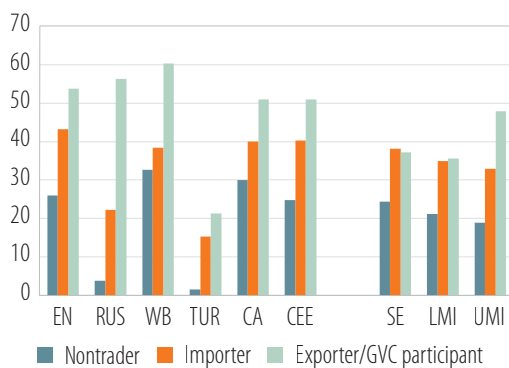
**International trade and innovation are strongly intertwined, as both can be considered drivers of firm productivity and competitiveness.** On the one hand, innovation and managerial quality have a direct impact on the quality of output, allowing firms to compete and survive on global markets. On the other hand, access to international markets, and especially to a globalised system of production through GVCs, opens up new ways for firms to learn from trade partners and improve their productivity further (Banh et al, 2020; Benkovskis et al, 2017).

**Two main mechanisms involving the interplay between trade and innovation can be distinguished in the literature: self-selection into trade; and learning-by-exporting.** The direction of the causal relationship is also key. The idea of a self-selection process argues that only the most productive firms are able to cover the sunk costs of exporting and engage in trade (Bernard et al, 2012; Wagner, 2007; Melitz, 2003). Trade participation requires significant and continuous investment in innovation, which may also influence the degree of internationalisation (Teruel et al, 2021). For example, the use of new technologies can enable new marketing and sales channels or reduce costs related to entry into foreign markets – factors that hamper smaller firms with limited resources. Lowering the cost of entry into trade can make the selection process work more efficiently. More firms will be able to compete with international counterparts, while the least productive firms, faced with expanded competition from home and abroad, will exit the market.

**The idea behind the learning-by-exporting mechanism is that exporters gain knowledge from exposure to foreign markets and practices, allowing them to grow and increase their efficiency.** The presence of factors that affect entry costs into trade or preferential access to foreign markets – for example, specific regulatory barriers, the time to clear customs, and direct informal or formal payments – will make it more difficult for firms to learn from global markets, adopt new technologies and become more innovative. This is particularly true for firms that are part of GVCs and may gain knowledge from foreign partners and competitors or through reacting to the demands of foreign markets (De Loecker, 2013; Bernard et al, 2007).

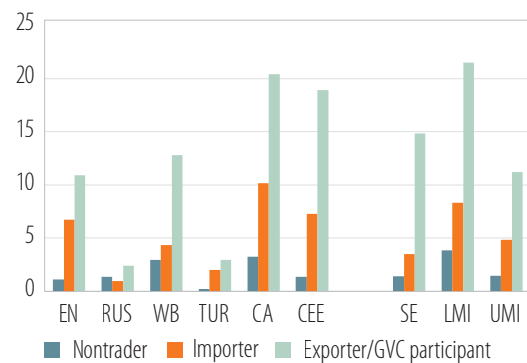
**Enterprise Survey data show that firms that trade in international markets tend to innovate more.** Among non-exporters, the share of innovative firms is about 30%, while it increases to close to 40% for importers (Figure 14). Innovation is particularly prevalent among exporters and participants in GVCs, where the majority of firms introduce new products and processes in all regions (with the exception of Turkey). Unsurprisingly, foreign ownership is also strongly associated with participation in GVCs (Figure 15). When the right conditions are in place, attracting FDI fosters investment in new or improved products and processes, and participation in GVCs tends to increase the quality of exports and stimulate product upgrading (Javorcik et al, 2017; Harding and Javorcik, 2012).

**Figure 14**  
Innovative firms (percentage of firms),  
by trading profile



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.  
Note: Innovative firms are defined as those investing in R&D or introducing new products or processes.

**Figure 15**  
Foreign-owned firms (percentage of firms),  
by trading profile



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.  
Note: Foreign-owned firms are defined as those with foreign ownership of more than 10%.

**Firms trading in international markets tend to invest more in R&D and to renew machinery and equipment.** Compared with non-traders (firms that do not trade or are only importers), they tend more often to introduce new or improved products that are new to their main market, suggesting that they develop more innovation (Table 4). Similarly, they are more likely to invest in R&D and to upgrade machinery and equipment. In turn, imports of materials and machinery may also increase productivity of firms, as it often accompanied with investment in skills and further process innovation (Halpern et al, 2015).

**Table 4**  
Investment in new or improved products and processes, R&D, and machinery and equipment upgrades (percentage of firms)

	Innovation type		R&D and machinery and equipment upgrades	
	New to the firm	New to the market	R&D investment	Machinery and equipment upgrades
Traders	12.1	20.6	24.4	44.8
Non-traders	6.8	13.5	12.0	38.5

Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

**At the firm level, participation in GVCs is strongly associated with innovation activities, foreign ownership and the use of foreign licensed technology.** Innovation is positively associated with participation in GVCs across all sub-regions – as it is in regression analysis that controls for the effects of country, sector and additional firm characteristics (Table 5). Innovators are on average 5% more likely to be participants in GVCs. Foreign ownership and the use of foreign licensed technology (excluding office software) are also positively related to participation in GVCs, but there is some variation across sub-regions: for example, foreign ownership matters for firms in Central and Eastern Europe and the Western Balkans. Larger firms are more likely to participate in GVCs (although for Turkey is not significant). In this analysis, controlling for size is important, as larger firms are also more likely to use foreign licensed technology, use a website, have recently upgraded their machinery or use international quality certification (Figures A.2 to A.5 in the Annex).

**Table 5**  
**Determinants of participation in GVCs**

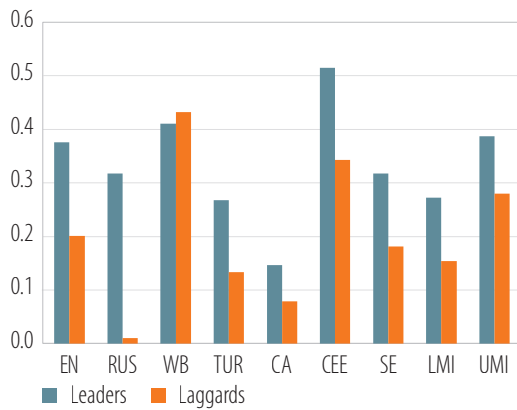
	All	EN	RUS	WB	TUR	CA	CEE
Innovation	0.055*** (0.011)	0.053*** (0.020)	0.100*** (0.030)	0.075*** (0.027)	0.061** (0.026)	0.026 (0.019)	0.049*** (0.019)
Foreign ownership	0.080*** (0.017)	0.041 (0.029)	-0.042 (0.052)	0.121*** (0.041)	0.036 (0.070)	0.021 (0.030)	0.108*** (0.032)
Foreign licensed tech	0.037*** (0.014)	0.012 (0.027)	0.100*** (0.029)	0.010 (0.030)	0.019 (0.038)	0.055** (0.027)	0.058** (0.025)
Firm size	0.034*** (0.004)	0.025*** (0.008)	0.024** (0.010)	0.041*** (0.010)	0.014 (0.012)	0.020** (0.010)	0.049*** (0.008)
Observations	16,479	3,278	1,015	1,640	1,351	2,932	5,775

*Note:* Marginal effects from logit estimation using sampling weights. Standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Firm size is defined as the log of number of employees. Other firm characteristics included in the regression but not reported in the table include: country, industry, binary variables for whether the firm was formally registered when it began operations, whether the firm has a written business strategy with clear key performance indicators, whether the top manager is female, whether annual financial statements are checked and certified by an external auditor, whether the firm is a young firm (under five years old), and the years of experience of the top manager (in log).

**Confirming the idea of self-selection into trade, firms engaging in exporting tend to be more productive.** To explore the link between trade participation and productivity, productivity leaders (or frontier firms) are defined as firms in the top 90<sup>th</sup> percentile of the distribution of labour productivity, while laggards are in the bottom 10<sup>th</sup> percentile. In most regions, productivity leaders are almost twice as likely to be involved in international trade. The Western Balkans and Turkey are the only regions where, on average, exporters are not significantly more productive than non-exporters (Figure 16). Similarly, productivity leaders are more likely to use foreign licensed technology, except in Turkey (Figure 17).<sup>12</sup> This highlights the role of foreign licensed technologies in improving productivity.

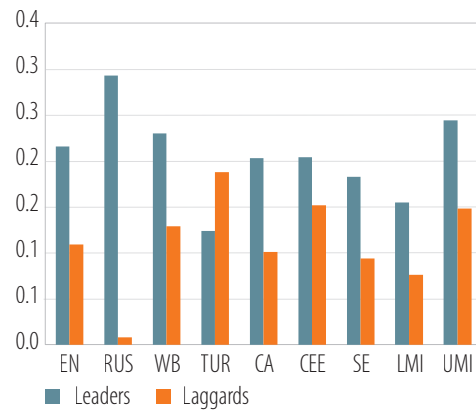
<sup>12</sup> The regression estimates corresponding to Figures 16 and 17 are reported in Tables A.4 and A.5 of the Annex.

**Figure 16**  
Exporting (percentage of firms),  
by productivity level



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.  
Note: Predicted probability of being an exporter for firms at the top 90th percentile (leaders) or bottom 10th percentile (laggards) of the productivity distribution. The logit regression also controls for the effects of country, industry, firm size and foreign ownership. The sample only includes manufacturing firms. Exporting firms also include GVC participants.

**Figure 17**  
Use of foreign licensed technology  
(percentage of firms), by productivity level



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.  
Note: Predicted probability of using foreign licensed technology for firms at the top 90th percentile (leaders) or bottom 10th percentile (laggards) of the productivity distribution. The logit regression also controls for the effects of country, industry, firm size and foreign ownership. The sample only includes manufacturing firms.

**Firms that trade and innovate at the same time tend to be much more productive than other firms.** There are significant productivity and firm size premiums associated with trade participation (Table 6).<sup>13</sup> Traders are on average 14% more productive and 20% larger than non-traders. But the premiums are even higher for firms that trade and innovate at the same time (increasing by 28 and 51 percentage points, respectively). In addition, innovative firms tend to have higher sales growth on average by 30%, but this association is even larger for firms that also participate in trade (increasing by 18 percentage points). In line with the self-selection hypothesis, there is a concentration of large, productive and innovative firms that are able to compete and grow on the international market.

**Table 6**  
Productivity, size and growth of sales premiums of traders and innovators

	(1) Productivity	(2) Firm size (log)	(3) Sales growth
Trader	0.141** (0.066)	0.200*** (0.052)	0.041 (0.097)
Innovation	0.029 (0.098)	0.238*** (0.072)	0.299** (0.152)
Trader & innovation	0.283*** (0.082)	0.511*** (0.053)	0.184* (0.101)
Observations	8,390	8,390	6,672

Note: OLS regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Other firm characteristics included in the regression but not reported in the table include: country, industry, a binary variable whether the firm is foreign-owned, firm size (included as explanatory variable in columns 1 and 3) and labour productivity (in column 2).

<sup>13</sup> The estimates corresponding to Table 6, but for each sub-region separately, are reported in Tables A.6, A.7 and A.8 in the Annex.

**To analyse the learning-by-exporting effect, it needs to be asked whether trade participation has a causal effect on innovation, which is not obvious.** Box 1 discusses two different estimation methods that can be used to control for endogeneity between international trade and innovation and mitigate the potential sample selection bias (based on observable firm characteristics, including labour productivity) between trading and non-trading firms. The results reported in Table 7 suggest that trade participation has a positive effect on innovation.

### Box 1

#### Effects of trade on innovation activity

The effect of internationalisation on the probability of being innovative is estimated using the following equation:

$$Prob(Innovator)_i = \beta_1 Trader_i + \beta_2 X_i + \epsilon_i$$

The dependent variable is a binary taking value 1 if the firm  $i$  is an innovator – defined as a firm that introduces new or improved products and processes or invests in R&D.  $Trader$  is a binary variable taking value 1 if the firm participates in trade – by importing, exporting or participating in GVCs – and  $X$  is a set of explanatory variables, which includes various firm characteristics, country and sector fixed effects, and is a disturbance term. The firm characteristics include: binary variables for whether the firm was formally registered when it began operations; whether the firm has a written business strategy with clear key performance indicators; whether the top manager is a woman; whether annual financial statements are checked and certified by an external auditor; whether the firm is a young firm (under five years old); and the years of experience of the top manager (in log).

To address the endogeneity issues of omitted variable bias and reverse causality, which cannot be addressed directly, two indirect approaches are taken: coarsened exact matching (CEM); and propensity score matching with overlapping covariates.

CEM is a non-parametric estimation method that establishes a covariate balance between treated and control units (Lamperti et al, 2017; Iacus et al, 2012; Blackwell et al, 2009). It creates different strata based on the covariates  $X$  included in the analysis. CEM thus meets the congruence principle and restricts the matched data to areas of common support. The results are reported in column (2) and confirm that trade participation has a positive effect on innovation.

Propensity score matching with overlapping covariates aims to compare traders and non-traders with otherwise similar characteristics (following the method described in Imbens and Wooldridge, 2009). As in CEM, the exercise consists of two steps: first, a logit regression is run to express the conditional probability of being a trader using productivity as an ancillary variable. In a second step, after having obtained the propensity score for each firm, the sub-sample of traders is trimmed by excluding the top quartile of the propensity score distribution for traders. Similarly, non-traders in the bottom quartile of their prospective score distribution is dropped. As a result, the number of firms included in this second step is lower. This estimation confirms the CEM results of a positive and significant effect of trade on innovation.



**Table 7**  
**Trade as a driver of innovation**

	(1) Innovation (Logit)	(2) Innovation (CEM)	(3) Trader	(4) Innovation (trimmed)
Trader	0.117*** (0.016)	0.125*** (0.016)		0.071** (0.029)
Productivity			0.029*** (0.009)	
Foreign ownership	-0.023 (0.028)	0.011 (0.021)	0.159*** (0.052)	0.044 (0.044)
Foreign licensed tech	0.175*** (0.020)	0.136*** (0.012)	0.127*** (0.028)	0.184*** (0.031)
Firm size	0.034*** (0.006)	0.016*** (0.005)	0.041*** (0.010)	0.042*** (0.011)
Observations	16,515	12,285	8,133	8,091

*Note:* Marginal effects from logit estimation using sampling weights. Standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Labour productivity is used as an ancillary variable both for CEM (column 2) and propensity score matching with overlapping covariates (columns 3 and 4). Firm size is defined as the log of number of employees. Other firm characteristics included in the regression but not reported in the table include: country, industry, binary variables for whether the firm was formally registered when it began operations, whether the firm has a written business strategy with clear key performance indicators, whether the top manager is female, whether annual financial statements are checked and certified by an external auditor, whether the firm is a young firm (under five years old), and the years of experience of the top manager (in log).

## 2.5. The European Union as a trade facilitator and driver of innovation

**The European Union acts as a trade facilitator for firms in Eastern Europe and Central Asia, especially for participants in GVCs and innovative firms.** Trade integration with EU markets for these countries can be boosted by engaging with higher value added sectors (Bussière et al, 2005). To understand the determinants of exports to the European Union by firms in the region, there is the workhorse tool of gravity models (see Box 2 for a discussion of the methodology). The results confirm the two key standard findings of gravity equations, namely the evidence on the negative association between trade flows and geographical distance, and the positive association with the level of GDP in the destination country (Table 8). The results also confirm that innovative firms and participants in GVCs tend to trade more than other firms.

**The European Union is a key trading partner for firms in the region.** Firms that export to EU markets tend to export much more than firms exporting elsewhere (Table 9). This may be expected due to the relatively large size and high level of income of the European Union as a destination market. But the European Union is also more likely to attract trade from innovative firms and sectors (Table 9).

**Box 2****A gravity model of trade combining bilateral data on trade flows and the Enterprise Surveys**

First introduced by Tinbergen (1962), gravity equations analyse the determinants of bilateral trade flows taking account of geographical distance between trading partners. The general form of a structural gravity model follows Anderson and van Wincoop (2003). After controlling for size (proxied by GDP), bilateral trade between exporter  $i$  and importer  $j$  depends on bilateral trade barriers between  $i$  and  $j$ , relative to the product of their multilateral resistance terms, that is, the average trade barrier each country/region has with the rest of the world. Bilateral trade barriers may be determined by various factors, including trade agreements, institutions, geographical proximity, cultural similarities and historical bonds (Head and Mayer, 2014; Dhingra et al, 2017).

A gravity model is developed to study the determinants of exports, by the traditional bilateral trade barriers, but also taking account of the role of innovation and GVC participation, with the following equation:

$$\ln(\text{exports}_{ijk}) = \alpha_i + \alpha_j + \alpha_k + \beta_1 \text{innovator}_{ik} + \beta_2 \text{GVC}_{ik} + \gamma_1 \text{distance}_{ij} + \gamma_2 \text{commonlang}_{ij} + \gamma_3 \text{contiguity}_{ij} + \varepsilon_{ijk}$$

$\alpha_i, \alpha_j, \alpha_k$  are importer, exporter, and sector fixed effects respectively.  $\text{innovator}_{ik}$  is a binary variable taking value 1 if a firm in sector  $k$  and country  $i$  is an innovator, and  $\text{GVC}_{ik}$  is a binary variable taking value 1 if the firm is a GVC participant.  $\text{distance}_{ij}$ ,  $\text{commonlang}_{ij}$ ,  $\text{contiguity}_{ij}$  are proxies of bilateral trade barriers indicating the log-weighted distance between country  $i$  and country  $j$ , whether they share their official language and whether they have a common border.

In the analysis, Enterprise Survey firms are matched to BACI data at the industry level, which provides disaggregated data on bilateral trade flows for more than 5000 products (that were reclassified in industry) and 200 countries (Gaulier and Zignago, 2010). The information on whether firms trade is from the Enterprise Survey, while the information on bilateral trade flows varies across industries.

**Table 8**  
**Gravity estimation: determinants of exports**

	Dependent variable: $\ln(\text{exports})$			
	(1)	(2)	(3)	(4)
Firm is an innovator	0.587*** (0.071)		0.353*** (0.072)	0.374*** (0.075)
Firm is a GVC participant		1.399*** (0.071)	1.342*** (0.073)	1.310*** (0.075)
(Log of) GDP per capita of destination country				0.107** (0.044)
(Log of) distance	-0.312*** (0.121)	-0.313** (0.124)	-0.330*** (0.123)	-0.035 (0.049)
Common border for trading partners	0.074 (0.121)	0.034 (0.119)	0.029 (0.119)	0.141 (0.096)
Common official/primary language	0.369 (0.253)	0.362 (0.249)	0.364 (0.249)	0.269 (0.210)
Observations	13,201	13,015	12,927	12,798
R-squared	0.277	0.324	0.330	0.292

Note: OLS regressions with sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Only the top five export destinations are used for the estimation. The regression control for sector, exporting country, and importing country fixed effects.

**Table 9**  
Gravity estimation: determinants of exports

	Dependent variable: $\ln(\text{exports})$		
	Full sample	Only non-innovators	Only innovators
EU = 1	0.288*** (0.089)	0.228* (0.131)	0.291*** (0.090)
(Log of) distance	-0.058 (0.074)	-0.041 (0.091)	-0.118 (0.085)
Common border for trading partners	-0.070 (0.141)	-0.109 (0.129)	-0.0479 (0.146)
Common official/primary language	0.445* (0.243)	0.362* (0.199)	0.445* (0.245)
Observations	12,684	4,297	8,300
R-squared	0.226	0.309	0.286

Note: OLS regressions with sampling weights. Standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Only the top five export destinations are used for the estimation. The regression control for sector fixed effects, and for the big countries, such as Russia, China and USA, while the omitted variable is the rest of the world.

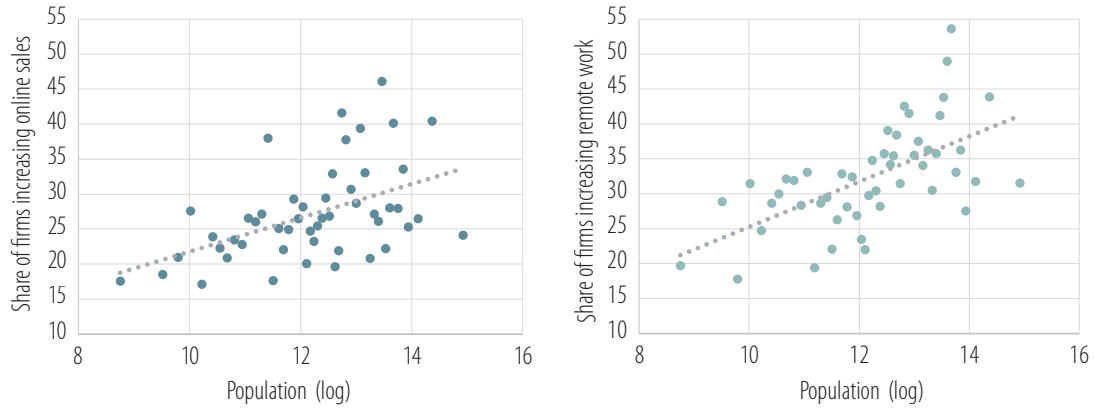
## 2.6. COVID-19 adaptability of innovators and traders

**The COVID-19 crisis has led to wider recognition of the importance of innovation and digital transformation.** Until recently, the implementation of digital technologies was considered an important contributor to market success and usually associated with the most innovative and modern companies. But the pandemic has made the digital transformation an integral part of many firms' survival. Digitalisation is indispensable to preventing business disruption, organising work remotely, improving communication with customers, suppliers and employees, and selling products and services online. Despite its strong negative impact on business activity, which may accelerate structural changes, the COVID-19 crisis may also be a driver of positive transformation towards a new normal, where flexibility, innovation and digital technologies will be of even greater importance for firms' competitiveness.

**As a response to the COVID-19 crisis, traders and innovators are more likely to adapt better.** Traders were more likely to start or increase remote working arrangements and adjust production compared with non-traders. Similarly, innovative firms were more likely to start or increase remote work, and to adjust production.<sup>14</sup> Location-based analysis shows that firms located in areas with higher population density tend to adapt faster (see Box 3). Areas with a higher share of traders and innovators also had a higher share of firms that started or increased online sales and remote working arrangements – even after taking account of the differences across countries and industries (Figure 18). The results highlight the importance of supporting ICT infrastructure, education and training activities in facilitating innovation in less populated areas. This may be explained by the availability of digital infrastructure, which is reflected in the higher share of firms having their own website. Moreover, the share of innovative firms tends to be higher in areas with higher population density, confirming the concentration of innovation clusters and hubs in higher populated areas, where a skilled workforce is easier to access (Figure 19).

<sup>14</sup> See Chapter 1 for in-depth analysis of the impact of COVID-19 on the private sector.

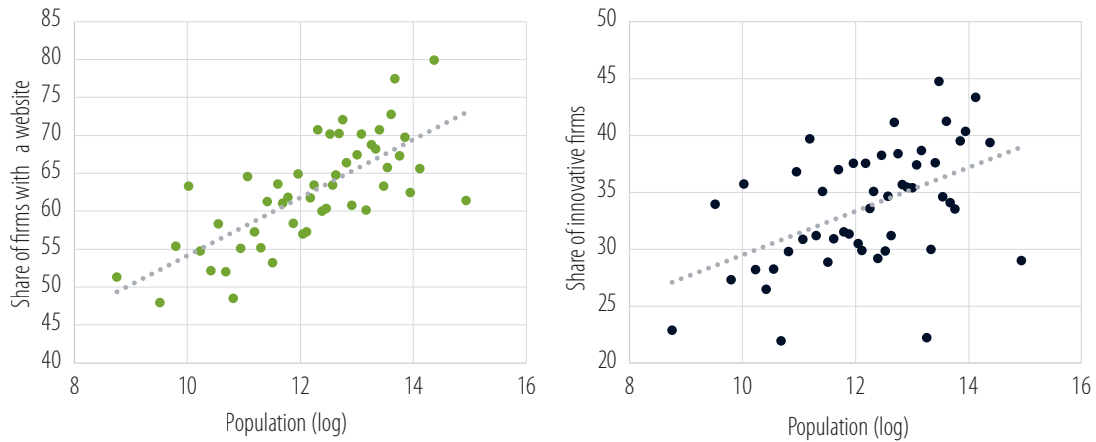
**Figure 18**  
**COVID-19 adaptability: increasing online sales and remote work arrangements, by population density**



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

Note: For visualisation purposes, the figures show binned scatterplots using 50 bins each accounting for 200 observations.

**Figure 19**  
**Digital infrastructure and innovation rate, by population density**



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

Note: For visualisation purposes, the figures show binned scatterplots using 50 bins each accounting for 200 observations.

**Box 3****Location-based development measures**

Location-based analysis indicates that firms in areas with higher population density tend to adapt faster. Socioeconomic data for sub-national administrative regions, such as provinces, districts or municipalities, are unavailable for most developing countries – and if they exist, they are often of poor quality. The lack or poor quality of the data has hindered attempts to understand economic growth, poverty, health status and environmental quality in these countries. In the absence of reliable sub-national data, economists and social scientists have started to use alternative measures to proxy local economic activity in studies of economic growth and development. One such measure is luminosity: measures of night-time light visible from space calculated using weather satellite recordings (Chen and Nordhaus, 2011).

The approach uses Visible Infrared Imaging Radiometer Suite (VIIRS) satellite images, collected by the NOAA and NASA. In this analysis, the data consist of annual average night-time light densities for 2016, which contain cloud-free average emitted radiances. First, using their geo-coordinates, Enterprise Survey firms are mapped at the smallest level of administrative units. Second, raster values for night-time light are extracted by masking the shape files of the areas of interest. Finally, mean night-time light raster values are assigned to the survey firms to proxy for local economic development. Night-time light raster values are higher in Central and Eastern Europe, the Western Balkans and Turkey, while they seem to be much more concentrated in a few areas in the Eastern Neighbourhood, Russia and Central Asia (Figure B3.1).

The previous literature shows that night-time light can be used as a relatively good proxy for variables such as urbanisation, city dynamics, population movements, GDP per capita and other development indicators at the sub-national level.<sup>15</sup> In line with the previous literature, these results show that night-time light is positively associated with urbanisation, measured as the distance-weighted population (in logs) of nearby urban centres (Figure B3.2).<sup>16</sup>

The study proxies the level of local development using night-time light or urbanisation, and explores its association at the local level with innovation and trade participation.<sup>17</sup> Furthermore, it investigates whether firms located in more developed regions are able to adapt faster to shocks, such as the new business circumstances of the pandemic – that is, whether firms started or increased online sales and adopted remote working structures.

Figures 18 and 19 use population density as a proxy for local economic development. Table A.9 in the Annex reports the estimates of regression analysis using night-time light as an alternative measure. The results are very similar when using either population density or night-time light, as they are both strongly associated with COVID-19 adaptability or innovation.

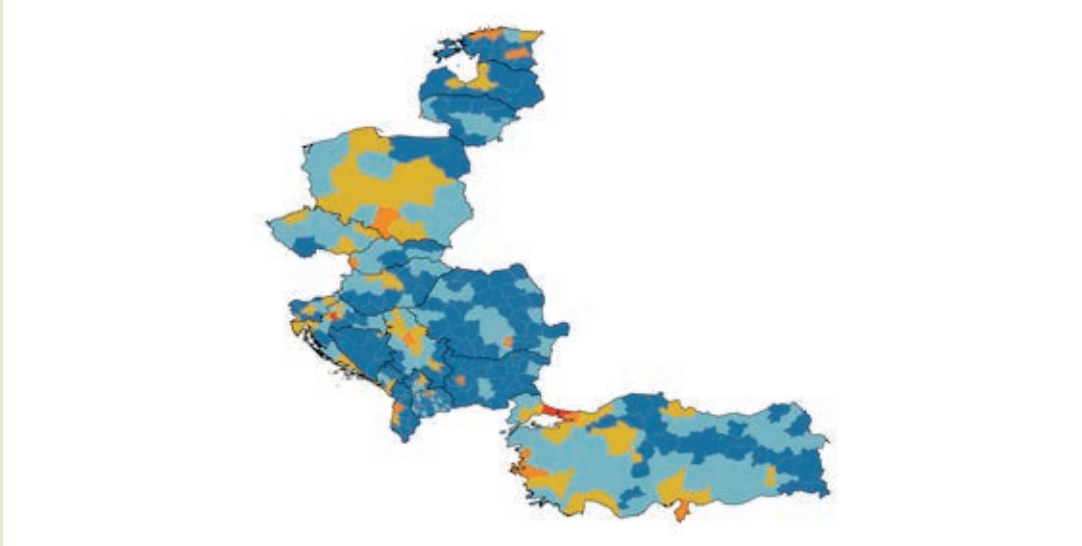
<sup>15</sup> Night-time lights have been used in a variety of studies, such as gross domestic product estimation (Ghosh et al, 2010; Sutton, Elvidge and Gosh, 2007), economic decline detection (Li et al, 2017) and human well-being measurement (Ghosh et al 2013).

<sup>16</sup> Our source for the population of urban centres is the Basic World Cities Database from Simplemaps.com.

<sup>17</sup> See Bircan and De Haas (2020) for location based credit market analysis of identifying the impact of bank lending on innovation activities of Russian firms.

**Figure B3.1**  
**Night-time light density in Eastern Europe and Central Asia**

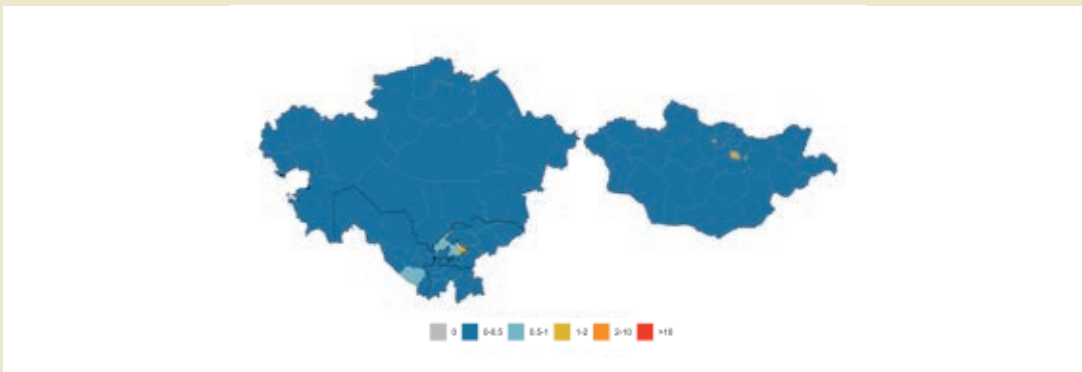
Central and Eastern Europe, Western Balkans and Turkey



Eastern Neighbourhood and Russia



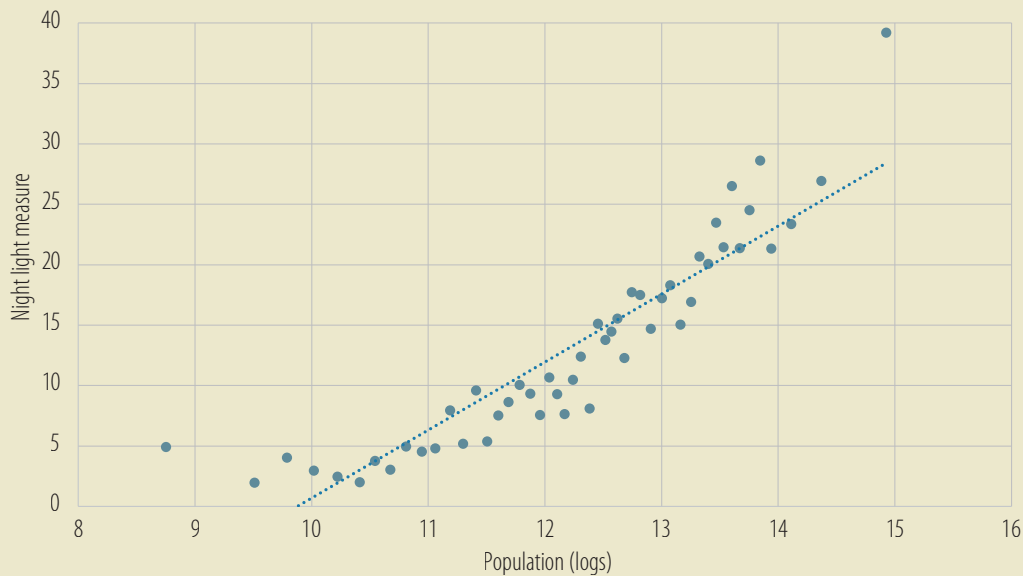
Central Asia



Source: Authors' calculations based on NOAA/NASA.

Note: Values corresponds to night-time light radiances. For visualisation purposes, radiances are grouped into five different categories.

**Figure B3.2**  
**Association between night-time light and population density**

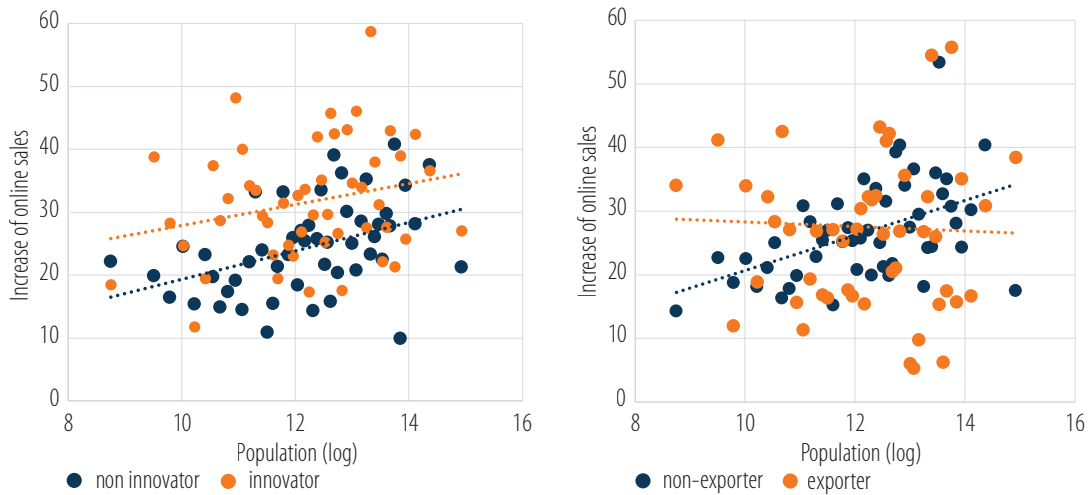


*Source:* Authors' calculations based on NOAA/NASA and Basic World Cities Database.

*Note:* Population is calculated as the inverse distance weighted average (log) population of closest urban centres. For visualisation purposes, the figure shows binned scatterplots using 50 bins each accounting for 460 observations.

**As a response to COVID-19, population density plays an important role: regardless of their innovativeness, firms close to large urban areas were more likely to take action to adapt to the crisis (Figure 20 and Figure 21).** For exporters, the distance from dense urban areas plays a less critical role in increasing online business activity, presumably because their destination market is the international market via well-established networks (Figure 20). In contrast, firms that do not export and which focus on traditional channels – because they sell their products and services in local and domestic markets – were much more in need of alternative business solutions. A rapid switch to online sales and business activity was possible for firms that already had their own website. In terms of the introduction of remote work arrangements, exporters were better able to adapt, which may be related to their location (close to dense urban areas or not), presumably because digital infrastructure and connectivity are a precondition for such arrangements.

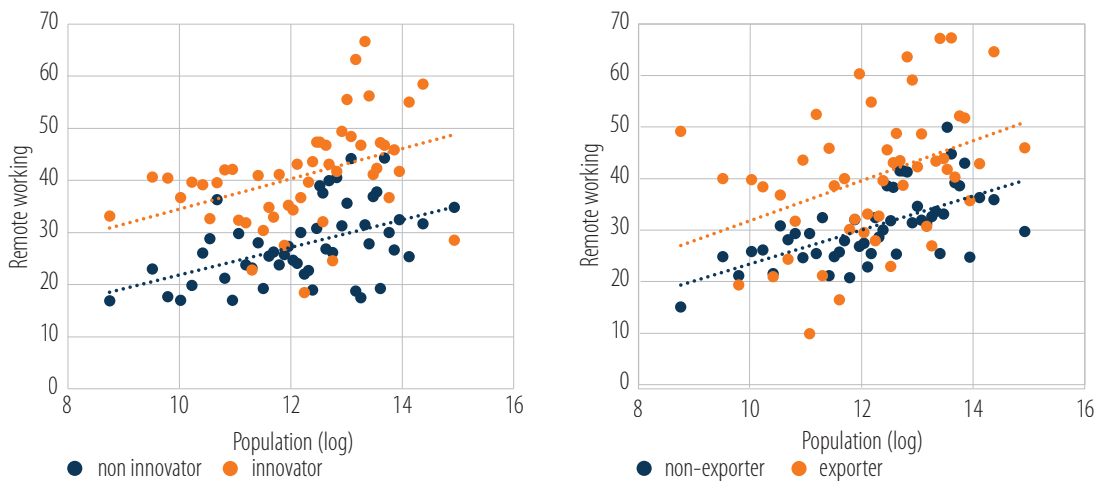
**Figure 20**  
**COVID-19 adaptability: online sales by innovation and trading profile**



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

Note: For visualisation purposes, the figures show binned scatterplots using 50 bins each accounting for 130 observations for non-innovator, 70 for innovators, 160 for non-exporters and 40 for exporters.

**Figure 21**  
**COVID-19 adaptability: remote working by innovation and trading profile**



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

Note: For visualisation purposes, the figures show binned scatterplots using 50 bins each accounting for 130 observations for non-innovator, 70 for innovators, 160 for non-exporters and 40 for exporters.



## 2.7. Conclusions and policy implications

**The analysis in this chapter shows that firms participating in international trade, in particular in GVCs, are more innovative, better managed and more productive.** Moreover, there is a strong positive correlation between firm size and trade participation, which highlights the role of scale economies and competitiveness in foreign markets. The productivity gains associated with trade participation are driven by very large firms and superstar exporters – while small firms tend to be less productive, regardless of whether they participate in trade. Small traders may lack incentives to expand but still have incentives to continue to trade while being less efficient. Besides the superstar traders, the winners from trade in terms of productivity gains and innovation are firms that get access to foreign technology.

**The economies of the region generally invest more in innovation activities than comparator economies, even though the innovation process is led by adapting new technologies developed elsewhere.** Innovation and trade are closely intertwined. Innovative firms tend to be more productive when they trade, while exporters tend to grow faster (in terms of sales) when they also invest in innovation. Innovation and trade are thus closely intertwined and both are necessary elements to improve firms' competitiveness. Trade integration with developed economies, in particular the European Union, access to information and know-how through participation in GVCs, foreign licensed technology and modern management practices are among the most important ingredients for boosting innovation.

**Innovativeness and connectivity to international markets are critical for faster adaptation, greater resilience and coping better with economic shocks such as the COVID-19 crisis.** Innovation activities also depend on the places in which firms are located, such as more populated urban centres, where digital infrastructure and skilled labour are available. Innovative and trading firms adapted better than non-innovative and non-trading firms located in the same areas. This highlights the role of the business and operating environment, including digital infrastructure and education, in boosting innovation at the local level.

**Taken together, these findings suggest several measures that policymakers might implement to accelerate economic development, by improving productivity through deeper trade integration and increasing incentives to invest in innovation.** First, improving customs and trade regulations, which will lower entry costs for firms to engage in trade, will increase access to international markets for a larger share of firms, especially smaller ones. But these measures should not only target small firms or give preference to certain groups of firms. This may not improve competition and productivity in the economy: small traders are not more productive than firms that do not engage in trade. Instead, improving the incentives to invest in innovation, in particular for small firms, might be more effective, as small and innovative firms have higher growth prospects and better chances of surviving in international, competitive markets.

**Second, a large share of firms in the region is reliant on imports, resulting in trade deficits for several economies.** Policies that aim to rebalance the deficit should not introduce restrictions on imports that serve as inputs of production and intermediary goods for domestic firms, especially those participating in GVCs. Imports also make it possible for local firms that do not engage in trade and sell their products and services in the local economy to source components and parts of a better quality (or at a lower cost) than those available in the domestic market.

**Third, to improve innovativeness and economic development, there should be incentives for the acquisition of foreign licensed technologies by both trading and domestic firms.** To increase the participation of local firms in GVCs, reforms to the business environment, through reducing informality and political uncertainty, should be promoted: this will help to create a more stable and predictable operating environment for trading partners and foreign investors. Foreign-owned companies are more likely to be part of global trade and they are important players in the international knowledge diffusion network. Under the right conditions, they can contribute to creating local ecosystems that will connect domestic firms to indirect exports. In addition, foreign licensed technology can be accessed by non-trading, domestic firms, thereby improving their innovativeness.

**Finally, policymakers should prioritise investment in digital infrastructure and facilitate improvements in management practices and workers' skills.** Government could encourage intensive training programmes, in particular aimed at improving the management of SMEs and incentives to reskill the workforce, including in less well-connected areas to attract innovative firms. Combined with investment in digital infrastructure, this could help to rebalance discrepancies within the region in terms of development, and improve resilience and adaptability to shocks, such as the COVID-19 crisis.

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## 2.9. Annex

**Table A.1**  
Productivity premiums of exporters (by exporters' size categories)

	EN	RUS	WB	TUR	CA	CEE
<i>Omitted category: firms that do not export</i>						
Superstar exporter	1.106*** (0.312)	0.425 (0.496)	0.127 (0.578)	1.438*** (0.348)	2.006*** (0.518)	1.159*** (0.197)
Big player	0.601** (0.275)	0.420 (0.363)	-0.268 (0.383)	0.837*** (0.205)	0.944** (0.401)	0.624*** (0.111)
Small player	-0.103 (0.114)	1.496** (0.606)	-0.646 (0.599)	0.178 (0.131)	0.0268 (0.255)	0.201*** (0.0724)
Observations	1,585	621	609	655	1,634	2,939
R-squared	0.078	0.130	0.104	0.078	0.093	0.197

Note: OLS regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Superstar exporters are defined as firms above the 95th percentile of the distribution of export sales, big player exporters are firms between the 50th and 94th percentile, and small player exporters are firms below the median. Other firm characteristics included in the regression but not reported in the table include: country, industry, a binary variable whether the firm is foreign-owned and firm size (log).

**Table A.2**  
Size premiums of exporters (by exporters' size categories)

	EN	RUS	WB	TUR	CA	CEE
<i>Omitted category: firms that do not export</i>						
Superstar exporter	3.198*** (0.238)	3.425*** (0.548)	3.090*** (0.233)	2.837*** (0.253)	2.350*** (0.282)	3.018*** (0.173)
Big player	1.077*** (0.274)	2.714*** (0.277)	1.604*** (0.182)	1.618*** (0.105)	1.724*** (0.319)	1.591*** (0.105)
Small player	0.183 (0.117)	-0.518* (0.267)	0.260* (0.143)	0.309* (0.171)	0.210 (0.261)	0.206** (0.0921)
Observations	1,585	621	609	655	1,634	2,939
R-squared	0.255	0.211	0.370	0.310	0.250	0.356

Note: OLS regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Superstar exporters are defined as firms above the 95th percentile of the distribution of export sales, big player exporters are firms between the 50th and 94th percentile, and small player exporters are firms below the median. Other firm characteristics included in the regression but not reported in the table include: country, industry, a binary variable whether the firm is foreign-owned and labour productivity.

**Table A.3**  
**Growth of sales premiums of exporters (by exporters' size categories)**

	EN	RUS	WB	TUR	CA	CEE
<i>Omitted category: firms that do not export</i>						
Superstar exporter	0.313 (0.594)	-4.888*** (0.928)	0.737*** (0.285)	-1.438** (0.605)	1.466*** (0.565)	-0.006 (0.244)
Big player	-0.348 (0.518)	-0.093 (0.441)	0.138 (0.235)	-0.579 (0.733)	0.670** (0.323)	0.141 (0.161)
Small player	-0.415 (0.398)	1.669*** (0.397)	0.069 (0.261)	0.238 (0.424)	0.137 (0.349)	0.112 (0.125)
Observations	938	323	799	399	1,161	2,828
R-squared	0.108	0.066	0.051	0.069	0.041	0.061

Note: OLS regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Superstar exporters are defined as firms above the 95th percentile of the distribution of export sales, big player exporters are firms between the 50th and 94th percentile, and small player exporters are firms below the median. Other firm characteristics included in the regression but not reported in the table include: country, industry, a binary variable whether the firm is foreign-owned and firm size (log).

**Table A.4**  
**Association between export status and productivity leaders, difference in expected probability, by sub-region**

	EN	RUS	WB	TUR	CA	CEE
Labour productivity	7.978*** (2.244)	8.495* (5.136)	-1.070 (3.767)	-3.156 (2.952)	3.658** (1.518)	13.382*** (2.146)
Observations	1,303	626	383	676	1,370	2,360

Note: Marginal effects from logit regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Other firm characteristics included in the regression but not reported in the table include: country and industry, a binary variable whether the firm is foreign-owned and firm size (log).

**Table A.5**  
**Association between the use of foreign licensed technology and productivity leaders, difference in expected probability, by sub-region**

	EN	RUS	WB	TUR	CA	CEE
Labour productivity	5.309*** (1.520)	7.538 (5.552)	5.653* (3.300)	-3.985** (1.879)	4.176*** (1.554)	4.708** (1.931)
Observations	1,305	627	383	696	1,370	2,360

Note: Marginal effects from logit regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Other firm characteristics included in the regression but not reported in the table include: country and industry, a binary variable whether the firm is foreign-owned and firm size (log).



**Table A.6**  
Productivity premium of traders and innovators, by sub-region

	EN	RUS	WB	TUR	CA	CEE
Trader	0.135 (0.146)	-0.260 (0.270)	-0.179 (0.220)	0.044 (0.237)	0.354** (0.173)	0.206** (0.089)
Innovator	-0.215 (0.193)	-0.187 (0.515)	0.188 (0.246)	-0.352 (0.430)	0.043 (0.208)	0.126 (0.147)
Trader & innovator	0.432*** (0.157)	0.737* (0.397)	-0.173 (0.305)	0.015 (0.269)	0.495** (0.201)	0.320*** (0.088)
Observations	1,670	688	625	671	1,646	3,090
R-squared	0.079	0.141	0.082	0.097	0.098	0.180

Note: OLS regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Other firm characteristics included in the regression but not reported in the table include: country and industry, a binary variable whether the firm is foreign-owned and firm size (log).

**Table A.7**  
Size premium of traders and innovators, by sub-region

	EN	RUS	WB	TUR	CA	CEE
Trader	0.247** (0.121)	0.253* (0.149)	0.481*** (0.166)	0.213 (0.143)	0.235** (0.111)	0.105 (0.074)
Innovator	0.378** (0.175)	1.222*** (0.431)	0.388** (0.194)	0.209 (0.277)	0.269** (0.122)	0.063 (0.102)
Trader & innovator	0.528*** (0.116)	0.048 (0.151)	0.730*** (0.132)	0.665*** (0.140)	0.420*** (0.115)	0.479*** (0.087)
Observations	1,670	688	625	671	1,646	3,090
R-squared	0.189	0.236	0.271	0.300	0.196	0.209

Note: OLS regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Other firm characteristics included in the regression but not reported in the table include: country and industry, a binary variable whether the firm is foreign-owned and firm size (log).

**Table A.8**  
Growth of sales premium of traders and innovators, by sub-region

	EN	RUS	WB	TUR	CA	CEE
Trader	0.247** (0.121)	0.253* (0.149)	0.481*** (0.166)	0.213 (0.143)	0.235** (0.111)	0.105 (0.074)
Innovator	0.378** (0.175)	1.222*** (0.431)	0.388** (0.194)	0.209 (0.277)	0.269** (0.122)	0.063 (0.102)
Trader & innovator	0.528*** (0.116)	0.048 (0.151)	0.730*** (0.132)	0.665*** (0.140)	0.420*** (0.115)	0.479*** (0.087)
Observations	1,670	688	625	671	1,646	3,090

Note: OLS regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Other firm characteristics included in the regression but not reported in the table include: country and industry, a binary variable whether the firm is foreign-owned and firm size (log).

**Table A.9****Population density and night-time light (as proxies for local economic development) and their association with COVID-19 adaptability and innovation**

	Increase online sales		Increase remote work		Firm has a website		Innovator	
Population	2.551***		3.674***		4.312***		1.980***	
	(0.661)		(0.769)		(0.480)		(0.523)	
Nightlight		1.370**		3.089***		2.670***		0.784*
		(0.545)		(0.559)		(0.437)		(0.448)
Observations	8,338	7,579	8,683	7,924	19,753	17,881	19,676	17,814

Note: Marginal effects from logit regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Other firm characteristics included in the regression but not reported in the table include: country and industry, a binary variable whether the firm is foreign-owned, labour productivity, and firm size (log).

**Table A.10****Population density and night-time light (as proxies for local economic development) and their association with COVID-19 adaptability and innovation**

	Increase online sales				Increase remote work			
	Non-exporter	Exporter	Non-innovator	Innovator	Non-exporter	Exporter	Non-innovator	Innovator
Population	2.555***	1.090	2.533***	1.713	3.234***	5.630***	3.104***	3.384***
	(0.753)	(1.558)	(0.817)	(1.150)	(0.885)	(1.709)	(0.973)	(1.269)
Observations	6,484	1,809	5,011	3,270	6,753	1,884	5,296	3,330
Nightlight	1.360**	0.339	2.223***	-0.477	3.064***	2.882**	2.111***	3.902***
	(0.642)	(1.035)	(0.596)	(1.077)	(0.643)	(1.238)	(0.763)	(0.964)
Observations	5,761	1,776	4,442	3,087	6,030	1,851	4,727	3,147

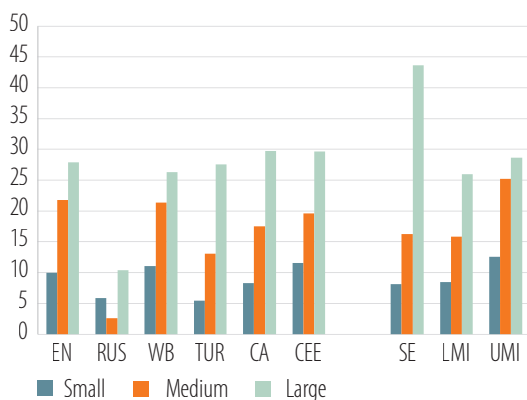
Note: Marginal effects from logit regressions using sampling weights. Standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Other firm characteristics included in the regression but not reported in the table include: country and industry, a binary variable whether the firm is foreign-owned, labour productivity and firm size (log).

**Figure A.1**  
Investment in fixed tangible and intangible assets (percentage of firms)

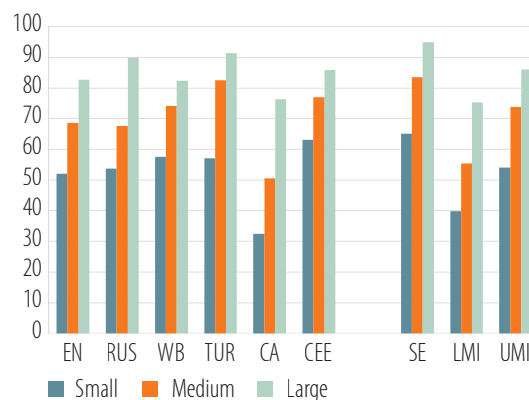


Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

**Figure A.2**  
Use of foreign licensed technology (percentage of firms)

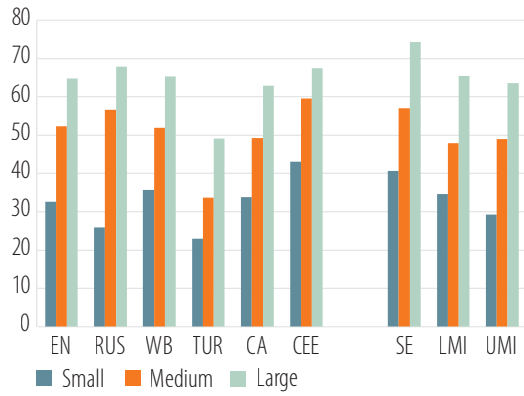


**Figure A.3**  
Having a website (percentage of firms)

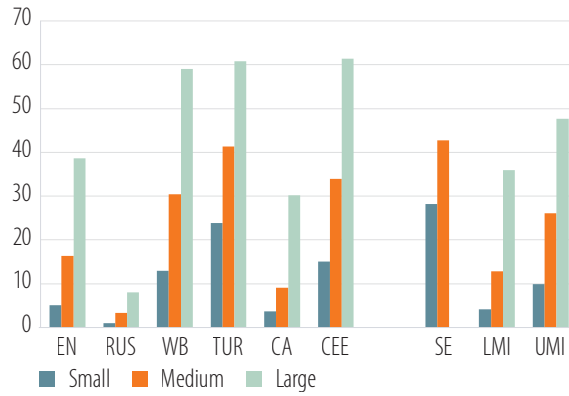


Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.  
Note: Small: 1-19 employees; medium: 20-99 employees; large: 100+ employees.

**Figure A.4**  
Machinery upgrade (percentage of firms)



**Figure A.5**  
Use of international quality certification (percentage of firms)



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey.

Note: Small: 1-19 employees; medium: 20-99 employees; large: 100+ employees.





CHAPTER III

# The green economy

## Summary

*Global warming is a major threat to humanity. This chapter provides an overview of the environmental performance of economies in Eastern Europe and Central Asia to date, and uses firm-level data from the Enterprise Surveys to assess the readiness of the private sector for the green transition. The region has witnessed substantial reductions in carbon emissions since 1990 in absolute, per capita and per unit of GDP terms. But between 2005 and 2018, overall emissions decreased only in Central and Eastern Europe. In other sub-regions, the increase was driven primarily by GDP per capita growth and, in Central Asia and Turkey, by population growth. Moreover, despite halving since 1990, the average energy intensity of GDP in the region is still almost twice that in Southern Europe. Despite a shift away from coal and oil towards nuclear power and renewables, the region still relied on fossil fuels to generate three-quarters of its electricity in 2018. Furthermore, several countries still have generous fossil fuel subsidies, thus making the transition to a low-carbon future harder.*

*Firms' environmental footprints depend on the way they address environmental issues and monitor energy usage and pollution (in other words, their green management practices), on their environmental, social and governance (ESG) practices more broadly, as well as on the investments they make with or without explicit consideration for the environment. The chapter looks at these in turn. Green management practices assess whether firms have clear, measurable and realistic environmental objectives and whether their managers have the right incentives and expertise to achieve those targets. Firms in the region lag those in Southern Europe in terms of the average quality of green management practices, particularly in terms of specific targets with respect to energy and emissions. Analysis suggests that external factors, such as customer pressure and energy tax, play a more important role in determining the quality of green management practices than firm characteristics, such as size and age.*

*Turning to firms' ESG practices, information is often only available for listed companies. The chapter fills the gap and sheds some light on whether smaller firms in the region pay sufficient attention to ESG practices by introducing a "Corporate ESG Responsibility" composite indicator. Not surprisingly, firms in the region lag those in Southern Europe on ESG practices too, with those with fewer than 20 employees on average the weakest in every sub-region.*

*In addition to improving their green management and ESG practices, firms can also invest to enhance their energy efficiency and/or reduce their negative environmental impact. Firms are more likely to invest in a higher number of green measures if they experience fewer financial constraints and have better green management practices. Despite this, many firms do not implement them, primarily because they do not view them as a priority relative to other investments. Taken together, the chapter's findings suggest that policymakers will need to provide a business environment that is conducive to green investment and encourages all firms to improve their green management practices and, more broadly, their corporate ESG responsibility.*



## 3.1. Introduction

**Global warming is widely recognised as posing a major threat to humanity.** It results in long-term changes in weather patterns, including rising sea levels and frequent extreme weather events, which have started to cause widespread economic damage and loss of human life. The Intergovernmental Panel on Climate Change (IPCC) has warned that global emissions must drop to net zero by 2050 to avoid the most catastrophic impacts of climate change (IPCC, 2019). Business models will need to adapt and build around the economics of low-carbon emissions to mitigate potential losses from exposure to physical and transition risks.

**Climate change and many other environmental problems do not observe national borders and can only be managed through timely collective action.** The 2015 Paris Agreement on climate change (UN, 2015) provides an opportunity for countries to strengthen the global response to climate change by keeping global temperature rises well below 2°C – and ideally as low as 1.5°C – relative to pre-industrial levels.

**The scale and urgency of what is required over the next 30 years will pose unprecedented challenges for the governments across the globe.** It will require them to play a more central role, guiding, enforcing and coordinating the transition to a low-carbon economy. The pandemic has shown just how vulnerable the global economic system can be in the face of system-wide risks. Hence, the need to transition to a green economy<sup>1</sup> remains urgent even as governments prioritise public health and battle the economic fallout from the pandemic in the short term.

**The rest of this chapter is organised as follows.** Section 3.2 describes trends in carbon emissions and energy supply in the region since the early 1990s, drivers behind the changes and energy intensity trends. Section 3.3 then turns to the private sector, relying on data from the EBRD-EIB-WBG Enterprise Surveys, which included a special Green Economy module with the aim of systematically collecting information on firms' green management practices and various other aspects of firms' behaviour relating to climate change.

**The chapter focuses on firms' green management practices, assessing whether firms have clear, measurable and realistic environmental objectives and whether their managers have the right incentives and expertise to achieve those targets.** Section 3.4 and Box 1 describe the first corporate environment, social and governance (ESG) responsibility composite indicator covering small and medium-sized enterprises (SMEs) in Europe and Central Asia. Section 3.5 then examines the extent to which financial and managerial constraints hinder green investment. Section 3.6 analyses the links between energy intensity and energy efficiency investments, and Section 3.7 discusses policy implications of the findings.

## 3.2. Taking stock

### 3.2.1. Carbon emissions

**The adoption of the Paris Agreement at the United Nations Climate Change Conference of the Parties in 2015 (COP 21) was one of the biggest climate change milestones in history.** The overarching aim of the Paris Agreement is to reduce greenhouse gas emissions and ensure that global temperature increases this century remain well below 2°C relative to pre-industrial levels, while ideally pursuing a scenario where the temperature increase remains below 1.5°C. As such, the Paris Agreement calls for very aggressive reductions in emissions – particularly carbon emissions, which account for more than three-quarters of all greenhouse gas emissions worldwide.

**Since the early 1990s, the region has experienced substantial reductions in carbon emissions, but there is room for further improvement.** Carbon emissions decreased in absolute terms, on a per capita basis as

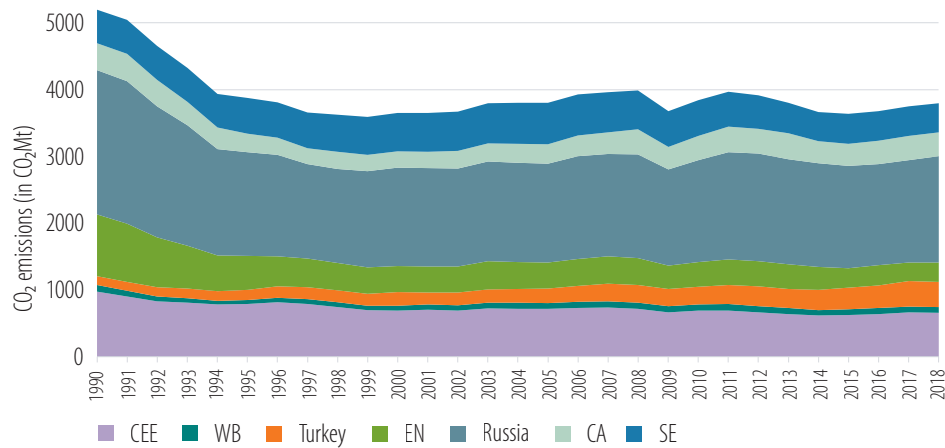
<sup>1</sup> This chapter uses low-carbon economy, carbon-neutral economy and green carbon economy interchangeably.

well as per US dollar of GDP (Figure 1).<sup>2</sup> While this is encouraging, much more remains to be done for alignment with the Paris Agreement. The region's emissions per capita declined in the 1990s, reaching their lowest point around 2000, but since then, they partially bounced back to higher levels. Moreover, carbon emissions have increased continuously in Turkey and several other sub-regions since the late 1990s; Russia remains the largest emitter (panel A). While they have halved compared with 1990, carbon emissions per US dollar of GDP are still about 50% higher in the region than in the Southern Europe sub-region of the European Union (Panel C). But an important difference is that countries in Southern Europe did not have to overcome the distortions of the low energy prices and chronic environmental neglect of the central planning era in the region.

**Figure 1**  
**Carbon emissions – absolute, per capita and per unit of GDP**

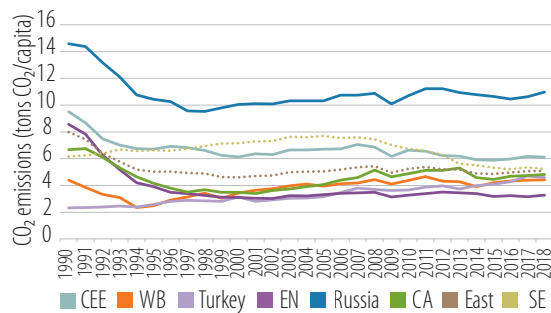
**Panel A**

**Absolute carbon emissions**



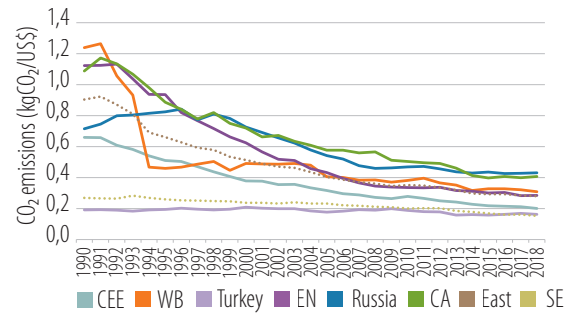
**Panel B**

**Carbon emissions per capita**



**Panel C**

**Carbon emissions per unit of GDP**



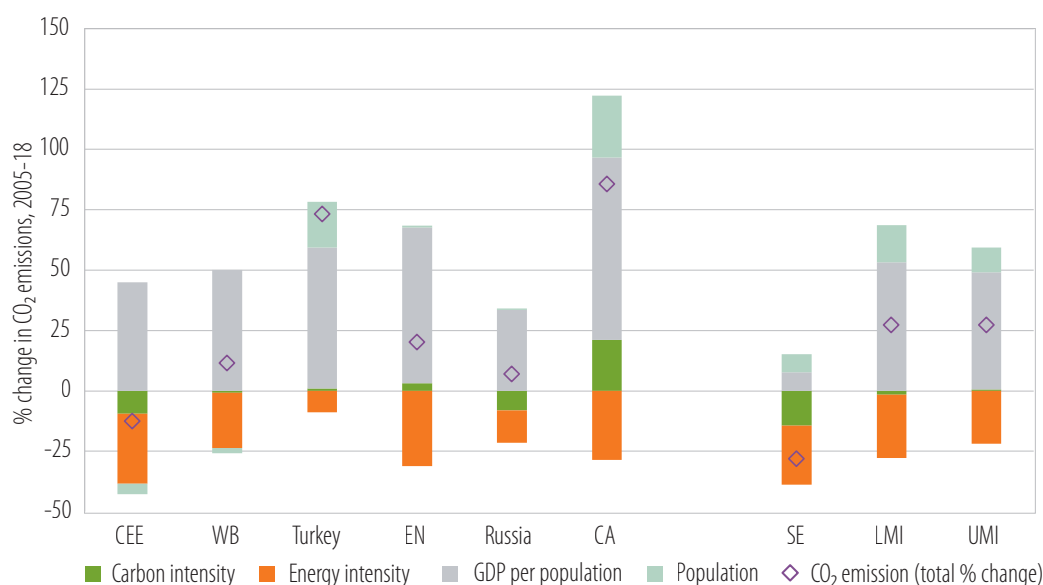
Source: IEA and authors' calculations.

Note: Data represent unweighted averages across countries. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; East – Eastern Europe and Central Asia; SE – Southern Europe.

<sup>2</sup> A significant drop in carbon emissions per capita and per unit of GDP in the Western Balkans in 1994 was driven by the significant drop in carbon emissions in Bosnia and Herzegovina.

**In the more recent period between 2005 and 2018, carbon emissions increased in most of the sub-regions.** The only sub-region where absolute carbon emissions decreased was Central and Eastern Europe: by 11.9%, which is less than the decrease in carbon emissions in Southern Europe during the same period (28.0%). The decrease was driven primarily by reductions in energy intensity (the amount of energy that is used to produce a unit of value added; Figure 2), motivated by EU policies and regulations, as countries in both Southern Europe and Central and Eastern Europe are EU members. In other sub-regions of Eastern Europe and Central Asia, energy intensity decreased too, but overall carbon emissions nevertheless increased during the same period, driven primarily by growth in GDP per capita and, in Central Asia and Turkey, by population growth.

**Figure 2**  
Drivers of changes in carbon emissions between 2005 and 2018



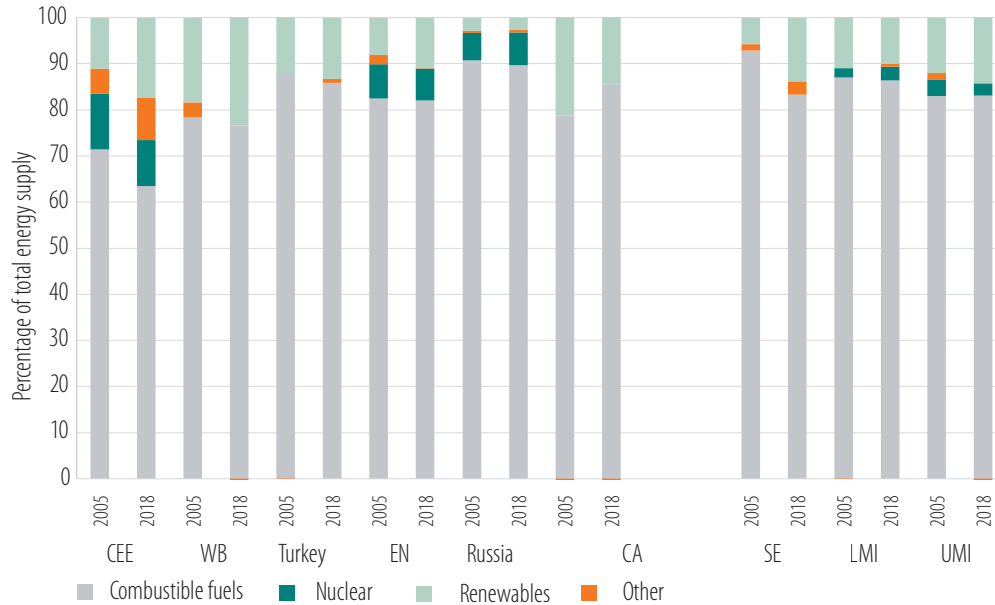
Source: IEA and authors' calculations.

Note: Data represent unweighted averages across countries. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; SE – Southern Europe; LMI – lower-middle-income economies; UMI – upper-middle-income economies. Carbon intensity refers to carbon emissions per unit of energy. Energy intensity refers to energy use per unit of GDP.

### 3.2.2. Primary energy supply

**Despite a shift away from coal and oil towards nuclear power and renewables, the region is still highly reliant on fossil fuels.** Combustible fuels (which include coal, oil and gas) remain the region's primary energy source, and accounted for 75.1% of its electricity in 2018 (Figure 3). Russia – a resource-rich country with substantial fossil fuel subsidies – had the highest share (89.7%), followed by Turkey (85.8%) and Central Asia (85.5%). In Central Asia, the share of combustible fuels as a source of energy increased by 6.7 percentage points between 2005 and 2018, primarily because of a substantial rise in the use of oil. In Central and Eastern Europe, by contrast, that share fell by 8 percentage points over the same period, primarily owing to a decline in the use of coal and peat. The share of renewable energy remained relatively small, though still higher than in Southern Europe as well as lower- and upper-middle-income economies.

**Figure 3**  
**Breakdown of primary energy supply by fuel type**



Source: IEA data from World Energy Balances.

Note: Data represent unweighted averages across countries. Combustible fuels include coal and peat, crude, natural gas liquids (NGL) and feedstocks, oil and natural gas. Renewables include hydro, geothermal, solar, tide, wind, biofuels and waste. Other includes heat and electricity. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; SE – Southern Europe; LMI – lower-middle-income economies; UMI – upper-middle-income economies.

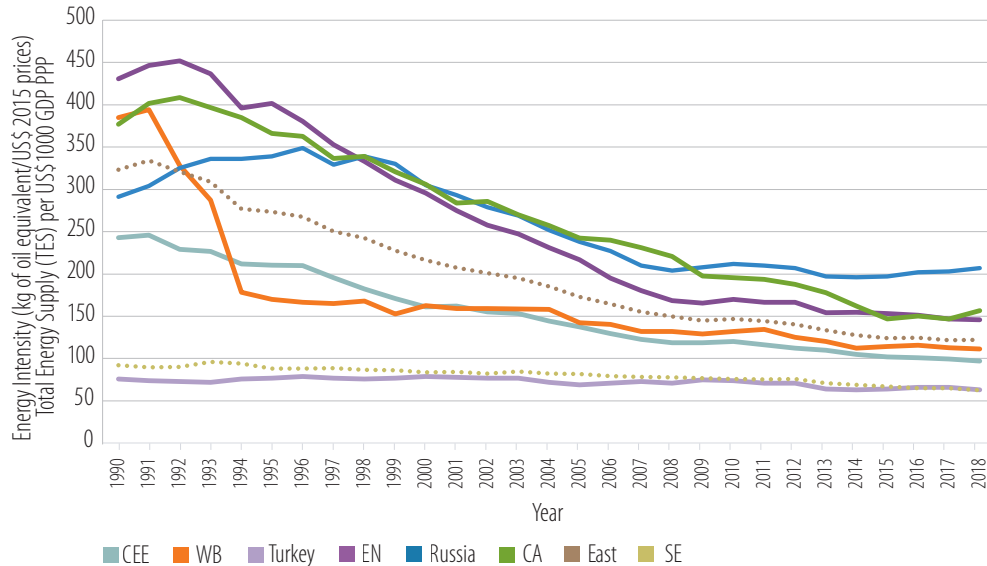
### 3.2.3. Energy intensity of GDP

**Central planning led to distortions in the sectoral structure of economies and intrinsic inefficiencies in the use of energy.** The sectoral structure of each economy and the amount of energy that is used to produce a unit of value added in each industry (which reflects the energy efficiency<sup>3</sup> of the various industries), alongside other factors such as weather conditions and the standard of living, determines the energy intensity of GDP.

**The average energy intensity of GDP in the region has more than halved since 1990.** This has been driven primarily by improvements in energy efficiency within individual sectors (EBRD, 2011). Nevertheless, the energy intensity of GDP remains almost twice that in Southern Europe (Figure 4), indicating that there is still much room for improvement.

3 The reverse of energy intensity is used as a proxy for energy efficiency.

**Figure 4**  
**Energy intensity of GDP**



Source: IEA and authors' calculations.

Note: Data represent unweighted averages across countries. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; East – Eastern Europe and Central Asia; SE – Southern Europe.

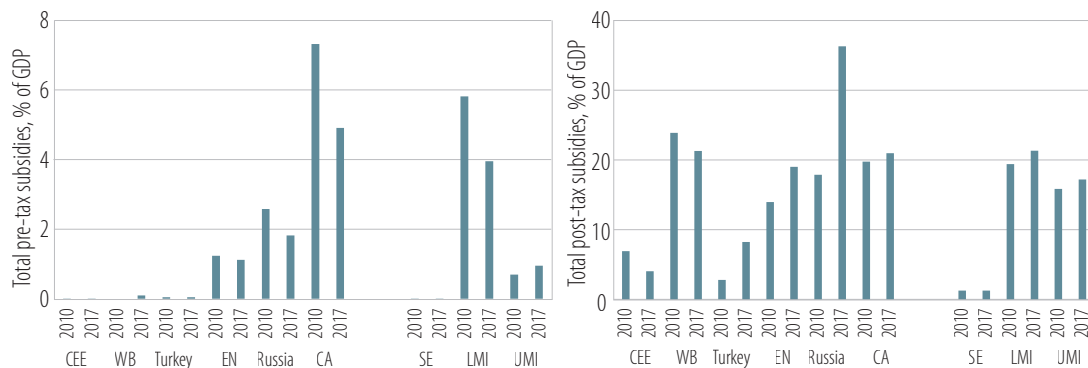
**A more nuanced picture emerges when looking at energy intensity by country.** Ukraine, for example, reduced its energy intensity by 42% between 1990 and 2018, but remains the country with the highest energy intensity of GDP in the region, more than twice the regional average. In contrast, Armenia, which had the second highest energy intensity of GDP among countries in the region in 1990 (after Uzbekistan), managed to reduce it by 80% in the same period, coming below the average for the region in 2018. In 2018, the most energy-intensive countries in the region besides Ukraine were Russia, the Kyrgyz Republic, Uzbekistan, Moldova, and Bosnia and Herzegovina (in declining order of energy intensity). On the plus side, each of those countries had reduced its energy intensity relative to the early 1990s, primarily thanks to a decrease in industry's share in GDP.

### 3.2.4. Fossil fuel subsidies

**When it comes to energy-efficient business models, firms' choices are strongly influenced by their countries' energy policies, including fossil fuel subsidies.** Several countries in the region that are heavily reliant on fossil fuels for their energy supply – such as Russia and several countries in Central Asia – subsidise fossil fuels and electricity generated from fossil fuels. Most countries do not take account of the costs associated with global warming, local externalities or forgone consumption tax revenues when setting energy prices. This is a key policy distortion that makes fossil fuels (and electricity generated from them) cheaper for both households and firms, in turn affecting behaviour in terms of energy usage. According to the IMF, the region's fossil fuel subsidies had a total value (excluding tax treatment) of \$43 billion in 2017 (equivalent to 1.2% of the region's GDP), while subsidies including tax treatment totalled \$885 billion (15.3% of GDP) (see Coady et al, 2019).

**Fossil fuel subsidies are not negligible as a percentage of GDP.** While the pre-tax fossil fuel subsidies as a percentage of GDP decreased in all regions between 2010 and 2017 (Figure 5), they still amounted to almost 5% of GDP in Central Asia and 1.8% of GDP in Russia. Once tax treatment is included, all countries – including those in Southern Europe – had some level of fossil fuel subsidies. Moreover, their share in GDP almost tripled in Turkey, doubled in Russia and increased in all other sub-regions except Central and Eastern Europe (where it decreased by more than 40%) and the Western Balkans.

**Figure 5**  
Fossil fuel subsidies as a percentage of GDP



Source: Coady et al (2019) and authors' calculations.

Note: Estimates represent unweighted averages across countries and include both consumption and production-related subsidies. Post-tax subsidies include the costs associated with global warming, local externalities or foregone consumption tax revenues when setting energy prices. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; East – Eastern Europe and Central Asia; SE – Southern Europe; LMI – lower-middle-income economies; UMI – upper-middle-income economies.

**Fossil fuel subsidies affect firms' behaviour: better-managed firms respond to incentives and reduce their energy intensity less if the fossil fuel subsidy is relatively large.** The magnitude is substantial: an improvement in the quality of general management practices (firms' general approach to operations, monitoring, targets and incentives) from the 25th to the 75th percentile of the distribution is associated with a 21% fuel intensity reduction when fossil fuel subsidies are low (or negative), but only with a 3% fuel intensity reduction when fossil fuel subsidies are high (Schweiger and Stepanov, 2021).

**Firms' environmental footprints are influenced by factors other than energy policies.** Besides general management practices, firms' environmental footprints depend on the way in which they address environmental issues and monitor energy usage and pollution, on ESG practices more broadly, as well as investments they make with or without explicit consideration for the environment. The next sections look at each of these in turn, using unique Enterprise Survey data.

## 3.3. Green management

### 3.3.1. Measuring green management practices

**Nowadays, effective management includes not only the ability to manage operations and human resources, but also the ability to minimise the firm's impact on the environment.** The Green Economy module of the EBRD-EIB-WBG Enterprise Survey systematically collected information on the four main pillars of firms' green management practices.<sup>4</sup> The first pillar concerns the question of whether firms have strategic objectives pertaining to the environment and climate change. The second pillar looks at whether firms employ a manager with an explicit mandate to deal with green issues. It is also important to see who the environmental manager reports to, since research suggests that the link between a firm's strategic objectives and its day-to-day actions depends crucially on its organisational structure. Generally speaking, the closer the person with environmental responsibilities is to the firm's most senior manager, the more able they are to solve problems and overcome ill-defined incentives (see Martin et al, 2012; and Yong et al, 2018). The third green management practices pillar concerns the question of whether firms have clear and attainable environmental targets. The fourth pillar looks at whether firms actively and

<sup>4</sup> In most economies, the response rate for the Green Economy module was in excess of 95%.

frequently monitor their energy and water usage, as well as carbon emissions and other pollutants, in order to reduce their environmental footprint.<sup>5, 6</sup>

**The quality of firms' green management can be quantified on the basis of their answers to several specific Enterprise Survey questions related to these four pillars.** A measure of the quality of green management practices was constructed based on the answers. The scores for each question were normalised so that they had a mean of 0 and a standard deviation of 1 (turning them into z-scores). Those z-scores were then aggregated to produce average z-scores for each of the four types of green management practice. Overall z-scores for all green management practices were then constructed as unweighted averages of the four types of practice. A z-score above zero indicates that a firm's management practices are better than the sample average. This exercise shows that the quality of firms' green management, averaged at the country level, is positively correlated with the average quality of *general* management practices (firms' general approach to operations, monitoring, targets and incentives). But this positive raw correlation is relatively modest, with a coefficient of 0.2.<sup>7</sup>

### 3.3.2. Green management patterns across the region

**The average quality of green management practices differs across sub-regions.** Firms in Central and Eastern Europe have, on average, the best green management practices in the region, followed by firms in the Western Balkans (Figure 6). But they lag firms in Southern Europe. Turkish firms score worst in terms of the average quality of green management, below the average for firms in lower- and upper-middle-income economies (LMI and UMI, respectively).

**There are also marked differences across the sub-regions in the four pillars underlying the overall green management practices measure.** For example, many firms in the Eastern Neighbourhood and the Western Balkans excel when it comes to monitoring – they frequently collect data on energy and water usage, and emissions of pollutants (Figure 7). But they are less adept at translating that monitoring into specific targets. Economies in Southern Europe do not perform so well when it comes to monitoring, but when they do, they are much better at translating that into specific targets. Firms in Central and Eastern Europe excel at having a manager with explicit responsibilities in the area of climate change and development, but again they do not deliver that much – comparatively – in terms of green monitoring.

5 The first pillar is based on one question about strategic objectives relating to environmental or climate change issues. The second pillar includes three questions about managers responsible for environmental and climate change issues and their reporting lines, as well as criteria for their performance evaluation. The third pillar covers nine questions about the monitoring of energy and water usage, greenhouse gas emissions and other pollutants over the last three years, as well as external audits. The fourth pillar includes three questions about targets relating to energy consumption and emissions (with questions relating to water usage and pollutants other than greenhouse gas emissions being answered only by manufacturing firms).

6 Energy usage is just one source of greenhouse gas emissions, albeit an important one. Other sources include physical and chemical processing and the transport of materials, products, waste and employees (see World Resources Institute and World Business Council for Sustainable Development, 2004).

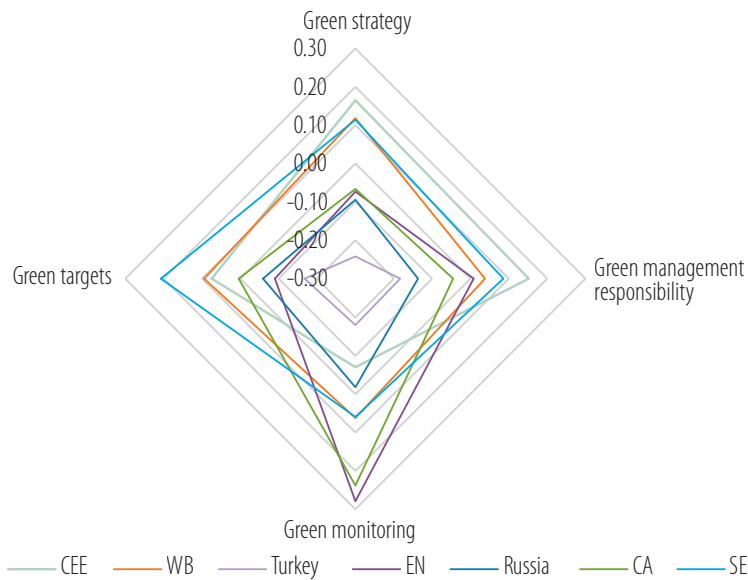
7 Controlling for country, sector and firm size, the correlation coefficient between general and green management scores is 0.15.

**Figure 6**  
The average quality of green management differs across regions



Source: Enterprise Surveys and authors' calculations.  
 Note: Data represent unweighted averages across countries. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; SE – Southern Europe; LMI – lower-middle-income economies; UMI – upper-middle-income economies.

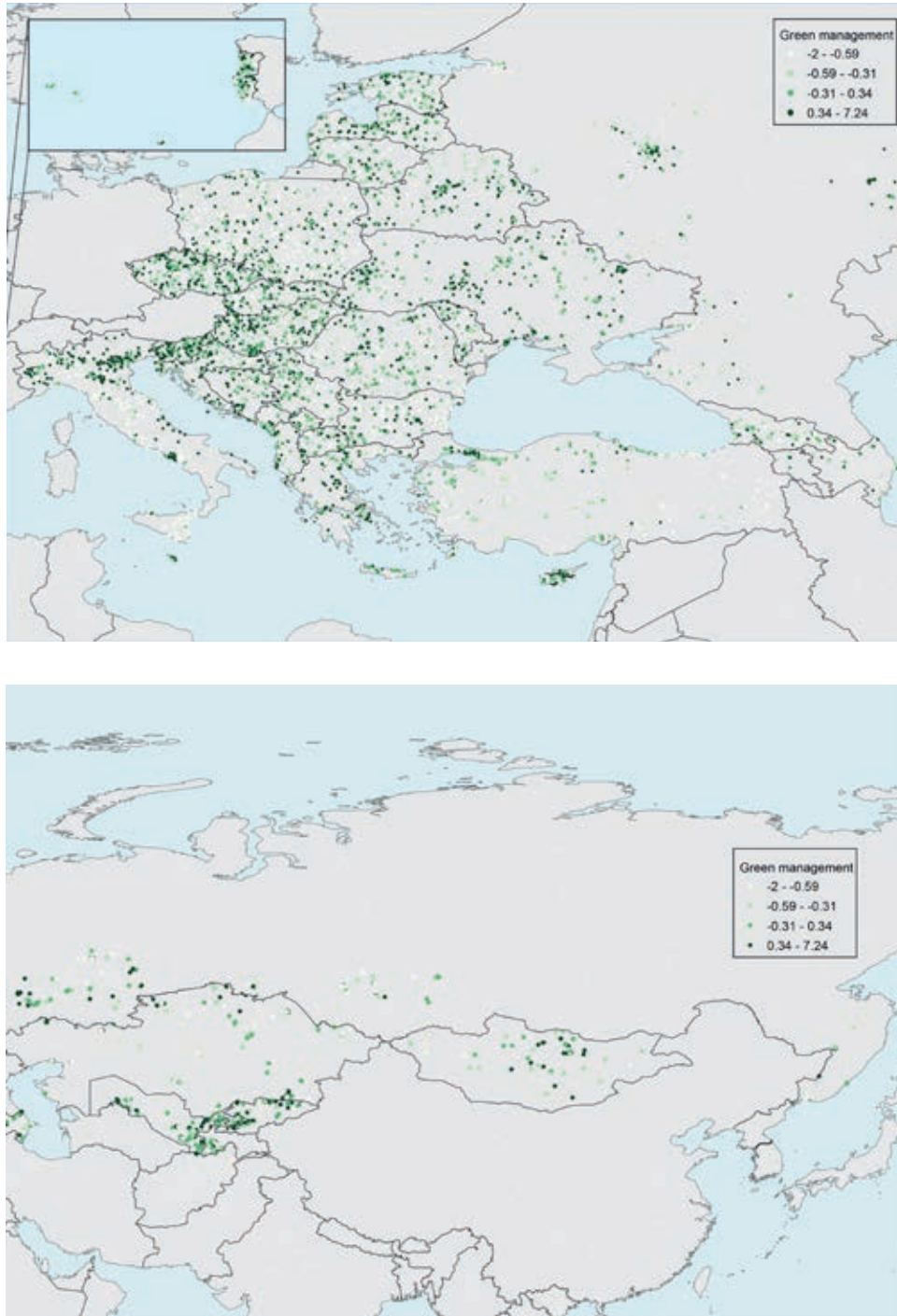
**Figure 7**  
The four pillars of green management



Source: Enterprise Surveys and authors' calculations.  
 Note: Data represent unweighted averages across countries. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; SE – Southern Europe.



**Figure 8**  
**Geographical distribution of firms and the quality of their green management**



Source: Enterprise Surveys and authors' calculations.

Note: This map shows the geographical distribution of the firms in the region and Southern Europe. Each dot represents one or several firms in a locality. Darker green colours indicate higher-quality green management. Green management is measured as a z-score based on four areas of green management practices: strategic objectives related to the environment and climate change; whether the firm has a manager with an explicit mandate to deal with green issues, who this manager reports to and whether their performance is evaluated against the establishment's environmental performance; environmental targets; and monitoring of energy and water usage, carbon and other pollutant emissions.

### 3.3.3. Determinants of green management practices

**Although there are substantial differences across countries in terms of the average quality of green management, most of the variation is found within countries.** This is true even after accounting for cross-country differences in sectoral composition. Figure 8 shows that firms with good and bad green management practices can be found in each country, with neither concentrated in specific locations within the country. There are several factors that may explain the large differences in green management scores across firms within a given country. Besides the firm's sector, these include other firm characteristics, such as size, age and ownership, as well as external factors, such as customer or regulatory pressure, and whether the firm is experiencing environmental and climate change-related problems. These are discussed further below.

**A firm's willingness and ability to adopt good green management practices (and the extent to which it is legally obliged to do so) will be dependent on its sector or industry.** A firm's sector provides a rough indication of the amount of pollution that it is likely to generate. It also determines the extent to which the firm is obliged to monitor its pollutant emissions and report them to national or international regulatory bodies, such as the European Pollutant Release and Transfer Register, or participate in an emissions trading system. Using data on average carbon emissions per unit of value added (see De Haas and Popov, 2019),<sup>8</sup> emissions-intensive sectors can be identified; they are defined here as industries covered by the Enterprise Surveys that have above-median emissions. The following sectors are emissions-intensive based on that definition: paper products, printing and publishing, coke, petroleum, chemical products, rubber and plastic products, non-metallic mineral products, basic metals, land transport, water transport and air transport.

**Another factor is whether a firm is required to be more transparent about its overall performance.** Listed firms tend to be subject to greater scrutiny and under more pressure (from institutional investors, for example) to report on ESG issues, and are thus more likely to have good green management practices. Other external factors requiring more transparency – such as customer pressure and environmental regulations (proxied by energy taxes or levies) – can also prompt firms to reduce their environmental impact. Where energy is expensive, firms have an incentive to use less of it. The resulting positive impact on the environment is especially large where energy is generated using fossil fuels.

**Experiencing environmental and climate change-related problems may affect green management practices, too.** Firms with direct, first-hand experience of such problems – for example, firms that have suffered monetary losses due to extreme weather events or which have been negatively affected by pollution produced by nearby firms – may be more inclined to enhance their green credentials. Enterprise Survey data reveal that 9.1% of firms in the region and 13.5% of firms in Southern Europe have experienced monetary losses due to extreme weather events in the three years prior to the survey. For example, Moldova, North Macedonia and Romania all experienced severe flooding in 2016, and heatwaves and droughts have become a common occurrence in many countries during the summer months. Similarly, there have been severe hailstorms in Croatia, Poland, Romania and Slovenia.

**Firm size and age are likely to matter as well.** As firms grow, they may eventually reach a size at which they are obliged to monitor their emissions. They may also face increasing pressure from consumers to reduce their impact on the environment. For example, providers of takeaway coffee and food have experienced growing pressure to switch to recyclable cups and containers. For young small and medium-sized enterprises (SMEs), emphasising their environmental credentials could also prove to be a unique selling point.

**When it comes to the impact that foreign ownership has on the environment, the results of existing studies are mixed.** In general, foreign ownership often improves firm-level productivity by transferring cutting-edge technology, management practices and knowledge to acquired firms and encouraging product and process innovation. Indeed, multinationals tend to use more advanced technology and production methods than their domestic counterparts, which can improve environmental outcomes.<sup>9</sup>

<sup>8</sup> Alternative classifications yield a similar set of industries. See, for example, Broner et al (2016).

<sup>9</sup> See, for example, Dean et al (2009) and Brucal et al (2019).

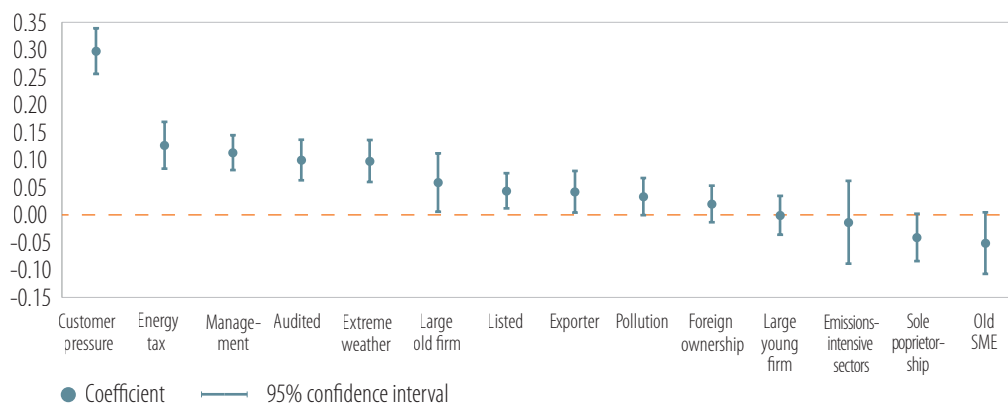
This has sometimes been referred to as the “pollution halo effect”. But at the same time, firms in polluting industries may also relocate to countries with less stringent environmental regulations (termed “pollution havens”) in response to costly regulations in their home countries, increasing pollution levels both in their host countries and globally (see, for example, Cai et al, 2016).

**Customer pressure is the most important determinant of the quality of green management practices.**

Estimates from a firm-level regression (Figure 9) indicate that in the region, firms whose customers require environmental certifications or adherence to certain environmental standards as a condition of doing business with them on average have better green management practices than firms whose customers do not require this. This is closely followed by whether a firm is subject to an energy tax and the quality of its general management practices. Several other determinants also play a role, such as having audited financial statements or having experienced monetary losses due to extreme weather events. With other controls included, being active in emissions-intensive sectors is not an important determinant of green management practices – but it is likely that this is covered, to a large extent, by customer pressure and energy tax.

**Overall, external factors play a more important role in determining the quality of green management practices than firm characteristics.** This suggests that there is a role for government guidance and stricter regulation.

**Figure 9**  
**Determinants of green management**



Source: Enterprise Surveys and authors' calculations.

Note: This figure shows the standardised coefficients from a regression estimated using weighted ordinary least squares. The dots represent standardised coefficient estimates, and the lines represent the 95% confidence intervals. Regression includes the variables shown in the figure and controls for locality size; it also includes country, sector, accuracy and truthfulness fixed effects, and uses robust standard errors. Young firms are defined as those less than 5 years old. SMEs have fewer than 100 employees. Foreign-owned firms are those with at least 25% foreign ownership. Sectors are based on ISIC Rev. 3.1. Emissions-intensive sectors include paper and paper products (21), printing and publishing (22), coke and petroleum (23), chemical products (24), rubber and plastic products (25), non-metallic mineral products (26), basic metals (27), land transport (60), water transport (61) and air transport (62).

## 3.4. Corporate ESG responsibility practices

### 3.4.1. Measuring corporate ESG responsibility practices

**The ability to handle environmental issues in a proactive manner is just one aspect of effective firm management; the ability to handle social and governance issues is also part and parcel of it.** But information on firms' ESG practices is often only available for listed companies. Relatively few firms in the region are listed, with many stock markets remaining underdeveloped. Even in the region's most developed stock markets, ESG disclosure is in its infancy: for example, the Warsaw Stock Exchange published its first ESG reporting guidelines for listed companies only in May 2021, in partnership with the EBRD. Consequently, few listed firms disclose ESG information.

**Moreover, even if listed companies had perfect ESG disclosure, there would still be no information on ESG practices of the vast majority of firms: unlisted firms and SMEs.** While the Green Economy module and Enterprise Surveys were not developed specifically to collect information on ESG practices, they included a number of questions that can shed light on ESG-related practices of the unlisted firms and SMEs. This information has been used to build a firm-level "Corporate ESG Responsibility" composite indicator (see Box 1 for more details). Thanks to the Enterprise Survey coverage, the information and thus the composite indicator cover more than 28 000 firms, mainly SMEs, in more than 40 economies.

**There is no global agreement on what ESG entails.** This Corporate ESG Responsibility composite indicator does not follow the standards of any of the four leading ESG organisations<sup>10</sup> in their entirety, nor does it match any of the variegated approaches of ESG rating agencies (such as Vigeo Eiris, ISS-oekom, MSCI ESG Rating or Sustainalytics). Indeed, ESG rating agencies are using significantly different approaches (Berg et al, 2020; Chatterji et al, 2016; Gibson, 2019) and the correlation of ESG scores provided by different agencies is very low (Berg et al, 2020). This lack of an "industry standard", a "surprising lack of agreement" among agencies (Chatterji et al, 2016) or even an "aggregation of confusion" (Berg et al, 2020) in the realm of ESG ratings make building an indicator relying only on one of the agencies' methodologies problematic.

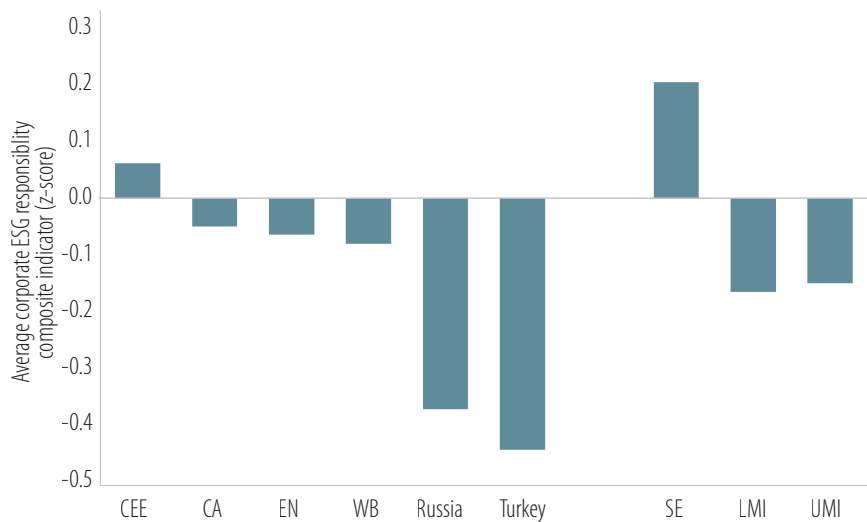
**The aim of this firm-level Corporate ESG Responsibility composite indicator is to shed light on whether smaller firms in emerging markets pay attention to ESG practices.** Its aim is not to produce ESG scores for listed large companies to serve investors' needs or to "certify" the ESG standards of any specific firm. This would require interaction with companies, verification on the ground and additional face-to-face interviews.

### 3.4.2. Patterns of corporate ESG responsibility practices across the region

**Firms in Southern Europe have on average better corporate ESG responsibility than all of the sub-regions in Eastern Europe and Central Asia, with Central and Eastern Europe performing best and Russia and Turkey the worst.** Figure 10 illustrates the resulting average Corporate ESG Responsibility composite indicator in the region and Southern Europe, as well as lower- and upper-middle-income economies covered in the Enterprise Surveys. At the country level, firms in the Baltic states have on average the best Corporate ESG Responsibility composite indicator, while firms in Montenegro and Tajikistan are at the other end of the spectrum.

<sup>10</sup> These are the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB); CDP (formerly the Carbon Disclosure Project); the Carbon Disclosure Standards Board (CDSB); and the International Integrated Reporting Council (IIRC).

**Figure 10**  
Average quality of Corporate ESG Responsibility composite indicator (z-score)



Source: Enterprise Surveys and authors' calculations.

Note: Z-score calculation is based on the Enterprise Survey sample of 41 economies. Data represent unweighted averages across countries. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; SE – Southern Europe; LMI – lower-middle-income economies; UMI – upper-middle-income economies.

### Box 1

#### Corporate ESG Responsibility composite indicator

**The Corporate ESG Responsibility composite indicator is based on ESG-related questions in the Enterprise Surveys.** It is inspired by the Sustainability Accounting Standards Board (SASB) standards. Selected ESG-related questions – 45 in total out of more than 200 in the Enterprise Surveys – have been aggregated to match the main ESG pillars and sub-pillars, and generate a synthetic index (see Table 1.1 for the schematic representation). The Corporate ESG Responsibility composite indicator has been built taking the following steps:

1. Identify and select the building blocks (E, S, G, and their sub-pillars) and respective variables, based on relevant frameworks such as the SASB and on their relevance in the assessments of the main ESG rating agencies.
2. Match the main building blocks and the variables used by SASB and ESG rating agencies with the topics (set of questions) covered by the Enterprise Surveys.
3. Align the sub-pillars with SASB standards to the maximum possible extent. Three sub-pillars are included for E (environmental awareness, green management practices, green measures), three for S (gender, education and skills, training) and six for G (corporate governance, management practices, internal controls and audit, business ethics, compensation, innovation).
4. When data are missing due to skipping patterns that ensure the firms answer only questions relevant to them rather than non-response, answers are imputed when logically straightforward (in line with OECD-JRC, 2008). Answers can include "refusal" or "don't know"; this is typically treated as missing in the analysis, but can on a case-by-case basis be used as valid information.
5. Calculate pillars and the overall composite indicator as z-scores with mean 0 and standard deviation 1 over the sample, including all 41 economies and companies covered in the Enterprise Surveys.
6. Weight the main building blocks (E, S, G) and the sub-pillars taking into account their relevance; the components within each sub-pillar, on the contrary, are equally weighted. The weight for E has been set at 40%, the one for S at 25%, the one for G at 35%.

7. Perform various other robustness checks, such as looking at correlation matrices and benchmarking different versions of scores built using different definitions in terms of (i) inclusion or not of specific building blocks; and (ii) different weights.
8. Generate the final output, represented by firm-level Corporate ESG Responsibility scores.

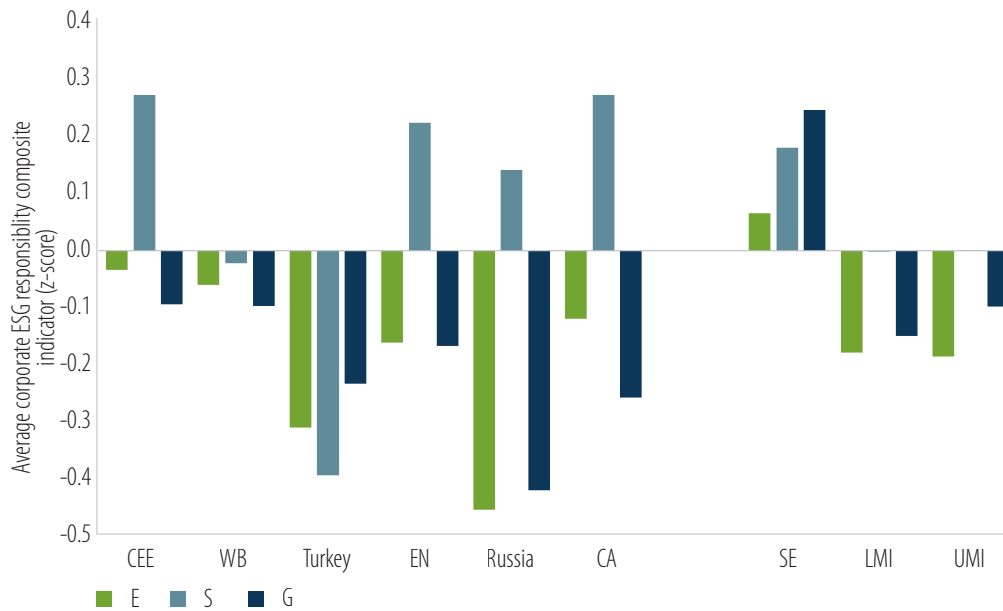
**Table 1.1****Corporate ESG Responsibility composite indicator: building blocks and Enterprise Survey questions**

<b>E</b>	Environmental awareness	Monitor/ external audit/ targets of energy consumption, CO <sub>2</sub> , water, pollution
	Green Management	Strategic objectives mentioning environment, manager responsible, certifications
	Green Measures	Heating and cooling improvements, upgrade of machines and of vehicles, etc.
<b>S</b>	Gender	Female owners, female top managers, female employees
	Education and skills	Secondary school completion
	Training	Formal training programmes
<b>G</b>	Corporate governance	Written business strategy with KPIs, board of directors, meeting with suppliers
	Management Practices	Monitor performance indicators, production targets, promotion of non-managers
	Internal controls & audit	Certified fiscal statement, internationally-recognized quality certification
	Business Ethics	Obstacles from crime, losses from robberies, gifts or informal payments
	Compensation	Performance bonuses for managers
	Innovation	R&D, purchase of fixed assets, use of technology from foreign company

Source: Authors' classification based on Sustainability Accounting Standards Board (SASB) standards and Enterprise Surveys.

**There are differences in the average performance on the three components of the Corporate ESG Responsibility indicator across the sub-regions.** On average, firms in Central and Eastern Europe perform best on the social component (Figure 11). The same is true for firms in Central Asia and the Eastern Neighbourhood, although these are on average weaker on environmental and governance components. The differences in average performance on the three components are smaller for firms in the Western Balkans than for those in Central and Eastern Europe, Central Asia and the Eastern Neighbourhood, but they are below the overall Enterprise Survey performance.

**Figure 11**  
Average quality of Corporate ESG Responsibility pillars (composite indicator, z-score)



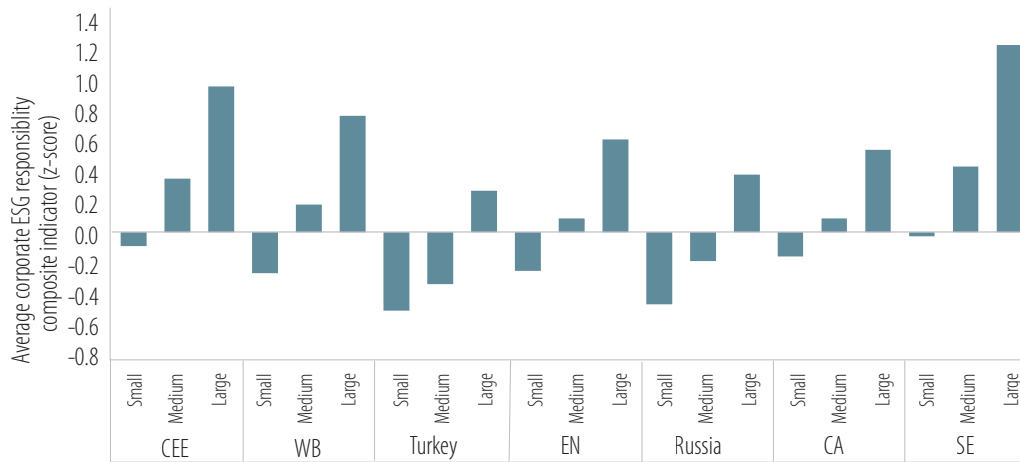
Source: Enterprise Surveys and authors' calculations.

Note: Z-score calculation is based on the Enterprise Survey sample of 41 economies. Data represent unweighted averages across countries. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; SE – Southern Europe; LMI – lower-middle-income economies; UMI – upper-middle-income economies.

**The Corporate ESG Responsibility composite indicator confirms that firm size<sup>11</sup> matters for ESG practices; it provides an indication of the relevance of the gaps across size and regions.** Small companies (those with fewer than 20 employees) are on average the weakest in terms of ESG performance in each sub-region, including Central and Eastern Europe, Central Asia, the Eastern Neighbourhood and the Western Balkans, followed by medium-sized firms (Figure 12). Large firms (those with at least 100 employees, most of them not listed) on average perform best and score better than small firms in all sub-regions.

11 The Enterprise Survey thresholds are: small – fewer than 20 employees; medium-sized – 20-99 employees; large: at least 100 employees.

**Figure 12**  
**Determinants of Corporate ESG Responsibility**



Source: Enterprise Surveys and authors' calculations.

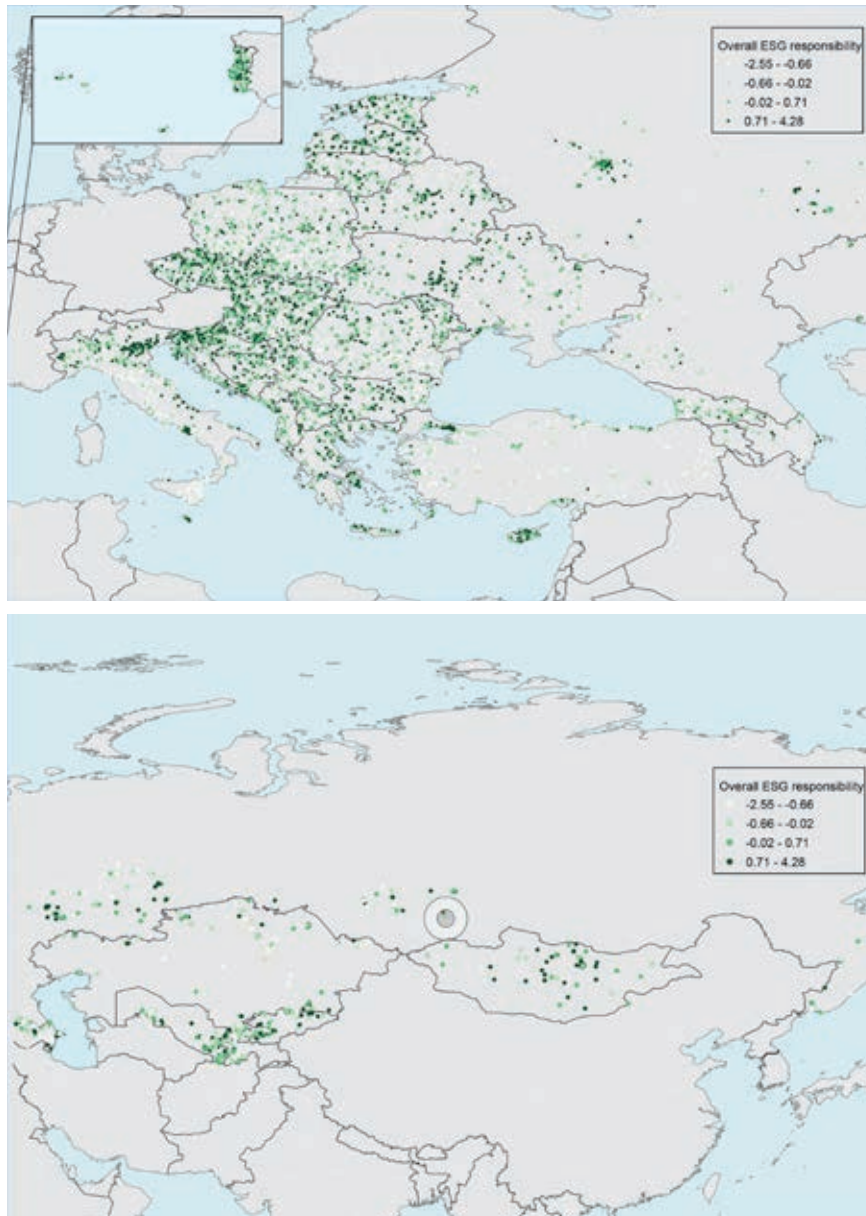
Note: Z-score calculation is based on the Enterprise Survey sample of 41 economies. Data represent unweighted averages across countries. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; SE – Southern Europe. Small firms have fewer than 20 employees, medium-sized firms have 20-99 employees and large firms have 100 or more employees.

### 3.4.3. Determinants of corporate ESG responsibility practices

**There are substantial differences across countries in terms of the average value of the Corporate ESG Responsibility composite indicator.** But firms with high and low values can be found in every country (Figure 13). In a few countries, such as Italy and Turkey, firms with high values and firms with low values of the Corporate ESG Responsibility composite indicator appear to be concentrated in specific locations, but such a pattern is not evident elsewhere.



**Figure 13**  
**Geographical distribution of ES firms and their Corporate ESG Responsibility composite indicator**



Source: Enterprise Surveys and authors' calculations.

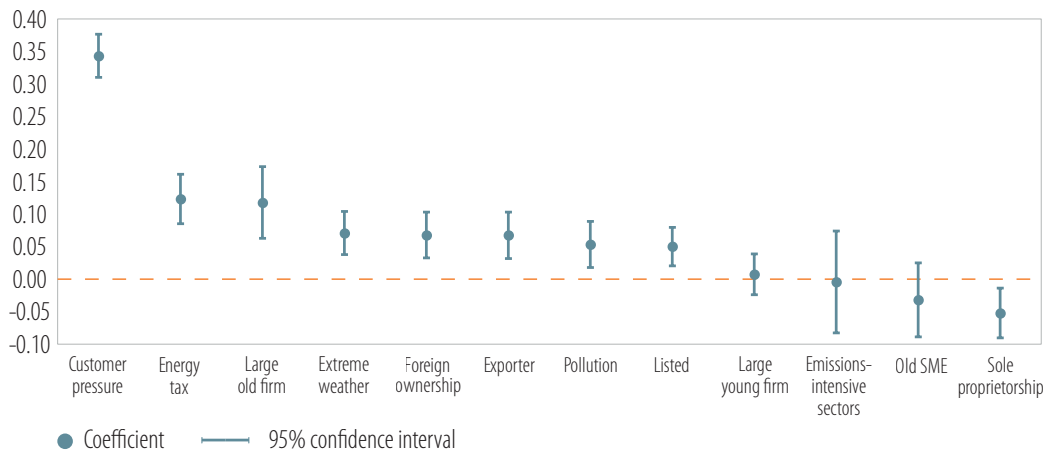
Note: Z-score calculation is based on the Enterprise Survey sample of 41 countries. See Box 1 for more details.

**There are several factors that may explain the large differences in Corporate ESG Responsibility composite indicator scores across firms within a given country.** Besides the firm's sector, these include other firm characteristics, such as size, age and ownership, as well as external factors, such as customer or regulatory pressure, and whether the firm is experiencing environmental and climate change-related problems.

**Customer pressure is the most important determinant of the quality of Corporate ESG Responsibility practices.** Estimates from a firm-level regression (Figure 14) indicate that across

the region, firms whose customers require environmental certifications or adherence to certain environmental standards as a condition of doing business with them on average have better corporate ESG responsibility practices than firms whose customers do not require this. This is closely followed by whether a firm is subject to an energy tax. Several other determinants also play a role, such as being a large old firm, having experienced monetary losses due to extreme weather events or pollution by others, having at least 25% foreign ownership, being an exporter or being a listed firm.

**Figure 14**  
Determinants of Corporate ESG responsibility composite indicator



Source: Enterprise Surveys and authors' calculations.

Note: This figure shows the standardised coefficients from a regression estimated using weighted ordinary least squares. The dots represent standardised coefficient estimates, and the lines represent the 95% confidence intervals. Regression includes the variables shown in the figure and controls for locality size; it also includes country, sector, accuracy and truthfulness fixed effects, and uses robust standard errors. Young firms are defined as those less than five years old. SMEs have fewer than 100 employees. Foreign-owned firms are those with at least 25% foreign ownership. Sectors are based on ISIC Rev. 3.1. Emissions-intensive sectors include paper and paper products (21), printing and publishing (22), coke and petroleum (23), chemical products (24), rubber and plastic products (25), non-metallic mineral products (26), basic metals (27), land transport (60), water transport (61) and air transport (62).

**These findings suggest that while ESG standards and guidelines are prepared for and adopted by listed firms, policymakers and other relevant stakeholders should think about ESG guidelines for unlisted firms and SMEs.** The latter groups represent the majority of firms in emerging markets, as well as the region as a whole. Moreover, ESG risks should not be left solely in the realm of financial investors: they should be evaluated by commercial banks, insurance companies and public authorities too. Furthermore, ESG disclosure should be on par with financial disclosure as quickly as possible, with the same rigour, level of implementation and enforcement, quality control and information and communication technology (ICT) infrastructure.

## 3.5. Green investment

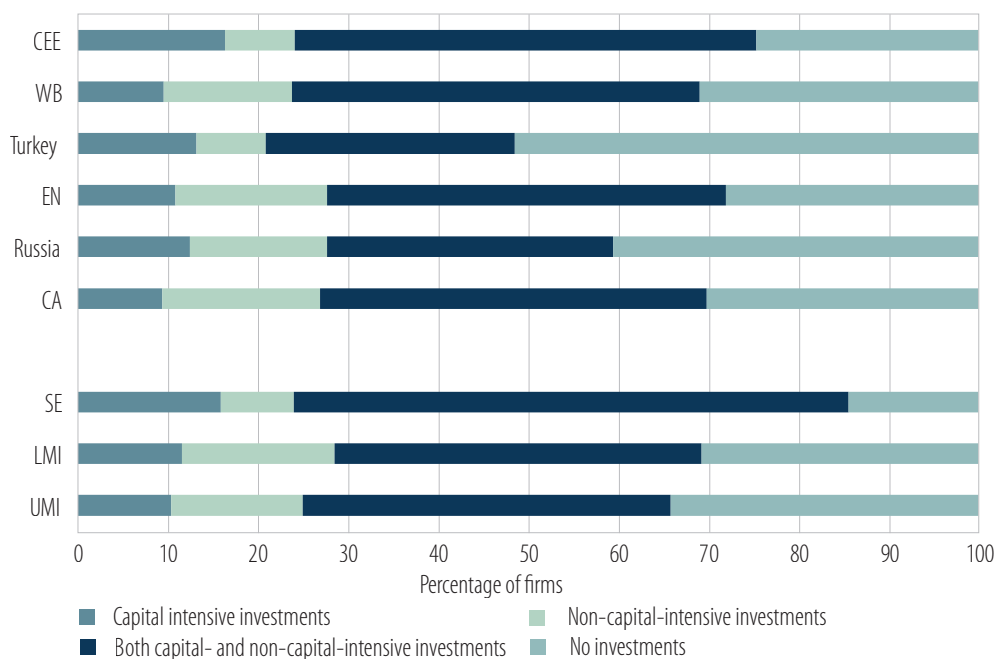
### 3.5.1. Evidence on green investment

**Green investments are necessary to reduce firms' carbon footprints.** In addition to improving their green management and, more broadly, their ESG practices, firms can also invest in measures that result in an increase in energy efficiency and/or a reduction in pollution or other negative environmental effects, even if this is achieved as a by-product of other objectives. In the Enterprise Survey, firms were asked about various types of investment, ranging from typical fixed asset investments, such as machinery and

equipment upgrades, to measures that might not require any fixed asset investments, without specifying the (green or non-green) reason for making a particular investment. Some of these investments, such as machinery and equipment upgrades, vehicle upgrades, on-site generation of green energy and waste minimisation, recycling and waste management, are capital-intensive – in other words, they require large amounts of investment. Others, such as heating and cooling improvements, energy management, measures to control air pollution, water management, lighting improvements and measures to control other pollution, are – in comparison – less capital-intensive.

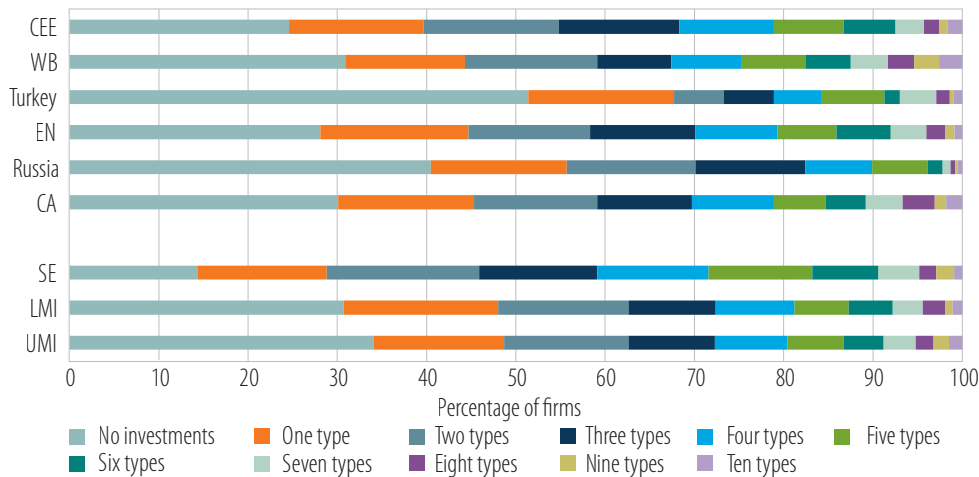
**More than 70% of firms in the region have made at least one type of green investment, compared with more than 85% of firms in Southern Europe.** Enterprise Survey evidence indicates that more than a quarter of respondent firms in the region have not engaged in any type of green investment, whether capital-intensive or not, over the three years prior to the survey, while 46% have engaged in both capital-intensive and non-capital-intensive green investment (Figure 15). Most firms have made one type of investment (Figure 16). These patterns vary across sub-regions. In Central and Eastern Europe and Central Asia, most firms have made two types of green investment, while in the Western Balkans, 2.6% of firms have made all the different types of green investment.

**Figure 15**  
Breakdown of firms’ green investment by capital intensity



Source: Enterprise Surveys and authors’ calculations.  
 Note: Capital-intensive green investments are investment in more climate-friendly energy generation on site, machinery and equipment upgrades, vehicle upgrades and investment in waste minimisation, recycling and waste management. CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; SE – Southern Europe; LMI – lower-middle-income economies; UMI – upper-middle-income economies.

**Figure 16**  
**Breakdown of the number of different green investments by firms**



Source: Enterprise Surveys and authors' calculations.

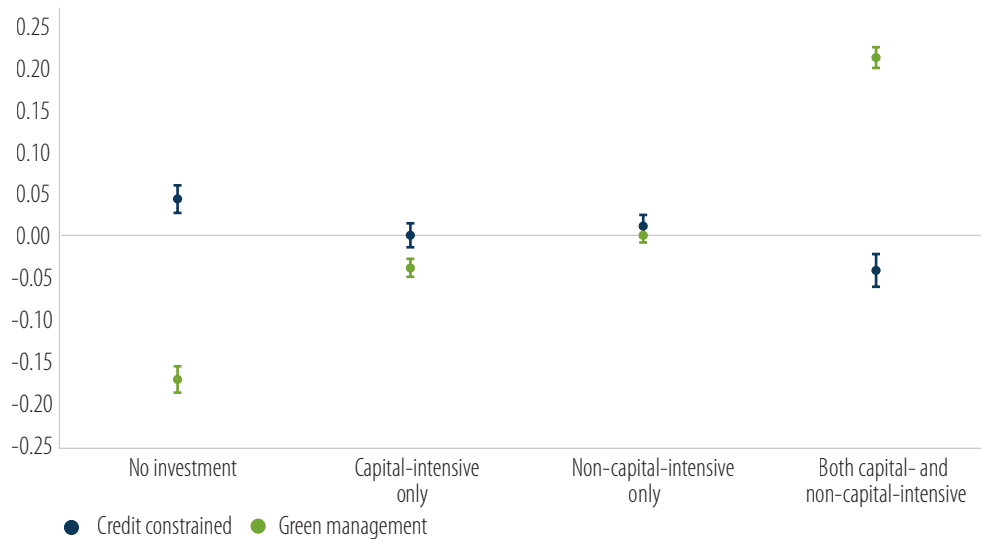
Note: CEE – Central and Eastern Europe; WB – Western Balkans; EN – Eastern Neighbourhood; CA – Central Asia; SE – Southern Europe; LMI – lower-middle-income economies; UMI – upper-middle-income economies.

### 3.5.2. Green investment: financial and managerial constraints

**What influences a firm's decision to make a particular type of green investment, and a particular number of green investments?** De Haas et al (2021) have shown that financial frictions and managerial constraints slow down firm investment in more energy efficient and less polluting technologies, with environmental consequences in the form of higher emissions down the line. This section tackles this phenomenon from an alternative perspective: it asks whether the impact of financial frictions and management constraints differs by the type of green investment (capital-intensive versus less capital-intensive) and the number of different green investments in which a firm engages. In the analysis that follows, a firm is regarded as credit-constrained if its survey answers indicate that it needed credit in the past year but was either rejected by a bank when it applied for credit or was discouraged from applying in the first place.

**Credit constraints and green management quality affect the type of green investment a firm makes.** Figure 17 illustrates the average marginal effects of credit constraints and green management on different types of green investments, based on multinomial logit regression with the type of green investment as a dependent variable (see the notes under the figure for more details). Being credit-constrained is associated with a 4.3 percentage points higher probability of making no green investments and a 4.2 percentage points lower probability of making both capital- and non-capital-intensive green investments. A unit increase in the quality of green management practices, equivalent to moving from the 10<sup>th</sup> to the 50<sup>th</sup> percentile of the distribution of the quality of green management practices, is associated with a 17.2 percentage points lower probability of making no green investments, a 3.9 percentage points lower probability of making only capital-intensive green investments and a 21.2 percentage points higher probability of making both types of green investments.<sup>12</sup>

<sup>12</sup> These average marginal effect estimates are statistically significant at 1% level of significance or lower.

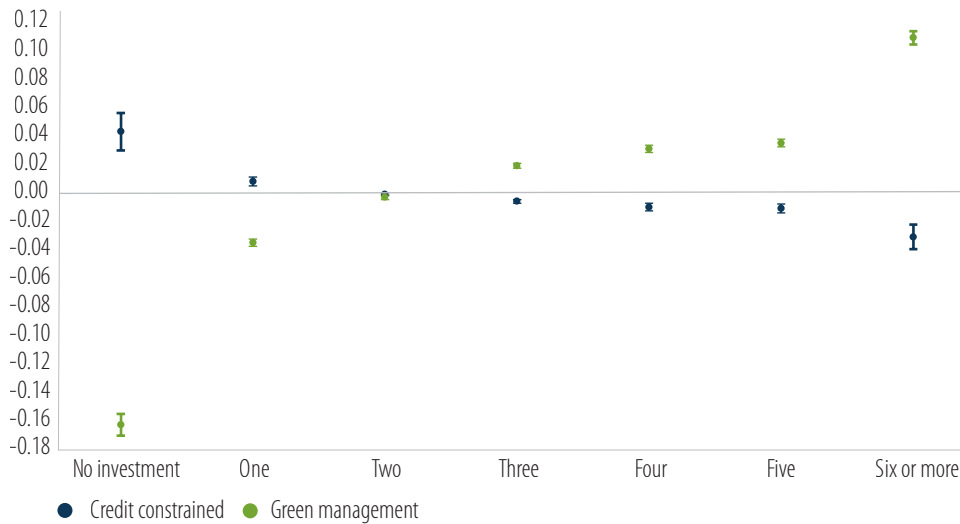
**Figure 17****Average marginal effects of credit constraints and green management on different types of green investments**

Source: Enterprise Surveys and authors' calculations.

Note: This figure summarises the average marginal effect estimates of credit constraints and green management on the type of green investment, based on a multinomial logit regression with the type of green investment as a dependent variable. The dots represent average marginal effect estimates, and the lines represent the 95% confidence intervals. Regression controls for the firm-level covariates (log firm age and its square, percentage of employees with a completed university degree, indicators for exporter status, listed firm, sole proprietorship, and audited financial accounts); locality-level credit market controls (log average amount of assets of banks in a 15km radius and the number of bank branches in a 15km radius) and population size class; and country and sector fixed effects.

**Moreover, the quality of green management practices plays a part in a firm's decision on how many different green investments to undertake.** A unit increase in the quality of green management practices is associated with a 16.2, 3.4 and 0.2 percentage points lower probability of making no, one or two different green investments, respectively, and with a 2.0, 3.2, 3.6 and 11.0 percentage points higher probability of making three, four, five or six or more different green investments, respectively (Figure 18). Being credit-constrained, in contrast, is associated with 4.4 percentage points higher probability of making no green investments, and a 1.0 and 3.0 percentage points lower probability of making five or six or more different green investments, respectively, than not being credit-constrained.

**Figure 18**  
Average marginal effects of credit constraints and green management on the number of different green investments



Source: Enterprise Surveys and authors' calculations.

Note: This figure summarises the average marginal effect estimates of credit constraints and green management on the number of green investments, based on an ordered logit regression with the number of green investments as a dependent variable. The dots represent average marginal effect estimates, and the lines represent the 95% confidence intervals. Regression controls for the firm-level covariates (log firm age and its square, percentage of employees with a completed university degree, indicators for exporter status, listed firm, sole proprietorship, and audited financial accounts); locality-level credit market controls (log average amount of assets of banks in a 15km radius and the number of bank branches in a 15km radius) and population size class; and country and sector fixed effects.

### **Green management practices play an important role in a firm's decisions about green investment.**

The estimates of the average marginal effects of credit constraints and quality of green management depicted in Figures 17 and 18 are not directly comparable, and they are also not causal – the extent to which a firm is credit constrained and the quality of its green management can themselves be influenced by the firm's investment decisions. But they suggest that the quality of green management practices might play a very important role – potentially a bigger one than credit constraints – in a firm's decision whether or not to make green investments at all, but also which type of green investments as well as how many different green investments to make.

**Policy measures that ease access to bank credit specifically for green investment might be just one element of a broader policy mix to stimulate green investment.** Governments and development banks should also consider measures that could strengthen green management practices. This may include dissemination of information on best green management practices, requirements to measure and report environmental impact, or credit lines contingent on the implementation of investment in the best technologies in environmental terms or contingent on the adoption of better green management practices by firms.

## 3.6. Energy efficiency investments

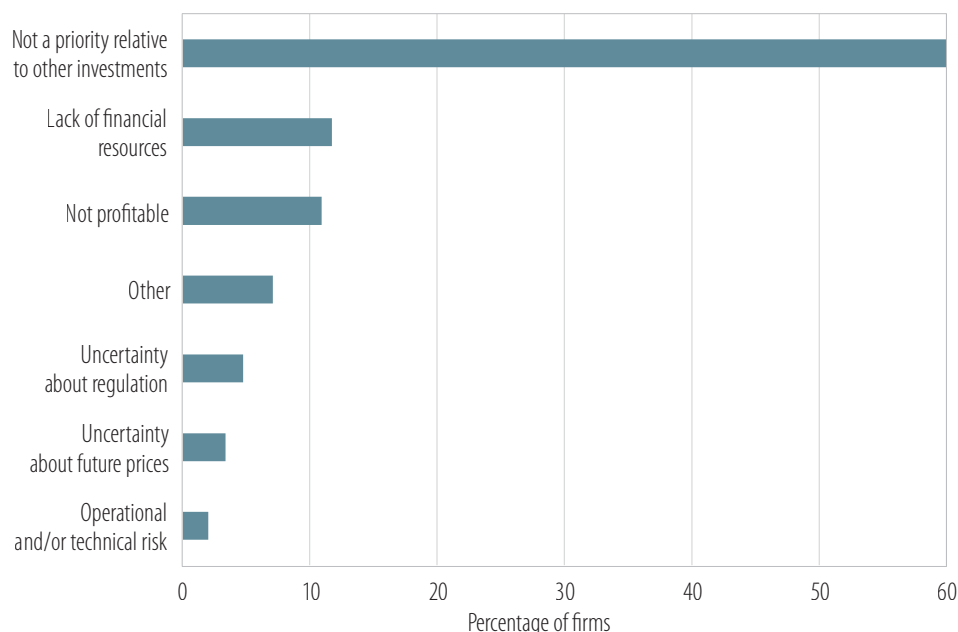
**Investments in energy efficiency are essential for the transition to a carbon-neutral economy.** Many of the green investments discussed in the previous section, such as improvements to heating, lighting and cooling, green energy generation on site, or machinery and equipment upgrades, are likely to result in lower energy usage and can thus be classified as investments in energy efficiency. IEA (2017) assessed that as much as 44% of all emissions reductions by 2040 could come from energy efficiency gains. But

despite the potential environmental and efficiency benefits of such investments, the share of firms implementing them is limited – in the region, over a quarter of firms adopted energy efficiency measures in the three years prior to the interview, ranging from 22.1% in the Western Balkans to 34% in Turkey.

### 3.6.1. Reasons for not investing in energy efficiency

**The majority of firms do not view investment in energy efficiency measures as a priority relative to other investments.** To understand the rationale behind these decisions, the Enterprise Survey asks firms that have decided not to adopt energy efficiency measures about their reasons for forgoing them. Overall, 60% of respondent firms in the region that have not implemented energy efficiency measures report that this is not a priority relative to other types of investment (Figure 19); in Southern Europe, this is even higher, at close to 70%.

**Figure 19**  
Reasons for not investing in energy efficiency measures



Source: Enterprise Surveys and authors' calculations.

**A lack of financial resources is the second most common reason for not investing in energy efficiency measures, followed by the perception that such investment is not profitable.** The second and third most cited reasons are a lack of financial resources (11.7%) and the perceived unprofitability of such investment (10.9%). In Turkey and Central Asia, the perceived lack of profitability was the second most common reason for both SMEs and large firms. Financial constraints are more of an obstacle for SMEs than they are for large firms in all regions except Central and Eastern Europe, Central Asia and the Western Balkans, where the percentages of SMEs and large firms complaining about financial constraints do not differ substantially by firm size. In contrast, this difference is particularly large in Turkey, the Eastern Neighbourhood and Russia. Large firms, in contrast, are more likely to worry about the uncertainty surrounding future prices.

### 3.6.2. Do firms that invest in energy efficiency have lower energy intensity?

**Investments in energy efficiency have potential environmental and efficiency benefits, but do the firms that make them actually have lower energy intensity than firms that do not?** Panel A of

Table 1 shows that there is no significant correlation between energy efficiency investments and energy intensity. This is not necessarily surprising given the differences among the countries in the region on a number of dimensions, such as the availability of fossil fuel subsidies, energy supply sources, the structure of the industry at the beginning of the 1990s and so on. While sector and country fixed effects are included in the regressions, they cannot control for all subsidies support that might be firm-specific.

**A firm's decision to invest in energy efficiency is likely to be influenced by its level of energy intensity.**

Highly energy-intensive firms may be more likely to invest in energy efficiency than firms with lower energy intensity. To alleviate such concerns when assessing the link between energy efficiency investments and energy efficiency, the following analysis estimates the impact that energy efficiency investments have on energy intensity in two stages. The first stage isolates the share of energy efficiency investments that is purely due to exogenous factors ("instrumental variables") and therefore unlikely to be affected by energy intensity. That predicted share of energy efficiency investments is then used in the second stage to estimate the causal impact on energy intensity. More details on this approach are in the notes accompanying Table 1.

**Table 1**  
**Energy efficiency investments and energy intensity**

Dependent variable	(1)	(2)
	Electricity cost/sales	Energy cost/sales
<i>Panel A: OLS</i>		
Energy efficiency investment	0.001 (0.001)	0.002 (0.001)
<i>Panel B: IV First stage; dependent variable: energy efficiency investment</i>		
Extreme precipitation 2000-2009, 100km radius	0.005** (0.002)	0.006** (0.003)
Energy efficiency investment instrument	0.814*** (0.027)	0.814*** (0.028)
<i>Panel C: IV (Second stage)</i>		
Energy efficiency investment	-0.009*** (0.003)	-0.024*** (0.005)
LM test for underidentification	909.26	810.78
Stock-Wright LM S statistic	15.10	22.35
Anderson-Rubin Wald test	7.53	11.14
Anderson-Rubin chi2 test	15.12	22.39
F statistic for weak identification	486.07	432.53
Hansen J statistic p-value	0.174	0.808
Observations	13190	12026

Source: Enterprise Surveys, Banking Environment and Performance Survey II (BEPS II), World Clim 2.1 database and authors' calculations.

Note: This table shows the results of OLS and instrumental variables regressions explaining the impact that energy efficiency investments have on firm energy intensity. Panel A shows the OLS estimates, Panel C shows the IV estimates and Panel B shows the first-stage regressions, where the dependent variable is energy efficiency investment. The dependent variables in Panels A and C are electricity cost over sales (column 1) and energy cost over sales (column 2), both winsorised at 5%. The first-stage instruments are extreme precipitation 2000-2009, 100km radius, defined as the number of times the average monthly precipitation within 100km of the firm was more than 2 standard deviations above the long-term (1970-2000) average monthly precipitation within 100 km of the firm in the period 2000-09, and average energy efficiency investment indicator of firms in other sectors in the region. All regressions include firm-level controls (log of the number of permanent, full-time employees and its square, log firm age and its square, percentage of employees with a completed university degree, indicators for exporter status, listed firm, sole proprietorship and audited financial reports, locality size class), as well as country\*sector fixed effects. \* Standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



**The first stage exploits exogenous variation in energy efficiency investments across different localities.** Awareness of the importance of energy efficiency investment is, at least in part, a form of intangible capital (Bloom et al, 2016), and local access to this form of capital is determined by knowledge diffusion, which varies from area to area. One important factor that can raise firms' awareness is the experience of extreme weather events. The increasing severity and frequency of such events are one of the consequences of global warming.<sup>13</sup> Firms that themselves experience extreme weather events, or are informed about such events in their area, are more likely to be concerned about climate change and the environment and therefore be more aware of the need for energy efficiency investments. To measure variation in firms' exposure to extreme weather, this analysis uses granular historical monthly climate data for average precipitation between 1970 and 2000 (Fick and Hijmans, 2017) and historical monthly average precipitation data between 1970 and 2009 (Harris et al, 2014, and Fick and Hijmans, 2017) from the World Clim 2.1 database. The resulting instrumental variable is the number of times that the monthly average precipitation within 100km around the firm between 2000 and 2009 was above the long-term (1970-2000) average precipitation within the same area by more than two standard deviations.

**Investment in energy efficiency is determined by the local diffusion of awareness of the importance of such investment.** Thus, an additional instrument is the average energy efficiency investment indicator of all other firms in the same region. To be of use as an instrument, an individual firm should have only negligible influence on this regional average. To ensure that this is likely, regional averages exclude observations from a firm's own (two-digit) sector. This is similar to the "leave-one-out" strategy pursued, for example, in "jackknife" approaches (Angrist et al, 1999). Table 1, Panel B, confirms that firms were more likely to make energy efficiency investments if they are located in an area that experienced a higher number of extreme weather events (in this case, precipitation) or an area where firms from other sectors were more likely to make energy efficiency investments, all other things being equal.

**Investment in energy efficiency measures is beneficial for a firm's bottom line.** With the first-stage result in hand, Panel C looks at how exogenous variation in energy efficiency investments influences firms' energy intensity. It shows that firms that make such investments have on average a 0.9 percentage points lower share of electricity costs in sales (column 1) and a 2.4 percentage points lower share of energy costs (including electricity and fuel) in sales (column 2). This is quite substantial, given that the average share of electricity and energy costs in sales in the sample are 2.5% and 5.2%, respectively.

### 3.7. Conclusions and policy implications

**At the start of the transition process, the region was an outlier relative to countries with similar levels of development, not only in terms of its industrial structure, but also in terms of the amount of carbon emissions that resulted from it.** Encouragingly, carbon emissions from fuel combustion have decreased substantially in absolute terms since 1990. But absolute carbon emissions have been on an increasing trend in several sub-regions since the late 1990s, and they have increased in Turkey compared with 1990, driven by economic growth. If the region's economies are to fulfil their commitments under the Paris Agreement, those improvements will need to continue.

**In Central and Eastern Europe, which are EU members, the decrease in carbon emissions between 2005 and 2018 was driven by improvements in energy efficiency.** In other regions, GDP per capita and population growth outweighed any energy intensity improvements (and led to overall increases in carbon emissions). This indicates that there is further room for reductions in energy intensity; indeed, energy intensity of GDP in the region remained almost twice that in Southern Europe, indicating that there is still a long way to go.

**Despite a shift away from coal and oil towards nuclear power and renewables, the region still relied on fossil fuels to generate 75.1% of its electricity in 2018.** Moreover, several countries still have

<sup>13</sup> Weather-related variables have been used as instruments in existing literature; see, for example, Cachon et al (2019) and Mellon (2020).

generous fossil fuel subsidies. This makes the transition to a low-carbon future harder, as energy prices are not reflecting the economic and environmental costs, and they hinder investment in green measures.

**The transition to sustainable growth and a green economy will only be a success if the private sector applies its ingenuity, investment and entrepreneurship to that endeavour.** Firms can improve their environmental performance through the adoption of good green management practices. There is significant variation in the quality of green management practices across the region's economies. External factors, such as customer pressure, being subject to an energy tax or having experienced losses due to extreme weather events play a more important role in determining the green management quality than firm characteristics. This suggests that there is a role for government guidance and stricter regulation.

**Moreover, the ability to handle environmental issues in a proactive manner is just one aspect of effective firm management; the ability to handle social and governance issues is also part and parcel of it.** Firms in the region lag those in Southern Europe on those too, as ESG disclosure is limited even by large listed firms, let alone large unlisted firms and SMEs. As with green management practices, external factors, such as customer pressure or being subject to an energy tax play an important role in determining the quality of corporate ESG responsibility practices.

**Another way in which firms can reduce their environmental footprint is by making green investments.** They are more likely to invest in a higher number of green measures if they do not experience credit constraints and have better green management practices. Credit constraints do not matter for non-capital-intensive green investments and their impact does not vary much with the number of green investments. But green management practices are important for all types of green investments and matter more for firms' profits, as well as their environmental footprints.

**Many green investments can be classified as energy efficiency investments.** These are essential for the transition to a green economy, but many do not materialise. By far the most important reason why firms did not make any energy efficiency investments is that they do not view them as a priority. But energy efficiency investments pay off for firms. Empirical findings indicate that such investments result in lower electricity and energy costs as a share of sales. Adopting energy efficiency measures is thus beneficial for firms' profits, as well as their environmental footprints.

**Taken together, the chapter's findings suggest that despite the progress made since 1990, countries in the region face several challenges in the transition to a green economy, particularly among private sector firms.** Policy measures that ease access to bank credit specifically for green investment might be just one element of a broader policy mix to stimulate green investment. Policymakers will need to provide a business environment that is conducive to green investment and which encourages all firms to improve their management practices and, more broadly, their corporate ESG responsibility.

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## CHAPTER IV

# Financial deepening and firms' access to finance

## Summary

*Despite a successful transformation over the past 30 years, significant gaps in financial deepening and firms' access to finance still affect the economies of Eastern Europe and Central Asia. Credit constraints are particularly binding for small and medium-sized enterprises (SMEs), and young and innovative firms. This chapter analyses the associations between bank credit, firm characteristics and firms' financing choices. It also introduces the concept of financial autarky, which refers to firms that are fully self-financing. Higher levels of autarky are associated with less developed institutional frameworks: the peaks are in the sub-regions of the Eastern Neighbourhood and Central Asia, while lower levels are recorded in Central and Eastern Europe, Russia, the Western Balkans and Turkey. The large majority of these firms are voluntarily autarkic: they choose to function without the support of the financial system. Financial autarky is also a function of firm characteristics: more sophisticated, larger, older and export-oriented firms are less likely to be autarkic. Autarky is particularly present among SMEs and young firms.*

*Low levels of financial deepening, financial constraints on firms and financial autarky might be due to both demand and supply factors. While fully disentangling them is difficult, the analysis in this chapter establishes that credit availability for firms is associated with investment and growth, thus showing the economic gains of being supported by and connected to the banking sector. Credit-constrained firms invest less than unconstrained firms. A simulation exercise suggests that removing credit constraints can boost aggregate growth over a ten-year horizon, especially in the Eastern Neighbourhood and Central Asia. Moreover, access to credit is associated with faster growing firms. Conversely, financial autarky is associated with a lower propensity to invest and lower employment growth: firms choosing to remain disconnected from the financial sector end up losing growth opportunities. Using firm-level information, the chapter quantifies credit gaps in the region, which are largely associated with constraints that affect SMEs. Additional credit worth 17-20% of GDP would be needed to meet the financing needs of enterprises across the whole region. Results differ across sub-regions, with Central and Eastern Europe and the Western Balkans having smaller gaps.*

*The documented gaps are mostly linked to a mismatch between demand and supply: re-aligning the two requires increased institutional focus on credit market infrastructure. Improvements in collateral frameworks can help to tackle inefficiencies in the allocation of credit, reduce risks and increase the accessibility of credit. Targeted financial and advisory support can reduce constraints and increase firms' investment opportunities, particularly for SMEs and young and innovative firms. Further diversification in terms of financial instruments and products is warranted. For example, the deployment of guarantee schemes can boost the risk-taking appetite of banking sectors, while their effectiveness can be enhanced via better risk assessment and screening capabilities. Moreover, financial literacy as well as improvements in audit and accounting standards, in conjunction with a genuine reform agenda geared to improving institutional quality, can reduce information asymmetries and increase firms' capacity, appetite and confidence in engaging with the banking sector.*

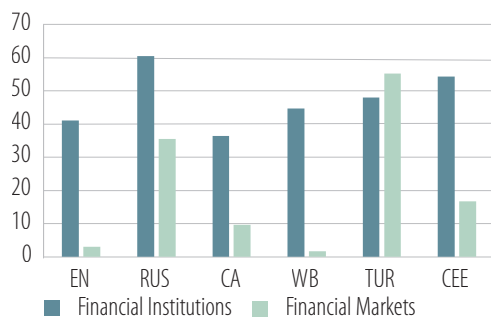


## 4.1. Introduction

**Financial sectors in the region are at different stages of development, but they all remain essentially bank-based.** Bank debt is still by far the most important source of external finance for many firms, including SMEs. Alternative sources of finance are scarce. The IMF Financial Development Index (which captures the depth, access and efficiency of financial institutions and markets) shows that countries' financial institutions are much more developed than their financial markets, with the exception of Turkey and, to some extent, Russia (Figure 1).<sup>1</sup> Capital markets remain underdeveloped and the availability of venture capital, private equity and leasing is very limited.

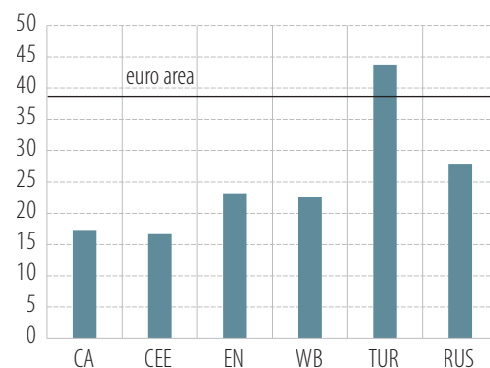
**Over the past 30 years, banking sector penetration has grown fast, with a booming phase, followed by some rebalancing after the global financial crisis of 2007-09.** In Central and Eastern Europe and the Western Balkans, as a consequence of the privatisation process, foreign banks entered the market, bringing new banking practices and capital, and funding relatively fast, mostly foreign exchange-based credit growth. The global financial crisis triggered a rebalancing, with more focus on domestically funded, and thus more moderate, growth. Similar paths have been followed in Turkey, Russia and Kazakhstan. In those countries, boom-bust phases have been somewhat more pronounced, while foreign banks were competing with dominant, domestic, often state-controlled banks. In the Eastern Neighbourhood and Central Asia, the transformation has been somewhat slower, both in terms of institutional development and growth, resulting in lower levels of financial sector penetration today.

**Figure 1**  
Financial institutions and financial market development; (0-70, best)



Source: IMF Financial Development index  
Note: Average country within each sub-region; latest data 2018

**Figure 2**  
Credit to non-financial corporations (including SMEs) as a percentage of GDP



Sources: IMF Financial Soundness Indicators (FSI); IMF Financial Access Survey (FAS); national central banks  
Note: A detailed country breakdown, including household credit, is in Annex A, Figure A.5; latest data 2019.

**The positions of the region's banking sectors had improved prior to the COVID-19 crisis.** Overall, banking systems in the area tend to be relatively well capitalised, with improved regulatory capital positions in all sub-regions (see Annex A, Figure A.4 for country details). The banking sectors can count on a solid base of domestic deposits, but there are still sources of vulnerability in loan-to-deposit ratios of over 100% in Turkey, Russia and Central Asia, as well as liability dollarisation/euroisation (see Box 2) in Turkey, Central Asia, the Western Balkans and the Eastern Neighbourhood. Banking systems are generally profitable, with relatively low levels of non-performing loans. The latter have decreased in many countries and are now close to levels observed prior to the global financial crisis in essentially all sub-regions (see Annex A, Figure A.1).<sup>2</sup>

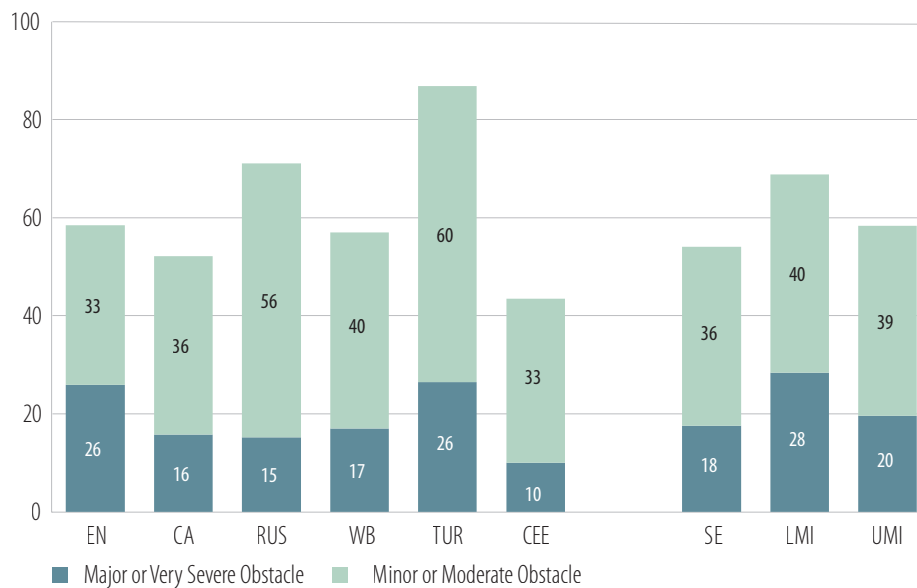
1 Specifically, the index shows how, on average, financial institutions are better developed in Central and Eastern Europe, the Western Balkans, Russia and Turkey, while still lagging in the Eastern Neighbourhood and Central Asia. Financial markets are underdeveloped in the Western Balkans and the Eastern Neighbourhood as well as Central Asia. Central and Eastern Europe still ranks at a relatively low level in terms of financial markets development, albeit markedly higher than the other regions, excluding Russia and Turkey. For details on the construction of the index, see Svirydenka (2016); and IMF Staff Discussion Note 'Rethinking Financial Deepening: Stability and Growth'.

2 Ukraine, where non-performing loans are still close to 50% of the loan portfolio, drives the higher non-performing loan figures in the Eastern Neighbourhood, while the other banking sectors in that sub-region operate at substantially reduced levels of non-performing loans (see Annex, Figure A.1).

**Eastern Europe and Central Asia still seem to have a credit penetration gap in the enterprise segment.** In 2008, the ratio of credit to GDP was about 70% for the average country in Central and Eastern Europe, and 40-50% for all the other sub-regions, with Central Asia lagging (see Annex A, Figure A.3). The global financial crisis, as well as idiosyncratic and localised crises,<sup>3</sup> has hampered economic and financial stability. Subsequently, credit penetration has stalled in the Eastern Neighbourhood and declined somewhat in Central and Eastern Europe, the Western Balkans and Central Asia.<sup>4</sup> In 2019, loans to non-financial corporations were 15-28% of GDP in Eastern Europe and Central Asia, except Turkey (Figure 2). This compares with a ratio of roughly 38% for the euro area.<sup>5</sup> The penetration potential should also be matched with the available local saving capacity and domestic funding space. They both appear somewhat limited in the region as a whole, notably in Central Asia,<sup>6</sup> Turkey and Russia, and, to a certain extent, in the Eastern Neighbourhood as reflected in relatively high loan-to-deposit ratios (see Annex A, Figures A.1 and A.2).

**Low credit penetration mirrors a relatively high share of firms that perceive access to finance as an obstacle.** On average in the Eastern Neighbourhood, Central Asia and the Western Balkans, 50-60% of firms consider access to finance as an obstacle. In Central and Eastern Europe, this share is slightly lower, at around 40%. It is significantly higher in Turkey and Russia (Figure 3).

**Figure 3**  
Access to finance as an obstacle to firms' operations (percentage of firms)



Source: Authors' calculations based on the 2019 EIB-EBRD-WBG Enterprise Survey (ES)

Note: Access to finance is scored as a standalone obstacle – results for no obstacle are not reported

3 Over the past decade, these include, but are not limited to, banking sector crises, armed conflicts and debt restructuring.

4 Sharp currency devaluations and idiosyncratic shocks coupled with structurally low saving rates and volatile inflation have further weighted negatively on many sub-regions. At the other end of the spectrum, the credit-to-GDP ratio has been increasing significantly in Turkey and Russia. But this went hand in hand with high and further increasing loan-to-deposit ratios in Turkey, thus signalling a potential build-up of imbalances.

5 The two principal components of loan stocks are outstanding credit to households and non-financial corporations. The ratio of household to non-financial corporations' outstanding credit was about 1.3 in the euro area in 2019. It was lower in Eastern Europe and Central Asia with the only exception of Central and Eastern Europe, where it was 2.5 – thus indicating a banking sector structurally more tilted towards consumer lending and mortgages. This could be the result of many different factors, including, but not exclusively, prudential/regulatory policies, differences in consumption patterns and consumer purchasing preferences as well as developments in the local housing markets.

6 The Central Asia figures are largely driven by a high loan-to-deposit ratio in Uzbekistan.

**The rest of the chapter is divided into four sections.** Section 4.2 explores the market for bank credit in the region, employing the concept of financially constrained firms and introducing the concept of firms operating in financial autarky. Section 4.3 analyses the effects of financial constraints and financial autarky, revealing the associations between firms' propensity to invest, growth and access to credit. It also shows that autarkic firms, controlling for their age, tend to be smaller and employ fewer people. Against this backdrop, Section 4.4 builds a link between firm-level information and the macroeconomic dimension, documenting the existence of aggregate credit gaps, largely driven by SMEs. Section 4.5 concludes.

**The chapter also includes three boxes.** Box 1 describes the key concepts of credit-constrained firms and financial autarky. Box 2 analyses the issue of dollarisation/euroisation in the local financial sector. Box 3 examines the effects of extreme weather events on firms' investments and financing.

## 4.2. Firms, banks, credit constraints and financial autarky

**In largely bank-based systems, bank credit is the most important source of external finance for many firms.** Therefore, understanding whether firms that need loans are able to obtain them is of particular interest. Box 1 provides a taxonomy of firms based on the extent to which they want to access bank credit and are able to do so. Figure 4 shows the percentage of firms needing loans by sub-region. It distinguishes firms that need loans and applied for them from those that needed loans and did not apply. Overall, the share of firms stating that they need loans is highest in Turkey (64%), followed by Russia (58%) and the Eastern Neighbourhood (54%), while the need is lower in the Western Balkans and Central and Eastern Europe.<sup>7</sup>

### 4.2.1. Credit-constrained firms

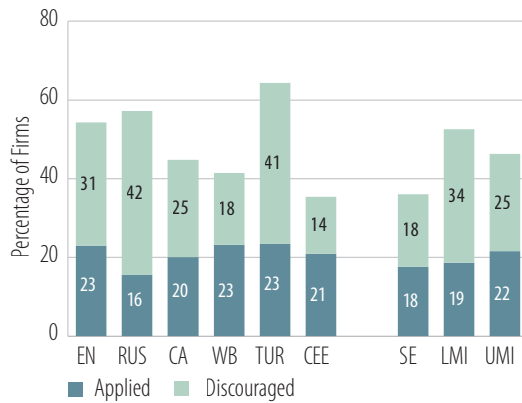
**Of firms in need of loans across Eastern Europe and Central Asia, 45-73% are unable to obtain one and are thus credit-constrained.** Credit-constrained firms are defined as firms that need loans but are either refused or discouraged from applying.<sup>8</sup> Figure 5 provides evidence of the prevalence of credit constraints in the region. According to the survey, 70% of Russian firms in need of loans are credit-constrained, exceeding the average for upper-middle-income countries (47%) by a significant margin. Close to 65% of firms in the Eastern Neighbourhood and Central Asia are credit-constrained. In Turkey, the high level of credit-constrained firms is largely associated with the timing of the survey, which was conducted during a period of acute crisis in the country. At the other end of the spectrum, the Western Balkans (34%) and Central and Eastern Europe (36%) have the lowest share of credit-constrained firms, suggesting that they have better functioning banking sectors. The vast majority of credit-constrained firms are discouraged. Rejections, on the other hand, are rather rare across all sub-regions.

7 In Turkey, the share of firms needing loans increased by 21 percentage points relative to the previous survey carried out in 2013 (check date). Despite the significant increase in needs, the share of firms that applied decreased. But discouragement levels are, on average, equal to or higher than loan applications.

8 See EIB (2021) for a comparative discussion of credit constraint indicators in the EIB Investment Survey, the ECB Survey of Access to Finance of Enterprises and the Enterprise Survey. Gorodnichenko and Schnitzer (2013), Popov and Udell (2012), and Kuntchev et al (2014) measure credit constraints using the Enterprise Survey. Additional survey-based work includes Schaller (1993), Ferrando and Mulier (2015) and García-Posada Gómez (2019).

**Figure 4**

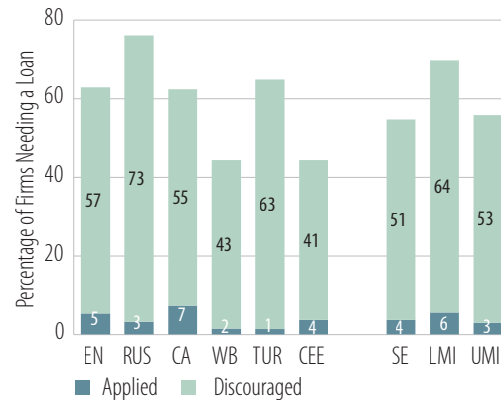
**Firms in need of loans** (those that applied plus those that were discouraged from applying)



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

**Figure 5**

**Credit-constrained firms as a share of firms needing loans**



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

**SMEs and young firms are more likely to be credit-constrained.** While 24% of SMEs are credit-constrained, this applies to only 16% of large firms. Similarly, only 37% of SMEs have loans outstanding, compared with 55% of large firms. When it comes to age, 27% of firms under five years old are credit-constrained, compared with 20% of firms aged over five. Data on outstanding loans suggest a steeper gradient. Only 29% of firms below age five have loans outstanding compared with 39% above age five. Those results are shown in Table 1, the rows of which break down the population of firms by firm characteristics. The columns of Table 1 measure firms' ability to access finance. Firm size and age are associated with access to finance.<sup>9</sup> Table B.1 in Annex B supports this evidence. It shows that younger firms are somewhat more in need of loans, and that smaller firms are statistically and economically more constrained than medium and large firms due to higher levels of both rejections and discouragement. In addition, firms with audited financial statements are less likely to be credit-constrained, while the opposite applies to firms that operated informally before registering.

<sup>9</sup> The Enterprise Survey uses stratified random sampling, with samples stratified by country, sector, region with a country and size. The size classes used are 5-19, 20-99 and 100+ employees – the last category representing large firms.

**Table 1**  
**Firm characteristics and financial structure (percentage of firms)**

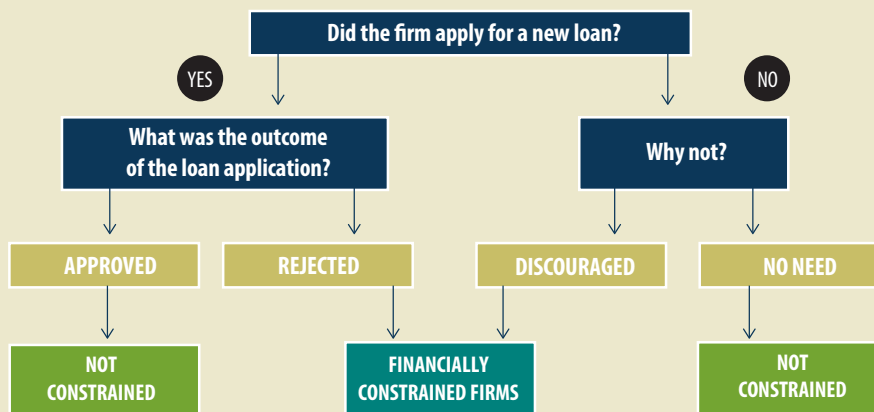
		Credit Constrained	Rejected	Discouraged	Need a Loan	Has a Loan
Size	SME	24	2	22	42	37
	Large	16	1	15	52	55
Age	<5 Years	27	3	23	43	27
	>=5 Years	23	2	21	42	39
Innovator	Yes	20	2	18	45	46
	No	26	1	24	40	32
Website	Yes	21	1	19	42	42
	No	28	3	25	43	30
Foreign Tech. License	Yes	19	1	18	45	45
	No	24	2	22	42	37
Informal	Yes	32	1	30	49	42
	No	23	2	21	42	38
Exporter	Yes	16	2	14	46	52
	No	25	2	23	41	36
<i>Degree of sophistication and compliance</i>						
ESG	Higher	21	2	18	44	43
	Lower	26	1	24	41	33
Audited	Yes	20	2	18	44	46
	No	25	2	23	42	34
Offering Formal Training	Yes	20	2	18	45	44
	No	25	1	23	41	35
Other						
Foreign Ownership	Yes	15	1	14	33	34
	No	24	2	22	43	38
Female CEO	Yes	23	2	21	40	32
	No	24	2	22	43	39
EAST & SE 2019		23	2	21	43	38

Note: "Informal" refers to firms that were operating originally in the informal sector when they were created

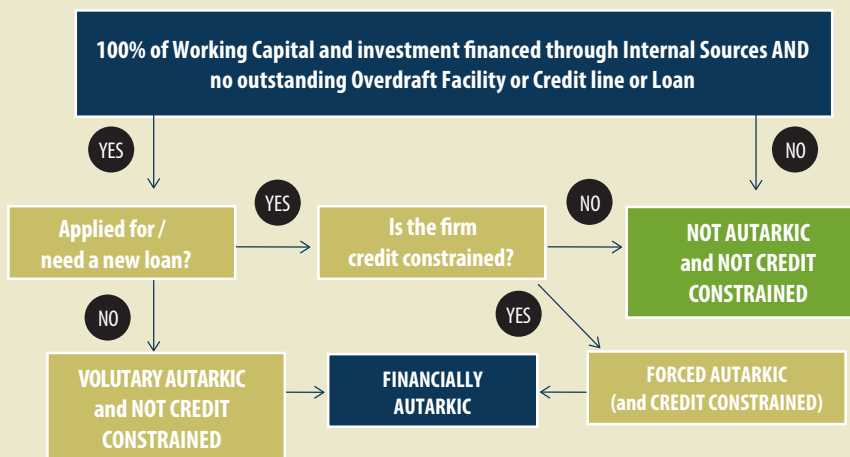
**Box 1****Firms that are credit-constrained, discouraged, rejected and autarkic – a primer**

The figures below illustrate the key concepts employed throughout this chapter to characterise firms' based on their access to finance: (i) credit-constrained firms; and (ii) firms in financial autarky.

**Credit-constrained firms are firms that need loans but were either discouraged from applying or rejected.** First of all, firms in need of loans are defined as those that applied for loans and those that did not apply because they were discouraged from doing so. In other words, discouraged firms need loans but have refrained from applying because of what they perceive as complex application procedures, unfavourable interest rates, high collateral requirements, insufficient loan amounts, fear of being rejected or other, unspecified reasons. Rejected firms are those that applied for loans and saw their application declined. The firms that got their loan applications approved and those that did not apply because they have no need are not credit-constrained. Firms that had the application approved "in part" or "withdrawn" by the borrower are also not credit-constrained.



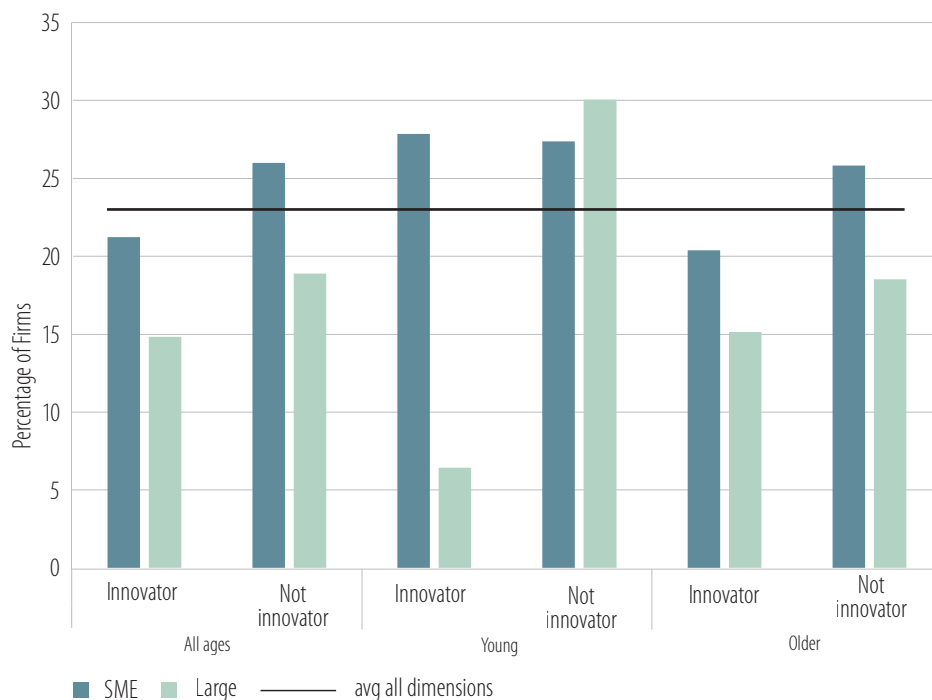
**Firms in financial autarky are those that have no liability relationship with the banking sector.** These firms: (i) finance their working capital and investment entirely with internal sources (this definition excludes, for example, firms that use supplier credit to finance their working capital); and (ii) have no outstanding loan, credit line or access to an overdraft facility. The vast majority of autarkic firms in the sample are voluntarily autarkic: they have chosen to disconnect from banks. Conversely, forced autarkic firms are those that are autarkic out of necessity, while still defined by criteria i) and ii), rather than choice: they have applied for loans and been rejected or they have not applied because they have been discouraged from doing so. Forced autarkic firm are fully credit-constrained, whereas the voluntarily autarkic are not.



**This evidence testifies to the importance of “information asymmetries” in the credit market.** SMEs, and in particular firms that have a history of informality, are often more opaque than large firms. Their opaqueness makes it difficult for a bank to assess their creditworthiness. The same applies to young firms since they lack a credit history.<sup>10</sup> Conversely, having audited financial statements mitigates asymmetric information as it enables firms to signal their creditworthiness credibly. Along these lines, on average, firms with less developed environmental, social and governance practices (ESGs) are somewhat more credit-constrained, thus signalling some tentative correlation between higher ESG standards and access to credit.<sup>11</sup>

**Innovative firms seem to be generally less constrained than those that are not innovative, particularly larger firms; but innovative SMEs are still significantly credit-constrained, particularly young innovative SMEs.** Table 1 shows that, on average, innovative firms are less likely to be credit-constrained.<sup>12</sup> This calls for further investigation, adding more granularity to the finding. Figure 6 shows the differences in credit constraints between SMEs and large firms and, within those, controlling for their age and innovation status. Innovative large firms are significantly less constrained than innovative SMEs, with the latter showing 6 percentage points higher levels of constraints. The average level of constraints for innovative SMEs does not differ significantly from the average for all SMEs reported in Table 1, and it is above the average level of constraints for all firms. Moreover, younger innovative SMEs are five times more constrained than young innovative large firms. In addition, more mature innovative SMEs exhibit higher levels of constraints than larger firms. All in all, SMEs are significantly more constrained than larger firms, and younger and innovative SMEs even more so, thus calling for targeted support.

**Figure 6**  
Credit constraints: breakdown by innovators, firm age and size

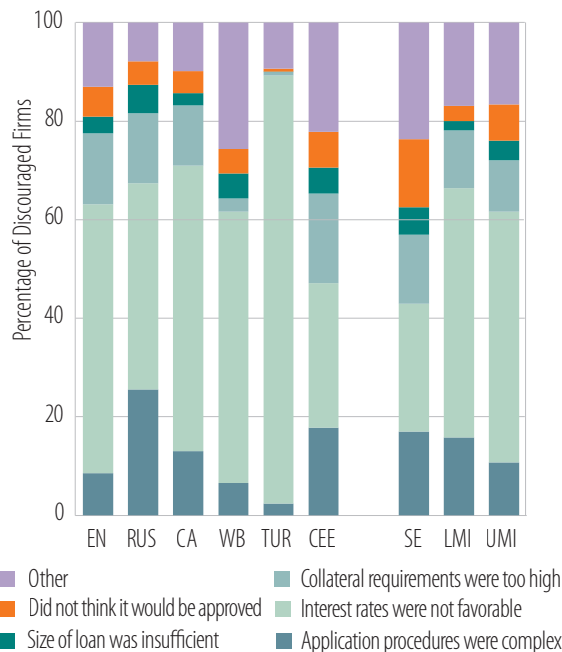


Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

10 Young firms are defined by age buckets (see Table 1) with a cut-off at five years of firms' operating age.  
 11 Leveraging Enterprise Survey data, Chapter 3 of this report proposes a firm-level "Corporate ESG Responsibility" composite indicator. To build the indicator, 45 questions were employed. They relate to environmental, social and governance practices (for example, green management, green investments, gender, education, general governance, audit, etc.). The indicator is particularly useful as it covers SMEs in emerging markets, while ESG information is in general very scarce and available only for (mainly large) listed firms.  
 12 See Chapter 2 of this report for the definition of innovative firms.

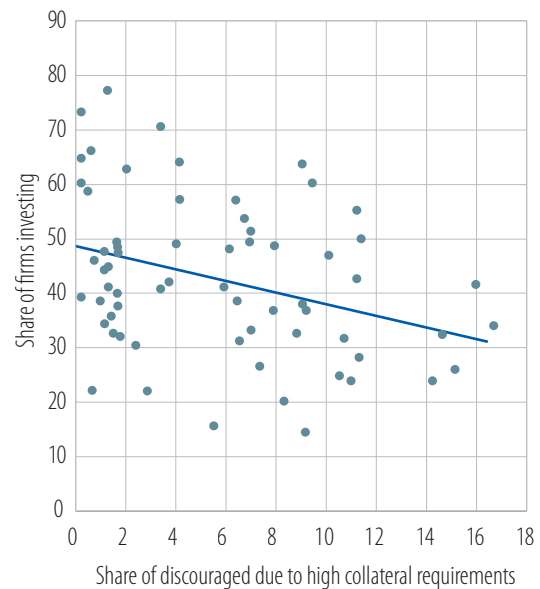
**Several factors contribute to firms being discouraged from applying for loans**, as shown in Figure 7. Given the high share of discouraged firms among credit-constrained firms, it is useful that the survey provides additional information on why firms are discouraged. Figure 7 shows that firms most frequently cite high interest rates as the reason why they did not apply for loans. But the relative importance of high interest rates differs across sub-regions. In Turkey, almost all discouraged firms are discouraged by high interest rates. In Central and Eastern Europe, high interest rates are still the most frequently cited factor, but complex application procedures and stringent collateral requirements are also important. The other sub-regions fall in between. In this context, it is important to note that complaints about high interest rates cannot be viewed in isolation from the returns that firms are able to generate from their assets. Firms discouraged by high interest rates implicitly state that their marginal cost of funding is high relative to the marginal return on capital.

**Figure 7**  
Factors discouraging firms from applying for loans



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

**Figure 8**  
Association between investing firms and broad stringency of collateral requirements



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

**Discouragement levels due to high collateral requirements are associated with lower investment levels.** Figure 8 associates the firms' propensity to invest with the stringency of collateral as a constraining element on firms applying for loans. The latter can be interpreted as a structural feature of financial sector infrastructure that hampers firms' connectedness, thus constraining them. As a result, firms invest less in countries with higher shares of firms declaring collateral as a discouragement factor, underscoring the importance of financial infrastructure development, notably collateral frameworks, in helping firms to be better connected to the financial sector, ultimately to support their investment opportunities.

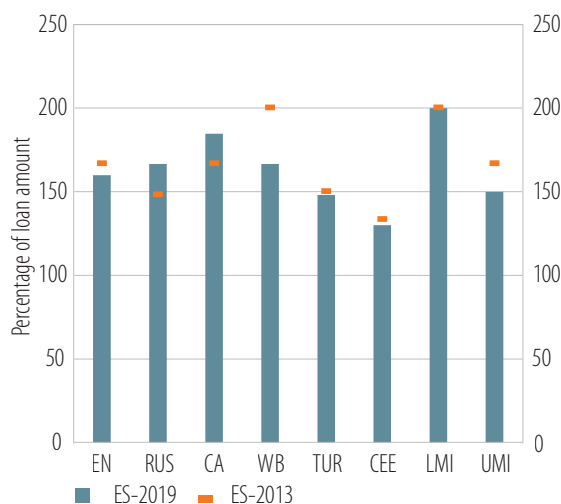
**Intensive and extensive margins of collateral are still elevated in many sub-regions.** The percentage of loans requiring collateral ranged between 38% (Turkey) and 90% (Central Asia) of the firms with loans in 2019. The value of the loan required as collateral or intensive margin of collateral is still high, with requirements above 100% for many firms (Figure 9), possibly reflecting a scarcity of high value collateral



assets and a lack of either secondary markets for collateral where collateral could be priced or collateral evaluation capacity among credit officers in banks. The median value of collateral as a percentage of loans decreased in the Western Balkans between the two most recent Enterprise Survey waves and remains rather low in Central and Eastern Europe, where there is an European Investment Fund (EIF) presence and established domestic credit guarantee schemes. Collateral requirements are higher in Central Asia and the Eastern Neighbourhood, where credit enhancement schemes are absent or less endowed, with the top 75% percentile still very high.

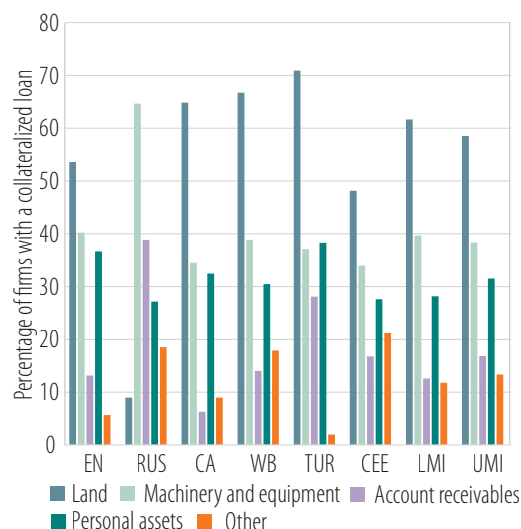
**Among the different types of collateral, land and buildings** remained the main asset pledge either standalone or with other assets in 2019. Machinery and equipment are the second most relevant, together with personal assets. Central and Eastern Europe and the Eastern Neighbourhood (where some collateral reforms have been enacted) require less land and buildings, which are probably perceived as the most liquid/safe form of collateral (Figure 10).

**Figure 9**  
Value of collateral needed for a loan as a percentage of the loan amount (%)



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey 2013 and 2019

**Figure 10**  
Different types of collateral, 2019



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

### 4.2.2. Financial autarky

**An average of 40% of firms in the region are fully self-financing; in other words, they are financially autarkic.** Broadly speaking, firms' levels of financial autarky reflect the interplay of investment opportunities, profitability (ability to generate funds) and the availability of external finance. Figure 11 shows that the share of autarkic firms is highest in Central Asia (56%), followed by the Eastern Neighbourhood (47%). At 7%, Turkey records the lowest share of autarkic firms. The share is also relatively low in the Western Balkans, Russia and Central and Eastern Europe, underscoring a better connection of firms to the financial sector and reconfirming the results in the discussion of financial constraints above. By way of comparison, it is important to note that the phenomenon of zero-leverage firms is not limited to small firms in middle-income countries: zero-leverage firms account for 10% of listed US firms.<sup>13</sup>

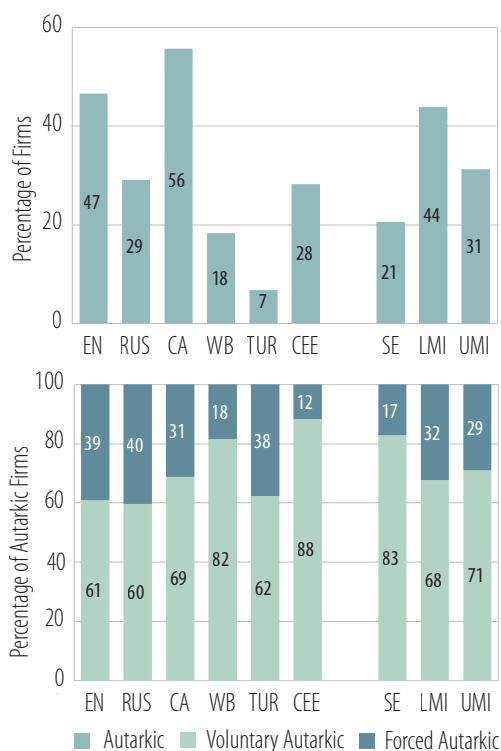
**The majority of financially autarkic firms are voluntarily autarkic.** Figure 11 provides information on the relative importance of voluntarily and forced autarkic firms. Across all sub-regions, the majority of

13 In advanced economies, zero leverage is often connected to under-diversified managers and shareholders; see Strebulaev and Yang (2013).

financially autarkic firms are voluntarily autarkic. At 88% of autarkic firms, the share of voluntarily autarkic firms is highest in Central and Eastern Europe, followed by the Western Balkans with 82%. Conversely, Russia (60%) and the Eastern Neighbourhood (61%) have the lowest share of voluntarily autarkic firms.

**Forced autarky is a transitory state.** Figure 12 combines data from the 2013 Enterprise Survey wave with the latest wave, thus building a panel, to examine the persistence of financial autarky. In particular, Figure 12 captures how firms make a transition between states from one survey wave to the next. For example, 35% of firms that were voluntarily autarkic in 2013 were also voluntarily autarkic in 2019, whereas 52% of voluntarily autarkic firms had become non-autarkic in 2019. The diagonal captures the extent to which a state is persistent. Non-autarky exhibits the highest persistence; and forced autarky the lowest. Moreover, it appears that movements out of financial autarky dominate those into autarky.<sup>14</sup> Since the panel follows the same firms over time, this effect may also reflect the age of firms, whereby young firms tend to be somewhat more autarkic than older firms (see below and Table 2).

**Figure 11**  
The prevalence of financial autarky



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

**Figure 12**  
Transition matrix

		2019		
		Voluntary	Forced	Non-Autarkic
2013	Voluntary	35	13	52
	Forced	27	16	57
	Non-Autarkic	15	7	78
	TOTAL	20	9	71

Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey 2013 and 2019

**Small, young firms, less sophisticated firms, those coming from informality and those catering mainly for the local market are more likely to be financially autarkic.** Table 2 shows which firms are more likely to be financially autarkic and voluntarily autarkic. Size and age are strongly associated with financial autarky with SMEs and young firms more likely to be financially autarkic. As expected, firms with audited financial statements are less likely to be autarkic. Firm sophistication, as measured by having an internationally recognised quality certification, a website, using licensed technology and being able to offer formal training to employees, is associated with lower autarky. The same applies to higher

<sup>14</sup> As this is built on panel data the size of the whole sample reduces while gaining the advantage of being able to follow each firm.

scoring ESG firms, particularly for voluntarily autarkic firms. To support these findings, Table 2 shows that innovative firms also tend to be less autarkic, particularly less voluntarily so than firms that are not innovative. Firms that cater mainly to local markets are more likely to be autarkic than exporters. Overall, this confirms the idea that more sophisticated firms tend to be more connected to the financial sector.

**Table 2**  
**Firm characteristics and financial autarky (percentage of firms)**

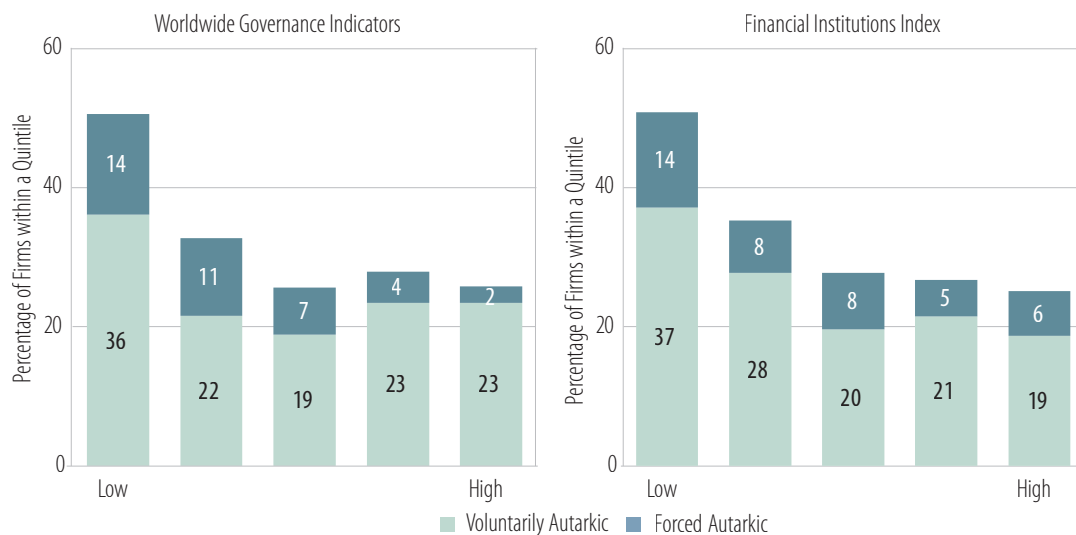
		Autarkic	Voluntarily Autarkic	Forced Autarkic
Size	SME	33	24	8
	Large	17	12	5
Age	<5 Years	40	30	10
	>=5 Years	31	23	8
Innovator	Yes	27	20	7
	No	35	26	8
Website	Yes	26	20	6
	No	41	30	11
Foreign Tech. License	Yes	25	20	5
	No	32	24	8
Informal	Yes	26	19	7
	No	32	24	8
Exporter	Yes	23	18	4
	No	34	25	9
<i>Degree of sophistication and compliance</i>				
ESG	Higher	27	20	7
	Lower	35	26	9
Audited	Yes	26	20	6
	No	35	26	9
Offering Formal Training	Yes	27	21	6
	No	34	25	9
<i>Other</i>				
Foreign Ownership	Yes	37	30	7
	No	32	23	8
Female CEO	Yes	41	31	10
	No	30	22	8
EAST & SE 2019		31	23	8

Note: "Informal" refers to firms that were operating originally in the informal sector when they were created

**Voluntary financial autarky is an endogenous response to a difficult operating environment.**

Figure 13 shows the percentage of financially autarkic firms conditional on quintiles of the financial institutions index. Perhaps unsurprisingly, countries with lower scores in the financial institutions index have a higher share of autarkic firms. But these countries not only have a higher share of forced autarkic firms, they also have a higher share of voluntarily autarkic firms. This also applies to the other plot of Figure 13. It suggests that gaps in the institutional development of credit market lead to some disconnect for firms. In other words, firms organise themselves in a way that enables them to operate without external finance. These results call for reforms to the business environment to facilitate firms' investment opportunities, thus increasing their appetite for external finance.

**Figure 13**  
**Institutional quality and financial development correlates with the level of financial autarky**



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

**The COVID-19 follow-up surveys can be used to gain insights into the behaviour of financially autarkic firms during the pandemic.** A final set of econometric exercises explores how financially autarkic firms fare during the COVID-19 crisis (see Annex B, Table B.2). These are based on the COVID-19 follow-up surveys available for a subset of the economies covered by the 2019 Enterprise Survey wave. The analysis pursues two objectives. First, financially autarkic firms constitute a significant share of the enterprise population in most sample economies, and understanding how they cope with the economic fallout of a major pandemic is of interest in its own right. Second, the COVID-19 shock can be exploited to gain insights into the forces that govern the capital structure choices of autarkic firms. On the one hand, all other things being equal, they should be good borrowers given that they entered the pandemic with zero leverage. On the other hand, they may not have an existing relationship with a bank, which in turn exacerbates information asymmetries.

**Voluntarily autarkic firms exhibit a certain degree of resilience during the COVID-19 crisis.** At first glance, this may not seem surprising given that autarkic firms are not exposed to rollover risk. Moreover, autarkic firms are by definition unleveraged. Thus, all other things being equal, they should be attractive borrowers. On the other hand, these firms do not have a pre-existing relationship with a bank, which in times of crisis aggravates problems of adverse selection. The exit rates of autarkic firms are no higher than those of non-autarkic firms: voluntarily autarkic firms are as likely to file for insolvency as any other firm. Voluntarily autarkic firms are less likely to exhibit financial stress as measured by delayed payments to suppliers, property owners or tax authorities. Forced autarkic firms are riskier as they are more likely to experience liquidity or cash flow shortages than non-autarkic firms operating in the same sectors. Subject to declines in cash flow, voluntarily autarkic firms are less likely to tap bank finance and more likely to inject equity, which presumably comes from the existing owners (see Annex B, Table B.2).

**Box 2**

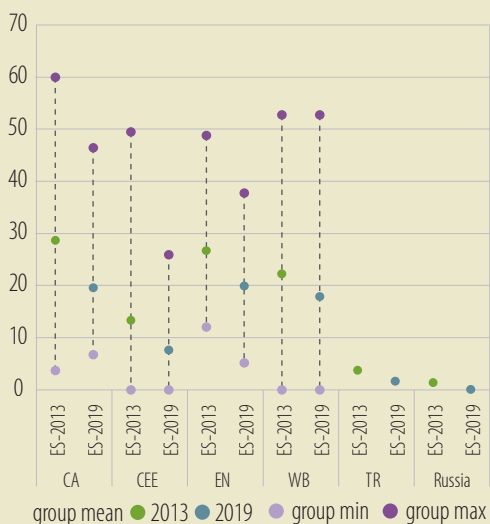
**Liability dollarisation/euroisation on firms' balance sheets**

**Extensive dollarisation or euroisation has been a driver of rapid financial sector growth in the region in recent years.** Easy access to long-term international funding in foreign currency has allowed relatively fast growth of financial penetration, via the enhanced supply of foreign exchange credit. This process is not without risks, as has been demonstrated by phases of boom and bust, and extensive market regulation of foreign exchange credit and risk exposure. This box analyses the phenomenon and the associated sources of risks.

**Historical experiences suggest that currency mismatches are an important source of vulnerability for firms.** Extensive evidence on the inadequacy of financial intermediation and the significant costs caused by it call for further deepening in the financial systems of the region's economies. But rapid credit expansion also brings risks. The experience of Central and Eastern Europe during the first decade of the millennium shows that one of these risks is liability dollarisation. In this period, the entry of foreign banks accelerated financial deepening, but the funding provided by these banks was overwhelmingly in hard currencies and thus exposed the real sector to currency mismatch risk. Realisation of risks brought about a sizeable burden on foreign exchange indebted economic units.

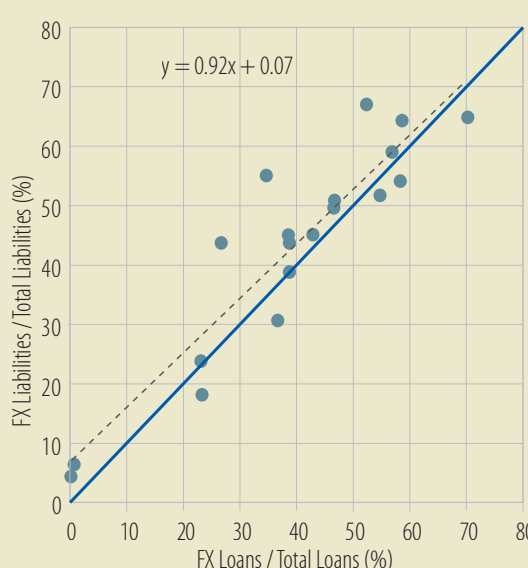
**Liability dollarisation is pervasive among firms in many regions, albeit lower than recorded in 2013.** Foreign exchange loans are more common in the Eastern Neighbourhood, Central Asia and the Western Balkans, where the share of foreign exchange indebted firms on average ranges between 18% and 20%, while it is around half that (8%) in Central and Eastern Europe. The latter region includes four euro area countries where the liability dollarisation ratio (defined as the number of firms with foreign exchange loans as a share of all firms with loans) is practically zero. In Turkey and Russia, the share of firms with a foreign exchange loan is close to zero: 2% and 0.1% respectively. The liability dollarisation ratio varies significantly within regions. For example, it ranges between 0% and 50% in Central and Eastern Europe and the Western Balkans. But foreign exchange indebtedness has declined in all regions compared with 2013 (Figure 2.1).

**Figure 2.1**  
Share of foreign exchange indebted firms in all firms with loans (percentage)



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

**Figure 2.2**  
Share of foreign exchange liabilities versus share of foreign exchange loans



Source: IMF, national central banks

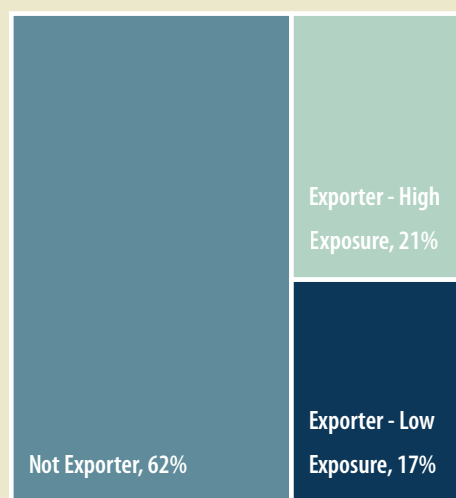
### Liability dollarisation on banks' balance sheets seems to be the main driver of foreign exchange lending.

The empirical literature suggests that difficulties in raising local currency funding are a key driver of banks' foreign exchange lending (see, for example, Rennhack and Nozaki, 2006). In less developed financial systems with limited access to international funding, the main source of hard currency funding is residents' foreign exchange deposits. In relatively advanced systems, foreign borrowing also accounts for a significant share of foreign exchange liabilities. Banks cannot lend hard currency funds in local currency as normally regulatory authorities apply a cap on the maximum amount of (net or gross) open currency positions. In addition, financial derivatives enabling banks to convert foreign exchange funding into local currency funding are largely unavailable. As a result, banks transfer the currency risk to their clients, which is reflected in a high correlation between foreign exchange liabilities and assets (Figure 2.2). On the other hand, for countries where banks get access to external borrowing or financial derivatives, such as Turkey, the relationship between on-balance sheet foreign exchange liabilities and foreign exchange loans weakens significantly.

### Despite prudential efforts towards limiting foreign exchange lending, around two-thirds of the foreign

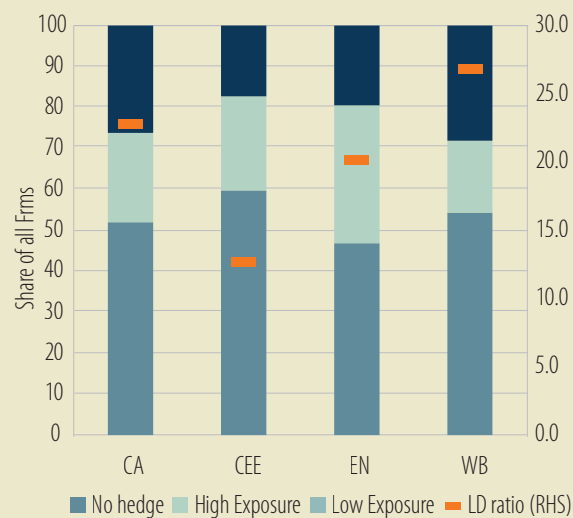
exchange indebted firms are unhedged. Banks' foreign exchange lending practices are paramount for limiting currency mismatch in firms' balance sheets. This can be tested using a pooled OLS regression, where the dependent variable is having a foreign exchange loan and the regressors are firm size, being an exporter and the interaction of the two terms, controlling for other unobservables. The results indicate that banks seem to apply a certain degree of caution in foreign exchange lending. They are more likely to lend in foreign exchange to larger firms and exporters, and while being an exporter does not affect the likelihood of getting a foreign exchange loan for larger firms, it matters for small firms. Nonetheless, in the Eastern Neighbourhood, Central Asia and the Western Balkans, where liability dollarisation is relatively higher, around half of the foreign exchange loans goes to non-exporters, whereas in Central and Eastern Europe, around 60% of foreign exchange indebted firms have no export revenues. The sufficiency of natural hedge is also paramount. This can be examined by comparing foreign exchange loan amounts with export revenues at the firm level. Considering the fact that the average maturity of foreign exchange loans is around three years, firms with a foreign exchange loan amount-to-exports ratio below three are considered sufficiently hedged. Among the exporters with foreign exchange loans, the Eastern Neighbourhood has the highest ratio of firms with insufficiently low hedge (64%), followed by Central and Eastern Europe (57%). In Central Asia and Central and Eastern Europe, more than half of the foreign exchange indebted exporters also have adequately high natural hedge (Figure 2.3 and 2.4).

**Figure 2.3**  
Foreign exchange indebtedness and natural hedge



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

**Figure 2.4**  
Foreign exchange indebtedness and natural hedge: regions



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

### 4.3. Access to finance, investment and growth

**Low levels of financial deepening and firms' constraints in access to finance, as well as firms' financial autarky, are linked to both demand or supply factors.** While fully disentangling the two is difficult, the analysis establishes that credit availability for firms is associated with investment and growth, thus showing the practical benefits of being supported by and connected to the banking sector. Credit-constrained firms invest less than unconstrained firms. A simulation exercise complements these findings, associating the removal of credit constraints with growth gains, although the effects are muted in some sub-regions. Moreover, even among firms that are investing, access to credit is associated with faster firm growth. The analysis also shows that financial autarky is associated with a lower propensity to invest and lower employment growth. The firms that voluntarily choose to remain disconnected from the financial sector end up losing growth opportunities.

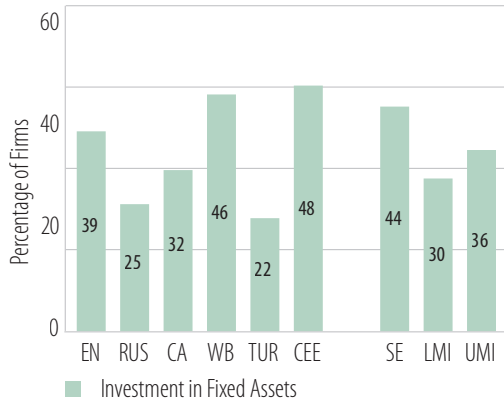
**Firms using external finance for their investments exhibit higher employment growth than firms not tapping external finance.** Figure 14 shows the percentage of firms investing in fixed assets, such as land and buildings or machinery and equipment, during the previous financial year. At 48%, investment rates are highest in Central and Eastern Europe, followed by the Western Balkans (46%) and the Eastern Neighbourhood (39%). In Turkey and Russia, on the other hand, only 22-25% of firms invested, reflecting the cyclical position of their economies.<sup>15</sup> Figure 15 focuses on the firms that invested: it relates employment growth to their liability structure. In particular, Figure 15 compares firms that applied for loans and obtained them to firms that did not apply or had their loan applications rejected.<sup>16</sup> It turns out that firms that obtained loans exhibit substantially higher employment growth in the years preceding the interview. The difference is particularly pronounced in Turkey, where firms that obtained loans grew by on average 7 percentage points compared with 2 percentage points for firms that did not obtain loans. This association could be a result of several forces. First, firms with high growth potential may find it easier to obtain loans. Second, the availability of external finance may enable firms to fund investments that they would otherwise not be able to implement or only on a smaller scale.

**Autarkic firms – those shut off from the financial sector – are smaller, exhibit lower employment growth and invest significantly less.** Figure 11 has shown the prevalence of autarky across the sub-regions. Figure 16 scores this dimension against firms' propensity to invest. A small share of autarkic firms invests in fixed assets, with on average more than two-thirds of autarkic firms not investing. Notably, a very small share of autarkic firms invests in the Eastern Neighbourhood, Russia, Central Asia and Turkey. In Central and Eastern Europe and the Western Balkans, more than 50% of autarkic firms do not invest. Figure 11 has shown that the vast majority of autarkic firms have chosen voluntarily to be autarkic. Figure 17 shows median firm size conditional on age and on whether the firm is voluntarily autarkic or non-autarkic (see Box 1). The median autarkic firm employs fewer people than the median non-autarkic firm. Furthermore, the size differential increases with firm age. This is consistent with non-autarkic firms growing faster than non-autarkic firms. Although Figure 17 refers to employment levels, regression results in Annex B (Table B.2, column 1) provide direct evidence on employment growth. On average, voluntarily autarkic firms have 1.6 percentage points lower employment growth than non-autarkic firms. Firms forced into autarky face an even bigger growth penalty of 2.7 percentage points. The regression results are consistent with the notion that autarky has a cost in terms of forgone growth. On the other hand, it may also be that firms with low growth opportunities chose to be autarkic. As the surveys do not contain information on firms' growth opportunities, it is not possible to distinguish between both interpretations. But at a minimum, the data suggest that firms with growth opportunities use external finance to realise them.

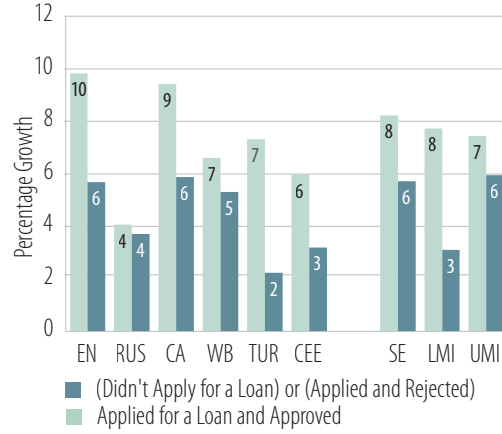
<sup>15</sup> This is consistent with the sharp drop of investment rates compared with the 2013 Enterprise Survey.

<sup>16</sup> At an even more granular level, firms that "do not need a loan" behave similarly to "firms that were discouraged or were rejected". These two elements form the aggregate of firms that did not apply for a loan or had their application rejected.

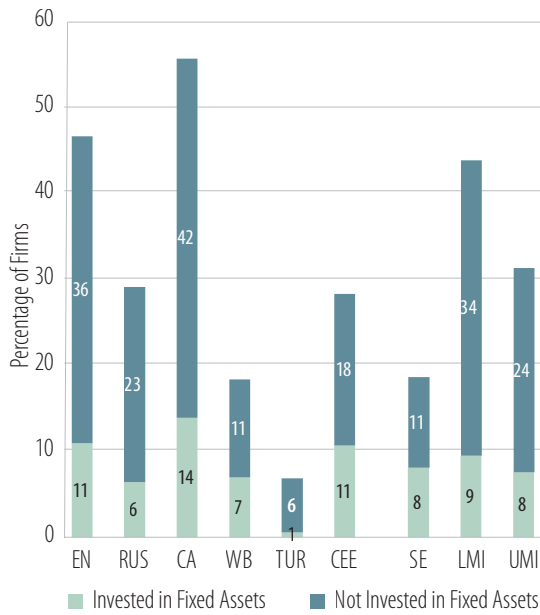
**Figure 14**  
Propensity to invest in fixed assets



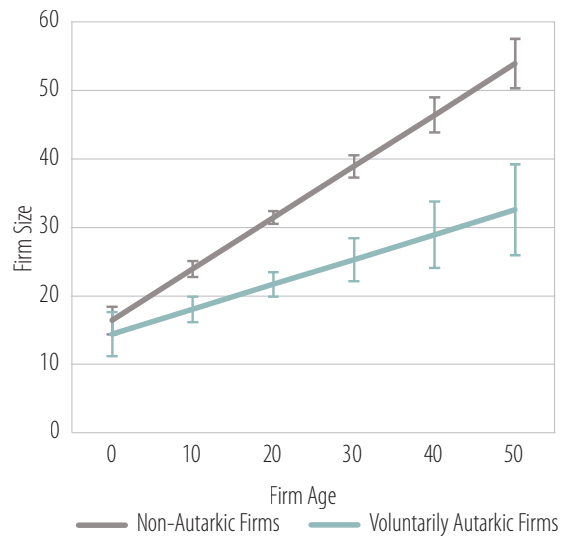
**Figure 15**  
Employment growth among firms that invested and have access to credit



**Figure 16**  
Autarkic firms – share of investing and non-investing firms



**Figure 17**  
Voluntarily autarkic, firm size and age



Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

Note: Fitted values from a median regression of firm size as measured by the number of employees on firm age and financial autarky.

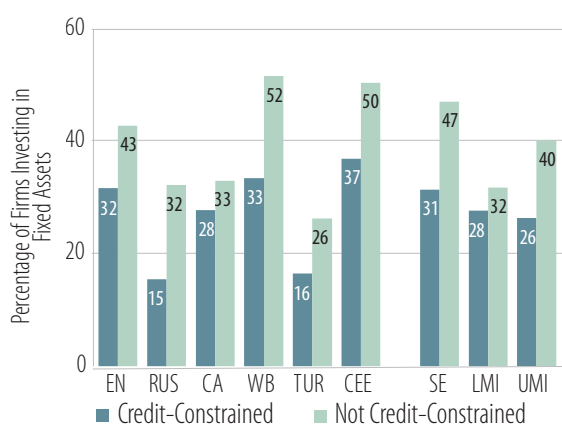
**Credit-constrained firms tend to invest less than firms that are not credit-constrained.** Figure 18 documents the association between being credit-constrained and firms' propensity to invest. Across all sub-regions, firms that are not credit-constrained have a significantly higher propensity to invest. Notably, in Central and Eastern Europe and the Western Balkans, around 50% of unconstrained firms invested. Similarly, in the Eastern Neighbourhood, about 40% of unconstrained firms invested. This share is lower in Turkey, Russia and Central Asia, reflecting the lower baseline propensity to invest in these areas, as shown in Figure 14. Nonetheless, constrained firms also invest less even in these jurisdictions. This evidence suggests that removing credit constraints would potentially increase investment at the firm level, thus leading to possible positive effects on output at the macro level.



**Removing credit constraints has a positive impact, but the results vary sizeably across sub-regions and countries.** Estimation of the potential growth gains stemming from enhanced access to credit requires several steps. First, Enterprise Survey data are used to estimate the association between investment and credit constraints. The regression output is then used to calculate the counterfactual investment level, conditional on removing the constraints. In the next step, predicted investment levels are aggregated at the country level to obtain the amount of investments under the counterfactual scenario relative to actual investment. Finally, based on a standard production function approach, the investment volumes under the two scenarios are used to project the capital stock and output.<sup>17</sup> Figure 19 illustrates the level of GDP projected over a ten-year horizon under the counterfactual scenario relative to the baseline (that is, the percentage point difference between the counterfactual scenario and the baseline GDP level). Turkey stands out with a GDP level that is 18 percentage points higher than the baseline; but this is related to the unusually tight financial conditions in 2019.<sup>18</sup> Russia, on the other hand, sees more limited gains from the removal of the constraints. Among sub-regions, Central Asia and the Eastern Neighbourhood get the highest rise in their output (7%), followed by Central and Eastern Europe (3.6%), whereas output levels in the Western Balkans and Southern Europe are only marginally above the baseline scenario (2% and 1%, respectively).<sup>19</sup>

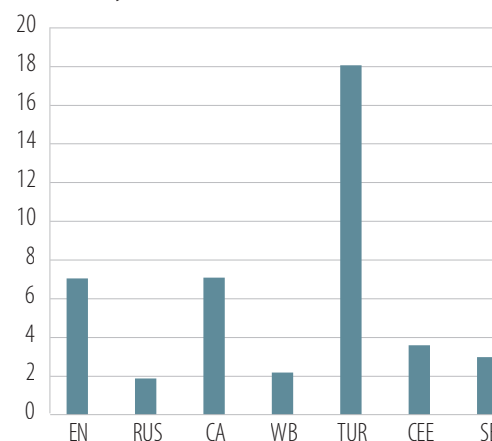
**The prevalence of financial constraints at the firm level is the main driver of the substantial variation in output at country level.** For a given country, the output gain under the counterfactual scenario is determined by two factors: (i) the pervasiveness of constraints at the firm level; and (ii) the marginal effect of an additional investment on growth.<sup>20</sup> The proportion of constrained firms across countries varies substantially, and so is the amount of investment predicted under the counterfactual scenario (see Annex C, Figure C.1).<sup>21</sup> For example, the relatively modest output gains from eliminating constraints in the Western Balkans stem largely from the lower incidence of credit constraints at the firm level.

**Figure 18**  
Investment propensity for credit-constrained and non-credit-constrained firms



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey

**Figure 19**  
Total output gains relative to baseline (cumulative percentage points deviations over ten years)



Source: Authors' calculations based on EBRD-EIB-WBG Enterprise Survey

17 Constrained and unconstrained firms are assumed to have the same production functions; there are no binding constraints other than finance.  
 18 Turkish financial markets saw massive fluctuations during 2019, triggered by several domestic political issues. During this period, loan interest rates went up substantially, which probably increased the number of discouraged firms. Moreover, in a time of crisis, the need for loans increases substantially due among other things to increasing liquidity needs.  
 19 The simulation assumes that the complementary productive factors (for example, labour, public capital) grow in tandem with private capital, which implies that output also grows at the same rate. Given the slack in labour markets of the economies and the fact that public sector is less constrained than private sector, this assumption is not a strong one.  
 20 The marginal effect of investment on growth depends on the initial level of capital stock is used across countries.  
 21 Annex C, Figure C.2 shows the contribution of the micro (credit constraints) and macro (aggregate capital and investment levels) factors together to allow a comparison across sub-regions. The contributions of financial constraints vary to a greater extent.

**Box 3****The effects of extreme weather events on firms' investments and finance\***

**In a warming climate, extreme weather events become more likely and more severe.** In its sixth assessment report, the Intergovernmental Panel on Climate Change (IPCC) considers it an established fact that greenhouse gas emissions have “led to an increased frequency and/or intensity of some weather and climate extremes since pre-industrial times”. The IPCC expects these trends to continue as global average temperatures increase further. The evidence is not limited to extreme heat, but is also reflected in heavy rainfall, floods, storms and droughts. To design appropriate adaptation policies, it is important for policymakers to understand how firms respond to losses from extreme weather, on both the asset and liability sides of their balance sheets.

**A significant share of firms is already suffering losses from extreme weather events.** The Enterprise Surveys do not have data on firms' exposure to extreme weather per se. Instead, they focus on the economic consequences of extreme weather, identifying firms that are experiencing monetary losses linked to such events. But there is no information available on the scale of the damage. About 9% of firms report having experienced monetary losses due to extreme weather, such as storms, floods, droughts and landslides, in the previous three years. Figure 3.1 shows that the share of firms suffering losses from extreme weather ranges from 8.8% in Central Asia to over 10.6% in Southern Europe.

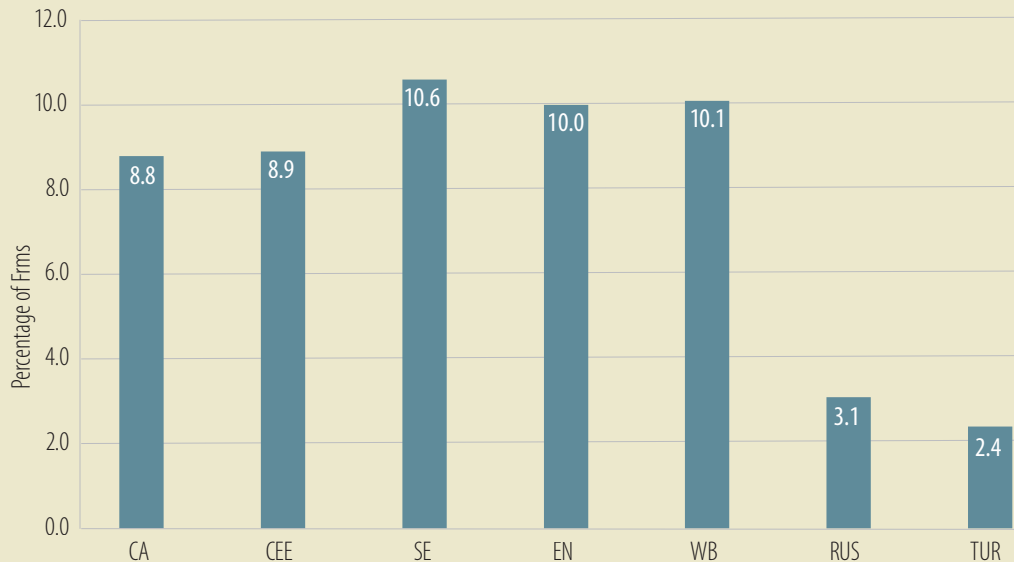
**Firms suffering monetary losses from extreme weather are more likely to invest in physical capital.** Table 3.1 presents regression results on the relationship between losses due to extreme weather and firms' investments. It shows a positive statistically and economically significant relationship between suffering losses due to extreme weather and the probability of increasing capital expenditure. Similarly, these firms have a higher probability of investing in land and buildings and of purchasing new machinery, vehicles or equipment, all other things being equal.

**Firms suffering losses due to extreme weather replenish the stock of capital by building back better.** Table 3.1 shows a positive statistically significant association between suffering losses due to extreme weather and the likelihood that the firm adopted climate-friendly (green) measures. The coefficient is also economically meaningful, as it corresponds to 16.5% of the mean of the dependent variable. Results are also robust to controlling for those aspects that are likely to increase the probability of investing in green measures: having a manager who is directly responsible for climate issues, being subject to energy standards and being subject to levies on energy usage.

**Firms that suffer losses due to extreme weather have a higher need to access external finance, specifically bank credit.** Table 3.2 shows a strong statistically significant and positive relationship between extreme weather losses and the need for bank loans. Firms suffering losses due to extreme weather are on average 12 percentage points more likely to need bank credit.

**To a certain extent, banks accommodate credit demand from firms suffering monetary losses due to extreme weather.** Table 3.2 shows no statistically significant association between extreme weather losses and credit constraints, conditional on needing loans. Banks seem not to constrain access to credit for firms suffering extreme weather losses. But this result is driven by the counterbalancing effects of discouragement and rejections, whereby firms with weather-related losses are less likely to be discouraged from applying for loans and more likely to be rejected (Table 3.2). This result signals that some tightening and/or discrimination is taking place, but also that firms are less creditworthy after a weather shock, given the risk aversion and screening practices of banks.

*\* The results presented in this section are based on a forthcoming working paper: E. Benincasa, F. Betz and L. Gattini: “How do firms cope with losses from extreme weather events?”, Mimeo*

**Figure 3.1****Percentage of firms suffering losses due to extreme weather events by region**

Source: Authors' own calculations based on EBRD-EIB-WBG Enterprise Survey

**Table 3.1****Extreme weather losses and investment**

	(1) Fixed assets	(2) Land and buildings	(3) Machinery and equipment	(4) Green measures
Extreme weather loss	0.06** (0.03)	0.04*** (0.01)	0.05** (0.03)	0.11*** (0.02)
N	18 968	18 968	18 968	18 968
R-squared	0.23	0.17	0.23	0.24
mean(dep. var)	0.421	0.115	0.407	0.663
Sector-size-country FE	Yes	Yes	Yes	Yes

**Table 3.2****Extreme weather losses and access to finance**

	(1) Need a loan	(2) Credit constrained	(3) Discouraged	(4) Rejected
Extreme weather loss	0.12*** (0.02)	-0.05 (0.03)	-0.11** (0.05)	0.07*** (0.02)
N	18 634	8 380	8 380	8 380
R-squared	0.18	0.31	0.29	0.21
mean(dep. var)	0.421	0.464	0.422	0.042
Sector-size-country FE	Yes	Yes	Yes	Yes

Note: Table 3.1 and 3.2 report estimates from sample-weighted linear probability models. The regressor of interest is the dummy variable Extreme weather loss which is equal to one if the firm experienced monetary losses due to extreme weather events; zero otherwise. All columns include firm-level controls (indicators for exporter status, listed firm, sole proprietorship, in partnership, audited financial accounts, female top manager, log of firm age, selling main product in the local market, having a website, and the log of manager's experience) and sector-size-country fixed effects. Column 4 in Table 3.1 on green measures additionally include indicators for payment of an energy levy, for being subject to energy standards and for having a manager responsible for climate issues. Omitted category in firm ownership is Limited partnership and Shareholding company with non-traded shares. Robust standard errors are clustered by Enterprise Survey regions and shown in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 4.4. Estimating credit gaps: quantifying the extent to which private enterprises are underserved<sup>22</sup>

**In general, a credit gap refers to the difference between the desirable level of credit and the actual level.** This section focuses on estimation prior to COVID-19. Measuring credit gaps is an empirical issue. Broadly speaking, two not mutually exclusive approaches have been deployed in the literature, namely: (i) a macroeconomic approach; and (ii) methodologies centred on firm-level data. The former approach is also defined as the gap between the credit-to-GDP ratio and its long-term trend (Drehmann and Tsatsaronis, 2014). For example, it is employed in macroprudential contexts, including the setting of countercyclical capital buffers (Basel III regulatory framework).<sup>23</sup> Though these methods are useful for identifying the periods of excess credit growth, they are not well suited for assessing structural excess demand for credit in emerging and developing economies. The exercise proposed in this section therefore employs the latter methodology, thus starting from a granular firm perspective.

**A few studies based on firm-level analysis measure credit gaps in emerging and developing countries.** McKinsey & Company (2010) estimates the size of the enterprise-financing gap. A 2013 update (IFC, 2013) reports a gap of around \$2.1-2.6 trillion for developing and emerging markets. In a qualitative assessment of financing gaps, the OECD (2006) concludes that emerging economies have a more pervasive gap than OECD countries. The EIB (2013) measures financing needs for the Eastern Neighbourhood countries based on publicly available data, finding that sizeable gaps persist although financial sectors were doing an adequate job in providing financing to SMEs. The IFC (2017) provides estimates of the financing gap for micro, small and medium-sized enterprises (MSMEs) across developing economies using a potential demand approach: essentially, it models potential demand for credit from MSMEs and matches it with outstanding credit, making use of firm-level information. The study finds that the financing gap for MSMEs totals \$5.2 trillion, or 19% of GDP on average, for a very large pool of emerging and developing economies.

**The credit gap is an estimate of the amount of additional financing required to cover the financing needs of discouraged firms, after correcting for their lower creditworthiness.** The core of the analysis estimates the amount of “acceptable” discouraged firms. These are the firms that form the credit gap. In a nutshell, a “scoring” model estimated on observed and rejected loan applications is applied out of sample to predict the implied rejection rate for the discouraged firms, thus determining the potentially “acceptable” discouraged firms. By doing so, the method screens out firms that would have been rejected had they applied for loans. It adjusts for observable firm-specific differences in the pool of non-applicants vis-à-vis the pool of applicants, while controlling for unobservable factors common to firms operating in a given country or sector. As a last step, the desired/latent loan volume is aggregated across firms, and it is linked to the existing outstanding credit to enterprises in the economy to obtain the credit gap as a percentage of GDP (see Annex D for details on the methodology).

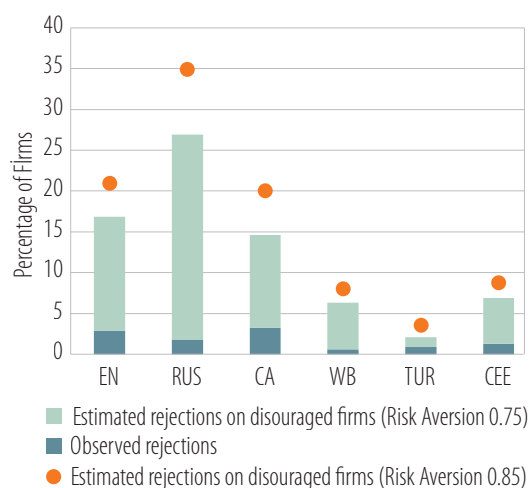
**The approach is subject to several caveats.** In particular, the approach does not correct for unobservable differences between applicants and non-applicants. Such differences may include the quality of the marginal investment opportunity as well as actual profitability/returns of investment. But these caveats largely apply to all firm-based studies of credit gaps. Moreover, this concern can be partially addressed by a model parameter that governs banks’ risk aversion (see Equation 2 in Annex D). But the calculated net credit gaps should be seen more as a ceiling (upper bound) rather than a floor to the potential financing needs.

<sup>22</sup> This section is based on a forthcoming EIB working paper: O. Akbas, F. Betz and L. Gattini, “An approach to measure credit gaps in emerging and developing economies based on survey data”, Mimeo.

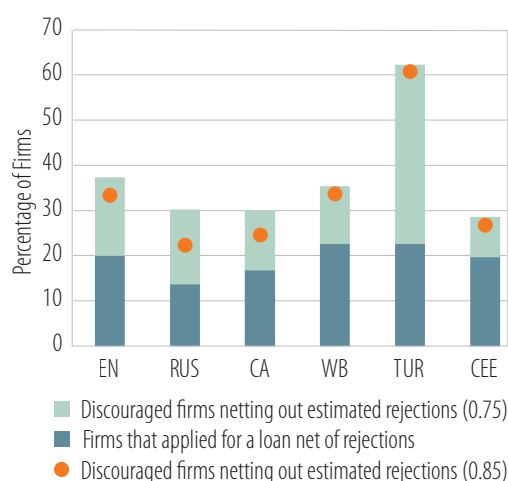
<sup>23</sup> It is based on various methods including, one-sided Hodrick-Prescott (HP) or other filtering methods – for example, bandpass methods Baxter and King (1999) and Christiano and Fitzgerald (2003); Kalman filter (Durbin and Koopman, 2012) – as well as structural approaches such as vector error correction modelling (Galán and Mencia (2018); Lang and Welz (2018); IMF (2015) or a mixture of the two (IMF, 2020) and Abiad et al (2011)

**Implied rejection rates for discouraged firms are higher than observed rejection rates.** Figure 20 shows the average observed rejection rates. These range between 1% and 3% of the population of firms for the average country in each sub-region. The imputed rejection rates for discouraged firms are much higher and, except for Turkey, are a multiple of the observed rejection rates. This is based on two assumptions. First, banks are assumed to employ the same screening criteria across all firms – that is, those applying and those not applying for loans. Second, the risk aversion of the banking sectors is calibrated to reproduce the actual rejection rates.<sup>24</sup> Ultimately, the implied average quality of the discouraged firms is lower than those firms that actually applied for loans. As a result, a significant share of firms is screened out because of their lower creditworthiness. To account for unobservable differences between applicants and non-applicants, a higher risk aversion parameter has been applied, yielding a theoretical in-sample rejection rate twice the average observed rejection rate. The dot in Figure 20 represents the implied rejection rates.

**Figure 20**  
Observed rejections and estimated rejections on discouraged firms (making use of alternative risk aversion parameters)



**Figure 21**  
Firms that received loans and “acceptable” discouraged firms, netting out estimated rejections from Figure 20



Source: Authors’ calculations based on EBRD-EIB-WBG Enterprise Survey

Source: Authors’ calculations based on EBRD-EIB-WBG Enterprise Survey

**The credit gap is estimated to account for 17-20% of regional GDP or \$822-1 032 billion (out of which \$587-742 billion is from Russia and Turkey combined) prior to the COVID-19 crisis.** To obtain an estimate of the credit gap, the respective rejection rates are subtracted from the shares of applying and discouraged firms. Figure 21 shows their relative importance among the population of firms for the average country within each sub-region. In Figure 21, the share of discouraged firms after the imputed rejection is smaller than the share of firms that applied for loans (also net of rejections), except for Turkey where the implied rejection rates on discouraged firms are low. Ultimately, these two components are linked to the outstanding amount of credit to non-financial corporations, to obtain the credit gap.<sup>25</sup> Figure 22 shows the credit gap bands for each sub-region as a percentage of GDP. It also reports a gross credit gap that does not apply any adjustment to assess the quality of discouraged firms. By construction, this gap is much higher and it is reported for information only.

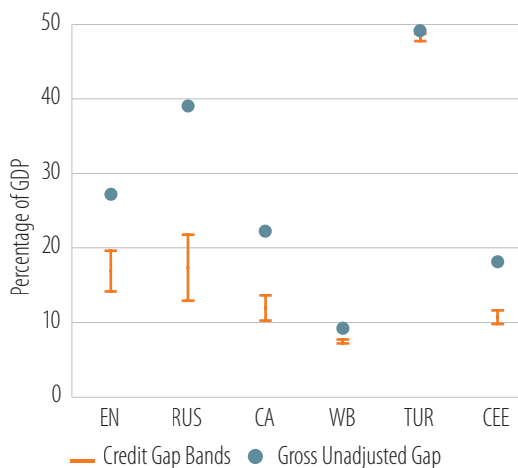
**These findings can be broken down further to obtain credit gap measures for SMEs and corporates** (Figure 23). The SMEs credit gap for Eastern Europe and Central Asia is estimated at 11.5-15% of regional GDP or \$551-718 billion (out of which \$400-531 billion is from Russia and Turkey combined). For comparison,

24 This is obtained via a parametrisation process employing a loss function for the banking sectors described in Annex B.

25 Non-financial corporations’ credit is sourced from IMF FSI, IMF FAS and national central banks.

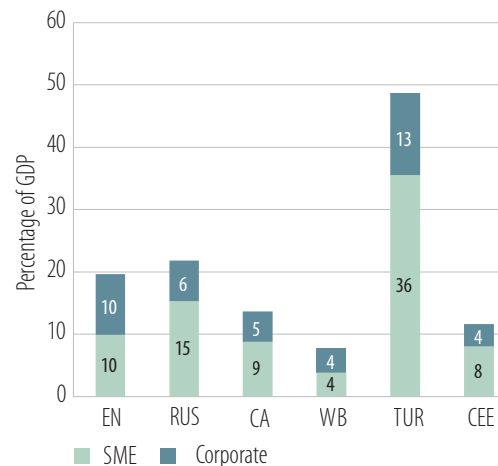
the IFC (2017) credit gap measures actualised with 2019 prices implies a regional credit gap for SMEs equal to 20% of GDP, thus somewhat higher than the estimated band in this analysis. Finally yet importantly, the corporate credit gap is significantly smaller than the gap for SMEs. It is estimated at 5.7-6.6% of regional GDP or \$271-314 billion (out of which \$187-211 billion is from Russia and Turkey combined).

**Figure 22**  
Credit gaps bands as percentage of GDP



Source: Authors' calculations  
Note: These figures represent the total credit gap in a given sub-region (as % of GDP) and not the credit gap for the average country within each sub-region

**Figure 23**  
Credit gaps as percentage of GDP – breakdown by firm type (employing the upper bound risk aversion parameter)

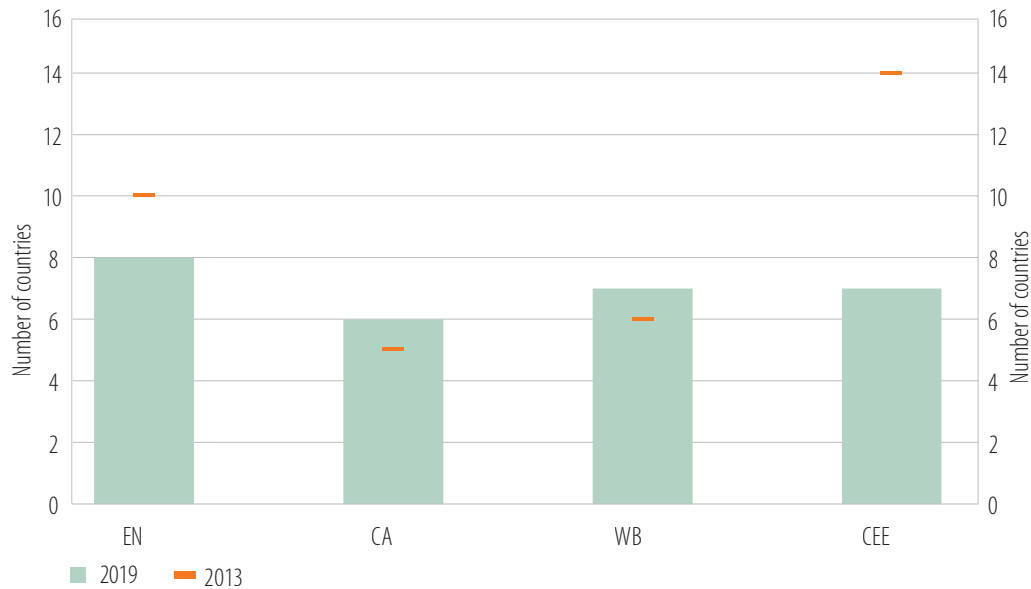


Source: Authors' calculations

**Collateral-related reforms can be an important element in reducing credit gaps.** Section 4.2.1 has documented still elevated collateral levels for the whole region. Campello and Larrain (2016) demonstrate the improved access to finance for a broad cross-section of Romanian firms in the aftermath of the collateral reform in Romania. Love et al (2013) show that collateral registries for movable assets increases firms' access to bank finance. Specifically, collateral reforms could include expanding the scope of the law governing collateral or/and reforming credit registries. Countries in the Eastern Neighbourhood introduced collateral-related reforms in the five-year period through to the 2019 wave of the Enterprise Survey, followed by Central and Eastern Europe and the Western Balkans, with the number of countries that introduced collateral related reforms in the Western Balkans and Central Asia higher in the 2019 survey relative to that of the previous wave (Figure 24). When splitting by type of collateral reforms, the number of countries that introduced law-related reforms over the five years to the 2019 survey was higher relative to the 2013 survey across the board (except in Central and Eastern Europe). Fewer countries phased in registry-related reforms in the five years to the 2019 survey relative to the 2013 survey, implying that countries mostly introduced law rather than registry-related reforms in the five years to the 2019 survey.<sup>26</sup>

<sup>26</sup> One caveat to be added is the credit measures implemented during banking crises, like the global financial crisis. The central bank, as lender of last resort, could provide emergency access to finance when firms face sudden financial market disruptions.

**Figure 24**  
**Collateral reforms by sub-region**



Source: WB Doing Business Law Library 2013 and 2019

**The introduction of collateral-related reforms has a positive impact on firms' broad access to finance.** The subsequent analysis is based on a differences-in-differences estimation of the impact of collateral reforms to access to finance, and contributes to the existing literature through enlarging the scope of the reforms examined, thus including reforms to enhance the scope of collateral on top of the development of credit registries. The analysis focuses on the impact of reforms initiated in 2014-18.<sup>27</sup> Specifically, the countries that introduced reforms aimed at expanding the scope of the law governing collateral or/and reforming credit registries between 2014 and 2018 are defined as the reform-treated countries, while the others are the control group. Table 3 shows the key results, with the interaction of treated and period being the differences-in-differences estimator capturing the impact of the reform. The introduction of collateral-related reforms has a statistically significant and positive impact on firms' broad access to finance (that is, access to loans, lines of credit or overdrafts). It also increases the number of firms that invest in fixed assets and with perceived access to finance to be minor or no obstacle, while the share of collateralised loans in total loans increases.

<sup>27</sup> Specifically, the collateral registry is one of the items in the Ease of Doing Business "Getting Credit" index, which includes seven additional components pertaining to movable collateral laws and two components pertaining to bankruptcy laws. Some of the collateral reforms other than the introduction of a registry include: allowing out-of-court enforcement of collateral and introducing a law that allows a business to grant a non-possessory security right in a single category of movable assets (such as accounts receivable or inventory), without requiring a specific description of the collateral. The Doing Business law library is used, which is the largest free online collection of business laws and regulations for local firms in 185 countries since 2004.

**Table 3**  
**Empirical results**

	(1)	(2)	(3)	(4)
	Access to finance	Proportion of firms requiring collateral	No financial obstacle	Invested in fixed assets
Firm size	0.0800*** (0.00415)	3.680*** (0.618)	0.00346 (0.00356)	0.109*** (0.00422)
Firm age	0.0166** (0.00710)	3.026*** (1.119)	0.00203 (0.00579)	-0.0538*** (0.00718)
Foreign owned firm	-0.125*** (0.0196)	-1.541 (3.965)	0.0431*** (0.0145)	-0.0227 (0.0204)
Government owned firm	-0.00621 (0.0331)	0.310 (6.183)	-0.0127 (0.0307)	-0.0592 (0.0385)
Firm is exporter	0.000556*** (0.000131)	0.0106 (0.0196)	-0.000244** (0.000113)	0.000833*** (0.000139)
Treated x Period	0.0549*** (0.0189)	8.714*** (3.002)	0.0307** (0.0154)	0.0418** (0.0193)
Observations	36,170	13,143	36,170	35,872
R-squared	0.187	0.127	0.077	0.132
Country FE	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES

*Note:* Standard errors in parentheses \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  Coefficient estimates from OLS regression using survey weighted observations (Stata's *svy* prefix) with country and sector fixed effects. Standard errors are reported in parentheses below the coefficient. The dependent variable at each column corresponds to Access to finance (1 if access to a loan, line of credit or overdraft, 0 otherwise); autarkic (forced and voluntary autarkic, defined in Box.1); No financial obstacle (1 if no, minor or moderate obstacle to access to finance, 0 otherwise); Invested in fixed assets (1 if 1 firm purchased any new or used fixed asset, 0 otherwise) and Proportion of loans requiring collateral. Independent variables included Treated (1 if firm is in a country that introduced collateral-related reforms over 2014-2018, 0 otherwise); Period (1 if year  $\geq$  2014, 0 otherwise); Firm age (logarithm of Age (years)); Firm size (logarithm of number of workers); Firm is exporter (1 if proportion of sales exported directly in excess of 10%, 0 otherwise); Foreign owned firm (1 if proportion of private foreign ownership in the firm is greater than 50%, 0 otherwise); Government owned firm (1 if government/state ownership is greater than 50%, 0 otherwise). \*\*\*, \*\* and \* denote statistical significance at the 1, 5 and 10 percent levels, respectively.

**The role of central banks should be acknowledged, including the collateral frameworks in place for interbank lending and prudential policy.** Stronger incentives for corporate lending to SMEs could be created through central banks' collateral frameworks and prudential policy. For example, the inclusion of "credit claims" in the Eurosystem collateral framework, and the "additional credit claims" in crisis times (for example, SME loans of lower credit quality), as well as the "SME supporting factor" in capital regulatory requirements in the European Union, have been instrumental in promoting SME lending in Europe. Central banks' collateral policy could also be considered for countries in Eastern Europe and Central Asia. Specifically, banks that participate in credit guarantee schemes could receive from their prudential regulator capital relief in the form of lower risk weights assigned to exposures covered by guarantees meeting specific criteria. Nevertheless, the capital relief for banks that participate in credit guarantee schemes would be limited given the small share of credit guarantee schemes in overall corporate lending (for example, under 10% for countries in Central and Eastern Europe).<sup>28</sup> For the same reason, the prudential regulation covering guarantee schemes is non-existent in some jurisdictions in Eastern Europe and Central Asia.

28 Vienna Initiative (2014), "Credit Guarantee Schemes for SME lending in Central, Eastern and South-Eastern Europe", November.



## 4.5. Conclusions and policy implications

**This chapter highlights that financial deepening and increased access to finance are associated with a higher propensity to invest and faster firm growth.** But throughout the region, there is a gap in terms of firms' access to finance, particularly for SMEs and young firms.

**A sizeable share of SMEs, notably young and innovative SMEs, are credit-constrained.** Size and age are strongly associated with access to finance, with 23% of SMEs being credit-constrained and 37% of SMEs having loans outstanding, compared with 12% and 55% of large firms. Similarly, 23% of firms under five years old are credit-constrained, compared with 20% of firms above age five, while 29% of firms below age five have loans outstanding compared with 39% above age five.

**Financial constraints are associated with decreased growth opportunities for firms.** Innovative large firms are significantly less constrained than innovative SMEs, with the latter showing 6 percentage points higher levels of constraints. Moreover, young innovative SMEs are five times more constrained than young innovative large firms.

**The region has a high share of firms in financial autarky, particularly among SMEs (33%) and young firms (39%).** Autarkic firms finance all their activities and investments entirely from internal sources and have no outstanding liability relationships with the banking sector. The vast majority of autarkic firms in the sample are voluntarily autarkic: they have chosen to disconnect from banks and, by doing so, they lose growth opportunities. Firms that are larger, older, more sophisticated, more export-oriented and with higher ESG standards are less likely to be financially autarkic.

**Additional credit worth 17-20% of GDP would be needed to meet the financing needs of enterprises in the region, mostly SMEs and young firms.** The credit gap estimates the amount of additional financing required to cover the financing needs of discouraged firms, screening out firms that would have been rejected had they applied for loans. It is estimated to be 17-20% of regional GDP or \$822-1 032 billion (of which \$587-742 billion is Russia and Turkey combined), with about two-thirds of the figure coming from SMEs.

**The gaps in terms of financial penetration and access to finance are mostly associated with a mismatch of demand and supply of credit.** This requires efforts in terms of development of the credit market infrastructure. Empirical analysis shows that improvements in collateral frameworks can help to tackle inefficiencies in the allocation of credit, reduce risks and increase the accessibility of credit and help to close credit gaps.

**Enhanced financial literacy as well as raising of audit and accounting standards, in conjunction with a genuine reform agenda geared to improving institutional quality, can decrease information asymmetries and increase firms' capacity, appetite and confidence in engaging with the banking sector, thus helping to reduce the phenomenon of autarky.** Such reforms could also help to smooth the burden of complex procedures and weaken firms' belief that their loan applications will not be approved, thus helping to decrease credit gaps and compress the number of credit-constrained firms. Furthermore, the deployment of guarantee schemes can boost the risk-taking appetite of the banking sector, while their effectiveness can be enhanced via improvements in risk assessment and screening capabilities.

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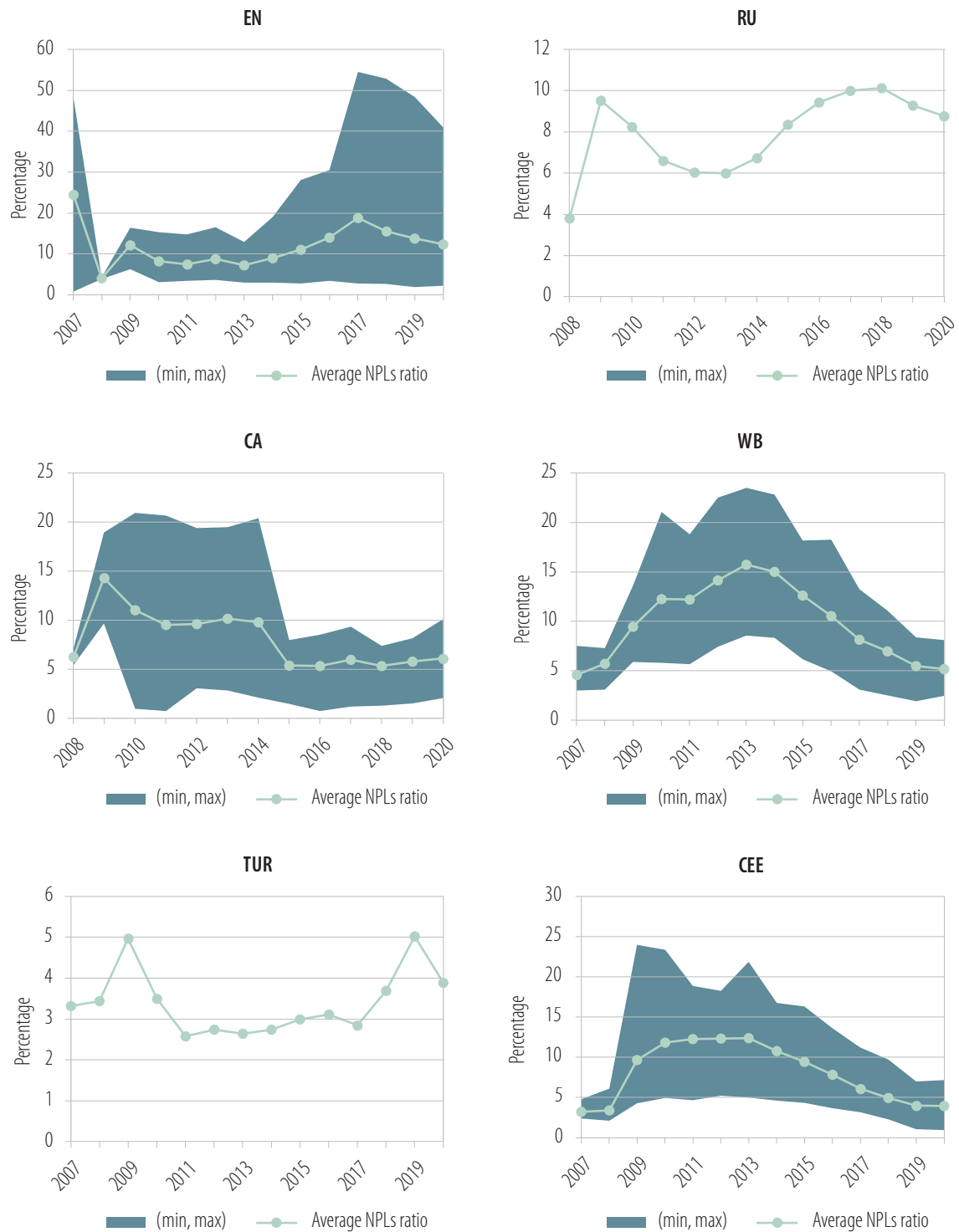
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## 4.7. Annex

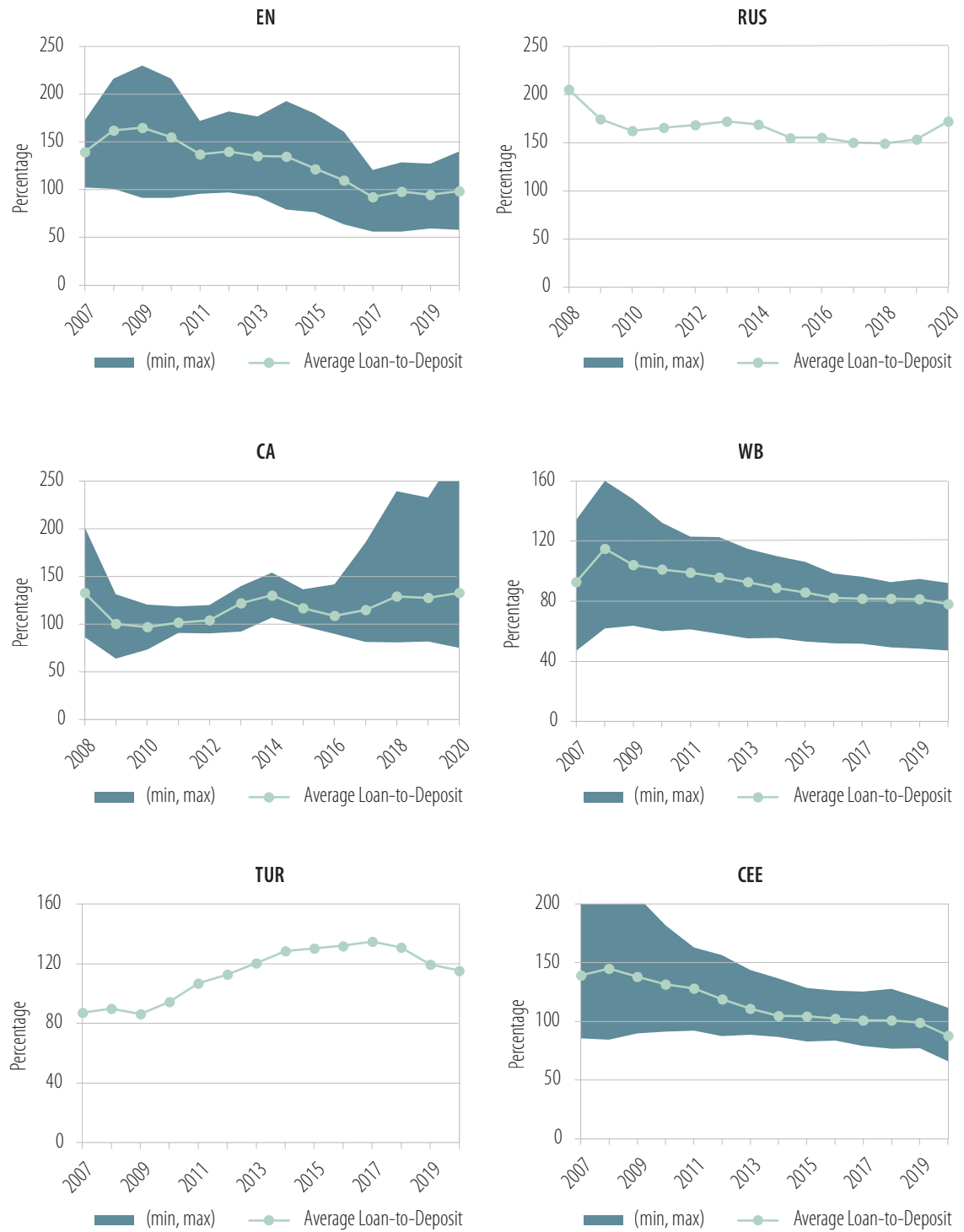
### Annex A

Figure A.1

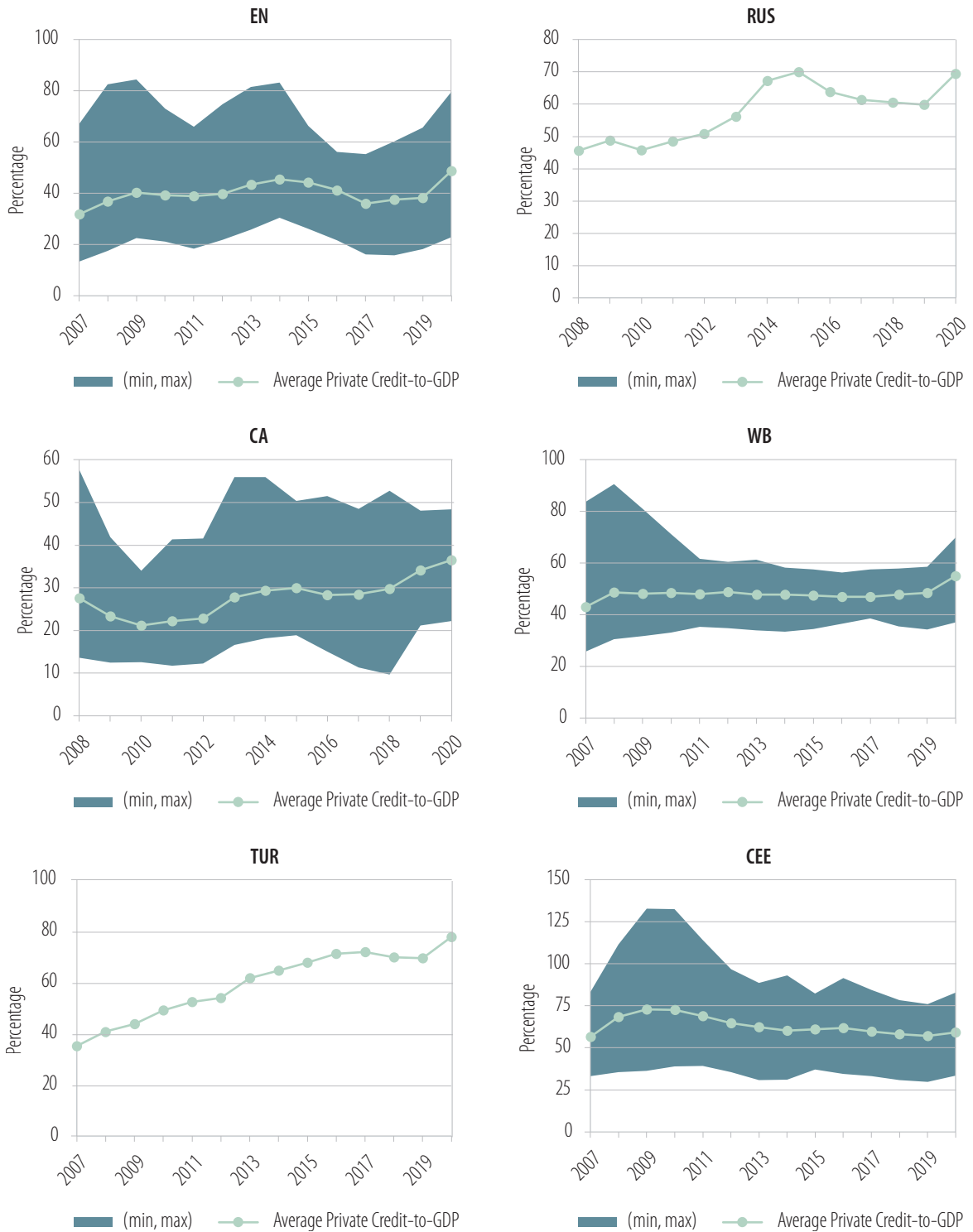
Banking asset quality – average and min-max levels of non-performing loan ratios for each sub-region



**Figure A.2**  
**Banking funding – average and min-max levels of loan-to-deposit ratios for each sub-region**



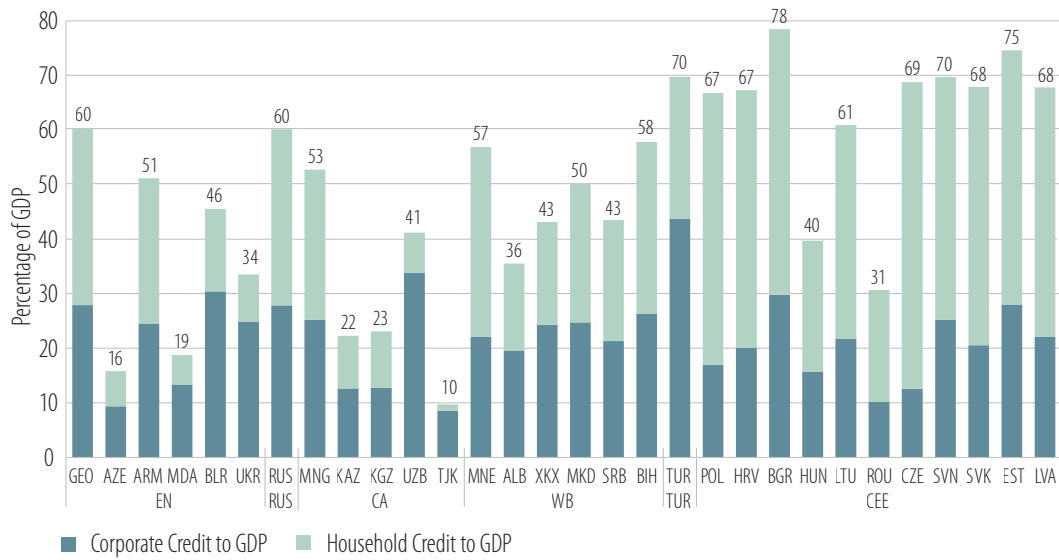
**Figure A.3**  
**Banking penetration – average and min-max levels of credit-to-GDP ratios for each sub-region**



**Figure A.4**  
Banking system characteristics by country

	Bank Non-Performing Loans to Total Loans (%)	Bank Regulatory Capital to Risk-Weighted Assets (%)	Bank Return on Assets (%)	Bank Return on Equity (%)	Strength of Legal Rights Index (0-12, best)	Depth of Credit Information Index (0-8, best)	Credit Registry Coverage (% of adults)	Credit Bureau Coverage (% of adults)	Financial Institutions Index (0-1, best)	Financial Markets Index (0-1, best)
Armenia	5.5	17.6	1.5	10.3	6	8	0	82	0.47	0.03
Azerbaijan	#N/A	#N/A	#N/A	#N/A	12	8	0	45	0.33	0.07
Belarus	4.6	17.8	1.9	12.8	3	7	53	0	0.32	0.01
Georgia	1.9	19.5	2.4	19.9	9	8	0	100	0.55	0.03
Moldova	8.5	25.3	2.6	14.6	8	6	0	18	0.42	0.00
Ukraine	48.4	19.7	4.7	37.5	8	7	2	57	0.37	0.04
Russian Federation	9.3	12.3	2.4	19.5	9	7	0	100	0.60	0.36
Kazakhstan	8.1	24.2	3.7	29.5	8	8	0	65	0.40	0.27
Kyrgyz Republic	7.7	23.8	1.4	7.8	9	8	0	39	0.23	0.01
Mongolia	#N/A	#N/A	#N/A	#N/A	9	7	54	0	0.64	0.15
Tajikistan	#N/A	#N/A	#N/A	#N/A	11	7	0	48	0.18	0.00
Uzbekistan	1.5	23.5	2.2	16.7	6	7	0	48	0.37	0.05
Albania	8.4	18.3	1.5	13.3	8	6	56	0	0.37	0.01
Bosnia and Herzegovina	7.4	18.0	1.4	10.4	7	6	47	14	0.53	0.00
Kosovo	1.9	15.9	2.1	17.2	11	6	41	0	#N/A	#N/A
North Macedonia	4.6	16.3	1.3	11.7	9	7	42	100	#N/A	#N/A
Montenegro	5.1	17.7	1.3	10.0	12	5	41	0	#N/A	#N/A
Serbia	#N/A	#N/A	#N/A	#N/A	6	7	0	100	0.44	0.04
Turkey	5.0	18.4	1.4	12.8	7	8	80	0	0.48	0.55
Bulgaria	6.6	20.2	1.5	11.3	8	5	78	0	0.68	0.06
Croatia	7.0	23.2	1.6	11.3	5	5	0	6	0.69	0.27
Czech Republic	2.7	19.7	1.2	18.2	7	7	7	81	0.55	0.38
Estonia	0.4	25.4	1.2	8.0	7	7	0	23	0.47	0.08
Hungary	1.5	18.0	2.0	19.5	9	6	0	91	0.45	0.36
Latvia	5.0	21.7	0.5	5.4	9	8	97	48	0.44	0.07
Lithuania	1.0	19.9	1.4	17.3	6	8	54	100	0.41	0.04
Poland	3.8	18.6	0.7	7.8	7	8	0	100	0.59	0.32
Romania	4.1	22.0	1.3	12.2	9	7	19	55	0.50	0.10
Slovak Republic	2.9	18.2	1.0	9.5	7	7	2	85	0.57	0.04
Slovenia	3.4	18.5	1.5	12.0	3	6	100	0	0.63	0.10

**Figure A.5**  
**Breakdown of credit into corporate and household credit, 2019**





## Annex B

**Table B.1**  
Firms' characterisation by typology of financing situation

	Need (1)	Rejected   Need (2)	Discouraged   Need (3)	Credit-Constrained   Need (4)	Credit-Constrained (5)
Female CEO	-1.97 (1.70)	0.38 (1.52)	-1.75 (2.82)	-1.54 (2.71)	-1.70 (1.46)
CEO Experience (Year)	0.03 (0.07)	-0.03 (0.07)	0.10 (0.11)	0.07 (0.10)	0.06 (0.06)
Foreign Ownership	-10.37*** (2.81)	-1.30 (1.90)	8.88* (4.74)	7.71* (4.25)	-0.36 (2.05)
Certificate	3.09 (1.95)	-0.73 (0.87)	-0.97 (2.62)	-1.53 (2.70)	1.83 (1.66)
Website	-0.17 (1.59)	-1.05 (1.06)	-3.09 (2.48)	-4.16* (2.48)	-1.91 (1.41)
Offering Formal Training	1.88 (1.55)	1.96 (1.42)	-4.83* (2.59)	-2.99 (2.51)	-0.18 (1.31)
Foreign Tech. License	0.51 (2.06)	-1.67* (0.98)	-5.36* (3.03)	-7.25** (3.06)	-3.11* (1.69)
Main Market: Local	-2.09 (1.55)	0.60 (1.07)	3.79 (2.42)	4.21* (2.44)	0.24 (1.43)
Exporter	5.18** (2.05)	2.32 (1.60)	-9.58*** (2.91)	-7.22** (3.02)	-2.14 (1.64)
<5 Years	5.38** (2.35)	3.73* (2.02)	-3.27 (3.41)	0.46 (3.40)	4.03* (2.10)
Audited	-0.24 (1.60)	-0.82 (1.64)	-6.01** (2.65)	-6.81*** (2.52)	-3.50** (1.40)
Informal	5.61 (3.42)	-1.30 (2.41)	1.75 (5.95)	0.51 (6.26)	3.79 (3.62)
Medium Firm	4.19** (1.64)	-2.12* (1.09)	-13.47*** (2.48)	-15.53*** (2.50)	-5.13*** (1.31)
Large Firm	7.15*** (2.40)	-2.51** (1.25)	-20.34*** (3.45)	-22.91*** (3.47)	-8.79*** (1.99)
Liquidity Shock	7.18*** (1.49)	1.31 (1.22)	-3.57 (2.21)	-2.20 (2.19)	2.67** (1.32)
Country x Sector FE	Yes	Yes	Yes	Yes	Yes
N	19444	8692	8804	8692	19332

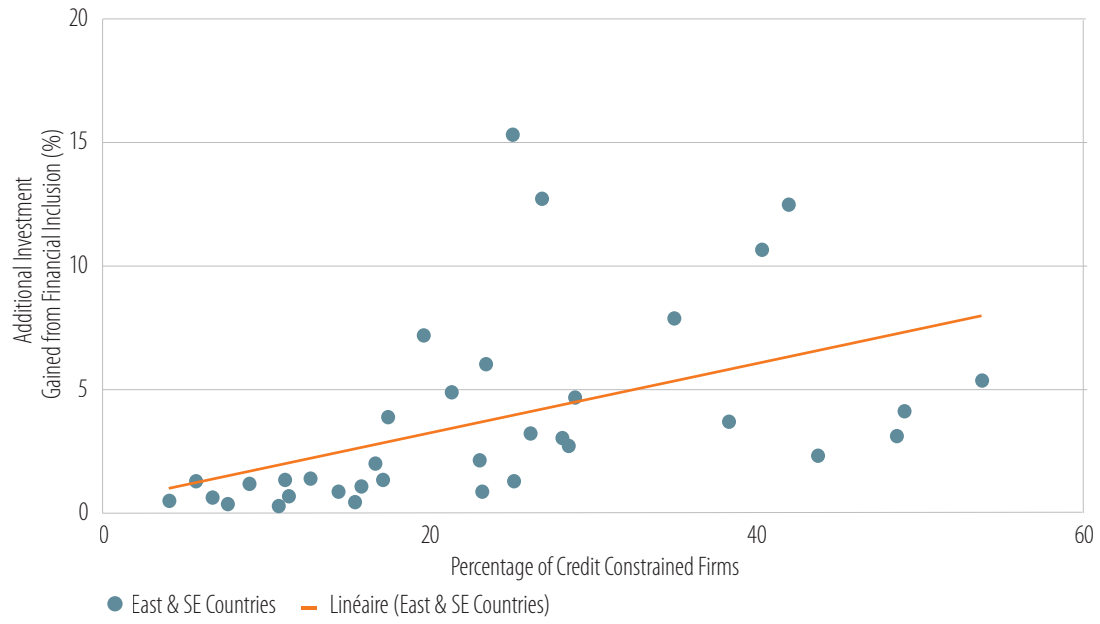
**Table B.2**  
**The impact of COVID-19 on firms' financials and performance**

		Annual Employment Growth	Delayed Payments	Permanently Closed
		(1)	(2)	(3)
Voluntary		-1.58*** (0.56)	-8.15*** (1.92)	0.47 (0.88)
Forced		-2.73*** (0.97)	0.01 (3.35)	0.58 (1.96)
Voluntary = Forced	F	1.359	5.539	0.003
	p	0.244	0.019	0.955
mean (dep. var.)		3.02	25.96	4.40
Country x Sector FE		Yes	Yes	Yes
N		16608	11978	12507
		Used Bank Loans	Used Equity Finance	Used No Ext. Source
		(4)	(5)	(6)
Voluntary		-7.84*** (1.85)	5.21** (2.31)	8.20*** (2.24)
Forced		-9.20*** (3.41)	3.79 (3.89)	4.61 (3.35)
Voluntary = Forced	F	0.160	0.125	0.922
	p	0.689	0.724	0.337
mean (dep. var.)		18.56	32.73	25.69
Country x Sector FE		Yes	Yes	Yes
N		6945	6945	6945

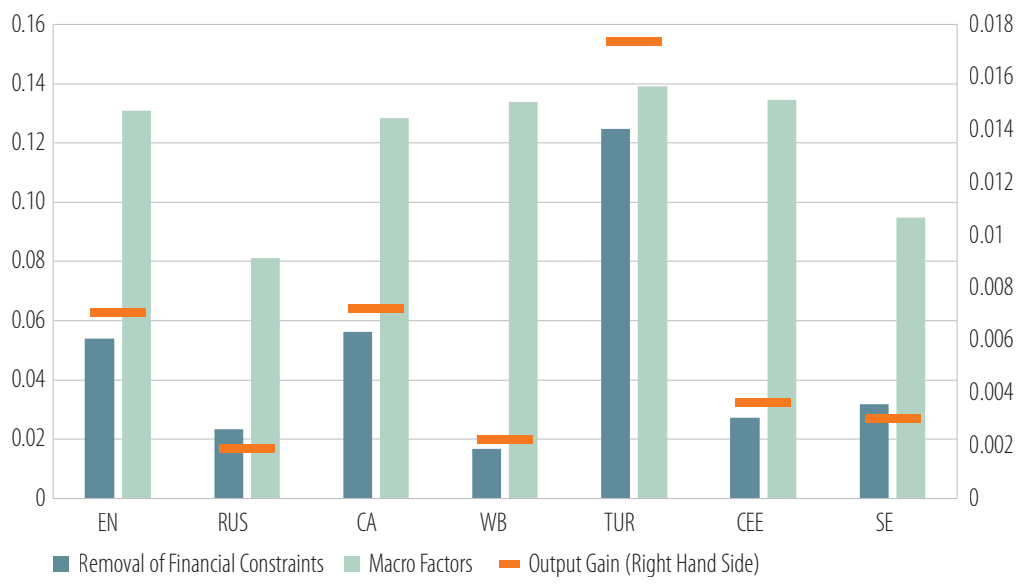
*Note:* Standard errors in parentheses \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Annex C**

**Figure C.1**  
**Additional investment under counterfactual scenario (percentage) – an indication of the potential effects of removal of credit constraints on economic growth**



**Figure C.2**  
**Contributions to output gains – an indication of the potential effects of removal of credit constraints on economic growth**



Source: Authors' calculations

## Annex D: Methodological description of the key stages for determining a credit gap

The starting point is to match discouraged firms with those that have obtained loans, and to predict the desired loan volume, conditional on firm characteristics. To do so, a rejection rate should be imputed for firms discouraged from applying for loans. This is obtained via a staged approach.

First, a “scoring” model for those firms that applied for loans and were actually rejected is estimated. A Logit-LASSO is employed to select the relevant explanatory variables and to predict rejections in sample. A 5-fold Cross Validation (CV) method has been applied to select the penalty term  $\lambda$ . Shao (1997) shows that k-fold CV is asymptotically equivalent to BIC. Specifically, the selection method determines 18 regressors out of the many entering the algorithm to be the statistically relevant. Moreover, country and sector fixed effects have been added to the “scoring” model.

$$\hat{\beta}_{LASSO}(\lambda) = \arg \min \left\{ -\ell_{LOGIT}(\beta_0, \beta) + \lambda \|\beta\|_1 \right\}$$

Second, the estimated model is employed out-of-sample to predict the probabilities of rejection for the discouraged firms. This makes it possible to obtain net discouraged shares of firms in each country and region. By doing so, the method screens out firms that would have been rejected had they applied for loans. It adjusts for observable firm specific differences in the pool of non-applicants vis-à-vis the pool of applicants, controlling for country and sectoral unobservable elements.

Third, a mechanism to allocate credit to firms is employed. To do so, credit allocation is based on the risk-aversion  $\mu$  in the banking sector. Following Betz et al (2014), a loss function that incorporates banks’ risk-aversion is used to select a threshold probability to screen out firms:

$$L(\mu) = \mu \frac{FN}{TP + FN} \mathbb{P}(Rejected) + (1 - \mu) \frac{FP}{FP + TN} \mathbb{P}(Not Rejected) \quad \forall \mu \in [0, 1]$$

where FP (FN) stands for false positive (false negative) and represents the share of firms (not rejected) rejected, but that should have been not rejected (rejected) by the credit allocation algorithm; TP (TN) stands for real positive (negative) and represents the share of firms that are classified correctly as (not rejected) rejected.

		Actual	
		Rejected	Not Rejected
Prediction	Rejected	True Positive ( <i>TP</i> )	False Positive ( <i>FP</i> )
	Not Rejected	False Negative ( <i>FN</i> )	True Negative ( <i>TN</i> )

For each  $\mu$ , there is a threshold probability minimising this loss function. A bank can be thought of as being concerned about two types of errors:

- High  $\mu$ : rejecting good quality applicants (high TP or FP and low FN or TN)
- Low  $\mu$ : not rejecting bad quality applicants (low TP or FP and high FN or TN)

The parameters are computed on the observable distribution of the accepted/rejected firms. Ultimately, firms with an associated higher probability of rejection than the implied threshold probability are rejected.

Specifically,  $\mu$  is selected to take two alternative values. The value (0.75) where the threshold probability  $P(\text{rejected})$  determines a level of rejection close to the actual rejection rates across firms applying for loans. A value (0.85) that reflects the doubling of the actual rejection rates across firms applying for loans, to ensure that results reflecting higher risk aversion are internalised. Finally, the model determined via the Lasso selection is employed to predict rejections out of sample and the risk-aversion implied threshold picked before to allocate credit to discouraged firms is applied.

Risk Aversion $\mu$	Threshold $P(\text{Rejected})$	TN	FN	FP	TP	mean( <i>Rejected</i> )	mean( $\widehat{\text{Rejected}}$ )	
							in-sample	out-of-sample
0.75	25 %	3584	162	195	149	7.6 %	8.4 %	29.0 %
0.85	16 %	3364	104	415	207		15.2 %	42.6 %

Fourth, the desired loan volume can be aggregated across firms, and expressed as a percentage of the existing loan volume from successful loan applications. Ultimately, this is linked to the existing outstanding credit to enterprises in the economy to determine the actual level of credit gaps as a percentage of GDP.

$$\text{credit gap (underserved credit)} = \frac{(\text{latent demand} - \text{estimated rejections})}{(\text{Expressed demand} - \text{observable rejections})} \times (\text{NFCs credit})$$

## GLOSSARY AND ACRONYMS

Bankruptcy	A legal process for liquidating a firm's assets to pay off its debts. Chapter 1 uses the term bankruptcy and insolvency interchangeably, where insolvency is a financial state where the firm cannot meet its debt payments on time.
BIS	Bank for International Settlements
Business environment	The various domains that affect the day-to-day experiences of firms. Examples include accessing finance, meeting regulatory requirements, infrastructure, corruption, etc.
Business obstacles	Firms are asked to rate an individual business environment obstacle on a 5 point scale. If the firm chooses a 4 or a 5, then that obstacle is a "major obstacle" for the firm.
CA	Central Asia
Capital structure	The mix of debt, equity, and other financing instruments used by a firm to finance its operations.
Carbon emissions	Emissions stemming from the burning of fossil fuels and the manufacture of cement; they include carbon dioxide produced during consumption of solid, liquid, and gas fuels as well as gas flaring.
Carbon intensity	Carbon emissions per unit of energy
CEE	Central and Eastern Europe
Central and Eastern Europe (CEE)	This region includes the following countries: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.
Central Asia (CA)	This region includes the following countries: Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan and Uzbekistan.
Climate change	Long-term shifts in temperatures and weather patterns. These shifts may be natural, but since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels (like coal, oil and gas), which produces heat-trapping gases.
Combustible fuels	Coal, oil and gas
Competitiveness	At the firm level, competitiveness can be thought of as the ability to sustain market position by supplying quality products on time—at competitive prices—and the ability to adapt quickly to changes in the external environment. It requires continuous increases in productivity, by shifting from comparative advantages, such as low cost labour, to competitive advantages—competing on efficiency and quality, delivery, and flexibility.
COP	Conference of the Parties
Corporate distress	Situation under which a firm may face serious difficulties to maintain its operations endangering its survival.
Corporate ESG Responsibility composite indicator	An indicator based on ESG-related questions in the Enterprise Surveys, inspired by the Sustainability Accounting Standards Board (SASB) standards.
Corporate policy support	Aid schemes granted by national authorities to firms to mitigate economic shocks and save businesses.
Corporate responsibility	The ethics which drive an organisation's activities and how it operates so that it's viable over the long term. These two factors are intrinsically linked because a business that damages the systems on which it depends will ultimately be unsustainable. In 'doing the right thing' by their stakeholders and sharing the same values, organisations will themselves see benefits from brand enhancement and reputation to building employee engagement. It therefore makes good business sense to operate sustainably.
COV-ES	COVID-19 Follow-up Enterprise Surveys
COVID-19 Follow-up Enterprise Surveys	The report also uses the first round of the COVID-19 Follow-up Enterprise Surveys (covering more than 16 000 firms), carried out by the World Bank to illustrate how firms have reacted and adapted during the crisis.

Credit gaps	A credit gap refers to the difference between the desirable level of credit and the actual level.
Credit-constrained firms	Credit-constrained firms are firms that need loans but were either discouraged from applying or rejected - see Box 1 in Chapter 4 for a comprehensive explanation.
Decarbonisation	Process of reducing carbon dioxide (CO <sub>2</sub> ) emissions resulting from human activity in the atmosphere, with the eventual goal of eliminating them. It is achieved by switching to usage of low carbon energy sources.
Digitalisation	Digitalisation is the use of digital technologies to change a business model; it is the process of moving to a digital business. In particular, firms can be considered digital if they have their own website, are able to sell their products online, or they can implement remote working conditions.
Discouraged firms	Discouraged firms need loans but have refrained from applying because of what they perceive as complex application procedures, unfavourable interest rates, high collateral requirements, insufficient loan amounts, fear of being rejected or other unspecified reasons.
Eastern Neighbourhood (EN)	This region includes the following countries: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine.
EBRD	European Bank for Reconstruction and Development
ECA	Eastern Europe and Central Asia
EIB	European Investment Bank
EIF	European Investment Fund
Emissions-intensive sectors	Sectors with above-median average carbon emissions per unit of value added: paper and paper products, printing and publishing, coke and petroleum, chemical products, rubber and plastic products, non-metallic mineral products, basic metals, land transport, water transport and air transport.
EN	Eastern Neighbourhood
Energy efficiency	Proxied by the reverse of energy intensity. Energy efficiency improves when a given level of service is provided with reduced amounts of energy inputs or services are enhanced for a given amount of energy input.
Energy intensity	Quantity of energy required per unit output or activity, so that using less energy to produce a product reduces the intensity. At the level of an economy, energy intensity is measured as units of energy per unit of GDP. At the firm level, energy intensity is calculated as units of energy per unit of sales.
Enterprise Survey (ES)	The Enterprise Survey provides a rich source of information about firms and their business environment. The questionnaire includes firm characteristics, annual sales, costs of labour and other inputs, performance measures, access to finance, workforce composition and participation in the labour market. There is also a special module on the green economy. The Enterprise Survey provides a representative sample of the non-agricultural, formal private sector for firms with at least five employees and operating in the manufacturing or services sectors.
ES	Enterprise Survey
ESG	Environmental, social and governance
ESG practices	A set of environmental, social and governance standards for a company's operations. Environmental criteria consider how a company performs as a steward of nature. Social criteria examine how it manages relationships with employees, suppliers, customers, and the communities where it operates. Governance deals with a company's leadership, executive pay, audits, internal controls, and shareholder rights. In Chapter 3, environmental criteria include environmental awareness, green management and green measures; social criteria include gender, education and skills and training; and governance criteria include corporate governance, general management practices, internal controls and audit, business ethics, compensation and innovation.
EU	European Union

Exporters	Firms that export at least 10% of their sales.
Extreme weather events	The most commonly considered examples of extreme weather events include heat waves, cold snaps, heavy rainfall or snowfall, ice or hail storms, droughts, hurricanes, storm surges, and tornadoes.
Financial autarky	Firms in financial autarky are those that have no liability relationship with the banking sector - see Box 1 in Chapter 4 for a comprehensive explanation.
Financial deepening	Increase in the supply of financial services in the economy
Financial lifelines	Liquidity provided to a firm that faces a sudden shortage or unavailability of liquidity to continue its operations.
Firm adaptation	Adaptation strategy concerns specific ways in which the firm makes adjustments, as it seeks to survive and capitalise on external circumstances. Such adjustments can be made in a variety of product, market and resource management areas.
Firm resilience	A firm's capacity to absorb stress, recover critical functionality, and thrive in altered circumstances.
Foreign direct investment (FDI)	Investments made by a foreigner (either individuals or business entities) in a domestic firm (in the form of equity capital, reinvested earnings and intra-company loans), acquiring more than 10% ownership and implying a significant degree of influence on the management of the firm.
Foreign-owned firms	Firms with at least 25% foreign ownership.
Fossil fuel subsidies	A fossil fuel subsidy is any government action that lowers the cost of fossil fuel energy production, raises the price received by energy producers, or lowers the price paid by energy consumers. The most obvious subsidies are direct funding and tax giveaways, but there are many activities that count as subsidies – loans and guarantees at favourable rates, price controls, governments providing resources like land and water to fossil fuel companies at below-market rates, research and development funding, and more.
GDP	Gross domestic product
Global value chains (GVCs)	Global value chains refer to international production sharing, a phenomenon where production is broken into activities and tasks carried out in different countries. Firms belonging to GVCs are both importing and exporting. Global value chains can be measured through the backward participation rate, which is the share of exported value added that is imported for further processing from another country and by the forward participation rate, that is the share of exported value added that will be used for further processing by another importing country.
Global warming	A gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants.
Green economy	A green economy is defined as low carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income are driven by public and private investment in such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services.
Green investment	Investment that increases energy or resource efficiency or reduces carbon emissions and pollution. Measures that result in an increase in the firm's energy efficiency and/or a reduction in pollution or other negative environmental impacts, even if this is achieved as a by-product of achieving other objectives.
Green management	Refers to the way firms address environmental issues and monitor energy usage and pollution. Green management practices assess whether firms have clear, measurable and realistic environmental objectives and whether their managers have the right incentives and expertise to achieve those targets.
GVCs	Global value chains
ICT	Information and communications technology



IEA	International Energy Agency
IMF	International Monetary Fund
Importers	Firms that import at least 10% of their sales.
Informal sector	This term refers to firms operating informally, which means unregistered firms.
Innovation	Introduction of new or improved products, services or processes, or investing in Research and Development.
Internal funds	These are sources of financing internally generated by a firm and not coming from any external - to the firm - source such as a bank.
IPCC	Intergovernmental Panel on Climate Change
ISIC	International Standard Industrial Classification (UN)
Large firm	A firm with at least 100 full-time employees
Liability dollarisation/ euroisation	Denomination of the liability side of an enterprise or a bank in a currency - US dollar or euro - other than that of the country in which they are held.
LMI	Lower-middle-income countries
Lower-middle-income (LMI) countries	This country group is defined following the latest available World Bank income classification and applying it to the set of economies covered by ES - see for details <a href="https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html">https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html</a>
Management practices	Refer to practices used to address problems arising in operations or production process, to monitor the performance indicators, to implement production targets (such as volume, quality, efficiency, waste or on-time delivery) and to incentives staff and managers' performance.
Medium-sized firm	A firm with 20-99 full-time employees
Middle East and North Africa (MENA)	This region in this publication includes the following countries: Egypt, Jordan, Morocco, Lebanon, Palestine and Israel.
OECD	Organisation for Economic Co-operation and Development
Old firm	A firm that is 5 years old or older.
Productivity	The effectiveness of productive effort, as measured in terms of the rate of output per unit of input. It is defined as value added per employment.
R&D	Research and development
Renewables	Types of energy from renewable resources that are naturally replenished on a human timescale. They include sources such as sunlight, wind, rain, tides, waves, and geothermal heat.
RUS	Russia
SASB	Sustainability Accounting Standards Board
SE	Southern Europe
Small firm	A firm with fewer than 20 full-time employees
SMEs	Small and medium enterprises, defined in the Enterprise Survey as firms with fewer than 100 full-time employees.
Southern Europe (SE)	This region includes the following countries: Cyprus, Greece, Italy, Malta and Portugal.
TFP	Total factor productivity
Trade barriers	Barriers or obstacles that make difficult and/or can reduce or restrict international trading activity and volumes either through non-tariff or tariff measures, and also other characteristics such as distance between countries, whether they share their official language and whether they have a common border.
Trade integration	The share of international trade, both export and import, as a proportion of the country's GDP.
TUR	Turkey
UMI	Upper-middle-income countries

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UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
Upper-middle-income (UMI) countries	This country group is defined following the latest available World Bank income classification and applying it to the set of economies covered by the Enterprise Survey – see for details <a href="https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html">https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html</a>
WB	Western Balkans
WBG	World Bank Group
Western Balkans (WB)	This region includes the following countries: Albania, Kosovo, Montenegro, the Republic of North Macedonia and Serbia.
Young firm	A firm that is younger than 5 years old

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# BUSINESS RESILIENCE IN THE PANDEMIC AND BEYOND

Adaptation, innovation, financing  
and climate action from  
Eastern Europe to Central Asia

