

EUROPE AND CENTRAL ASIA STUDIES

# CRITICAL CONNECTIONS

Promoting Economic Growth  
and Resilience in Europe  
and Central Asia

OVERVIEW



# **Critical Connections**

***Promoting Economic  
Growth and Resilience in  
Europe and Central Asia***

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## About the Authors

**David M. Gould (World Bank)** is currently Lead Economist in the World Bank's Europe and Central Asia Region and the lead author of the ECA *Critical Connections* flagship. He is the author of several books and peer-reviewed journal articles on international trade and finance, migration, and economic policy. Currently, he is leading Europe and Central Asia regional studies on the development impact of disruptive technologies. During his 15 years at the World Bank, he has led teams to deliver country development strategies and analytical and lending operations in Europe, Latin America, and South Asia. Prior to joining the World Bank, he served as the Director of Global Economic Analysis at the Institute of International Finance and as Senior Economist and Policy Advisor at the US Federal Reserve. He has held visiting research positions at the Central Banks of Mexico and Chile. He holds a PhD in International Economics (with honors) from the University of California at Los Angeles and is a Chartered Financial Analyst charter holder.

**Megersa Abate (World Bank)** is a Transport Economist in the World Bank's Transport and Digital Development Global Practice. He has extensive expertise and interest in various topics, including freight demand modeling, air transport regulation, and transport connectivity. His research has been published in leading transportation economics journals. Before joining the Bank in 2016, he worked as a researcher at VTI, the Swedish National Road and Transport Research Institute, and at the VU University of Amsterdam. Earlier in his career, he worked at the Ethiopian Civil Aviation Authority as an air transport expert. He received his PhD in Transport Economics from the Technical University of Denmark in 2013; during his PhD studies, he was also a visiting student in the Institute of Transport Studies at the University of Leeds.

**Erhan Artuc (World Bank)** is a Senior Economist in the World Bank's Development Research Group. Prior to joining the World Bank in 2011, he was a faculty member at Koç University in Istanbul, Turkey. His most recent research focuses on international trade and migration policies and their effects on labor markets and development. His work has been published in leading academic and policy journals such as the *Journal of International Economics*, *Economic Journal*, and *American Economic Review*. He received his undergraduate degree from Bilkent University and a PhD in Economics from the University of Virginia.

**Omar Bamieh (University of Vienna)** is an Assistant Professor of Economics at the University of Vienna. His research focuses on labor market institutions and the

interaction between legal frameworks and labor markets. He holds an MS in Economics and Social Sciences from Bocconi University in Milan and a PhD in Economics from the European University Institute in Florence, where he also worked as a Research Fellow in Global Economics at the Robert Schuman Centre for Advanced Studies.

**Cecilia Briceno-Garmendia (World Bank)** is a Lead Economist in the World Bank's Transport and ICT Global Practice, where she leads the economic research agenda in logistics and transport in the Latin America region and globally advises teams and governments in strategic issues pertaining to prioritization and planning of infrastructure investments, including aspects related to spending efficiency, green trucking and trucking sector performance, multimodal development corridors, and adaptation of transport networks to climate change. Previously, she led the economic team in the Office of the Director for Sustainable Development of the Latin America region, where she provided leadership for the analytical agenda on infrastructure, urban, and disaster risk management and climate change adaptation issues. She has worked extensively on issues pertaining to connectivity, logistics, and port performance and co-led the pathbreaking Africa Infrastructure Country Diagnostic. She has worked on projects and research in more than 70 countries. Before joining the World Bank, she worked in software engineering and the design of information and organizational systems for both private and public sector enterprises in República Bolivariana de Venezuela. She has an MBA from the Instituto de Estudios Superiores en Administración in Caracas, República Bolivariana de Venezuela, and a doctorate in Economics from Georgetown University.

**Matteo Fiorini (European University Institute)** is a Research Fellow in Global Economics at the Robert Schuman Centre for Advanced Studies of the European University Institute in Florence, Italy. His research focuses on international trade, trade policy, migration, and development. Prior to joining the Schuman Centre, he worked as a researcher at the Institute's Migration Policy Centre, the World Trade Organization, and Bocconi University. He holds an MS in Economics and Social Sciences from Bocconi University in Milan and a PhD in Economics from the European University Institute in Florence.

**Bernard Hoekman (European University Institute)** is a Professor at the Robert Schuman Centre for Advanced Studies of the European University Institute. He is also a Research Fellow at the Centre for Economic Policy Research, a member of the World Economic Forum Council on Trade and Investment, and a Senior Fellow at the Centre for International Governance Innovation. His research focuses on trade and development, economic integration, and the multilateral trading system.

**Dror Y. Kenett (World Bank)** is a multidisciplinary financial economist and an expert on financial networks, financial stability, and systemic risk. He is a consultant to the World Bank, Adjunct Professor at Johns Hopkins University, a research associate at the London School of Economics Systemic Risk Centre, and a visiting researcher at Boston University and at the Israel Securities Authority. He has also

held a researcher position in the US Department of the Treasury's Office of Financial Research. He applies his scientific background to financial stability questions, focusing on network-based models, market structure, financial contagion and spillovers, and correlation-based models. He has extensive policy experience and has contributed to the Office of Financial Research *Financial Stability Report* and participated in the development of the Office's monitoring tools. He has published more than 40 papers in financial, physics, and engineering journals, including the *Journal of Banking and Finance*, *Journal of Risk and Financial Management*, *Quantitative Finance*, *Nature Physics*, and *Scientific Reports*. He has a PhD in Physics from Tel Aviv University in Israel.

**Mathilde Lebrand (World Bank)** is an Economist in the World Bank's Transport Global Practice. Currently she is working on the Belt and Road Initiative, economic corridor development, and connectivity. Previously she worked for the Europe and Central Asia Chief Economist office and contributed to several upcoming regional studies. Her research focuses on economic geography, international trade and global value chains, networks, and political economy. She has taught at the University of Montreal and has worked at the World Trade Organization in Geneva. She is a Research Fellow at the Center for Economic Studies ifo Institute (CESifo). She holds a PhD in economics from the European University Institute.

**Paloma López-García (European Central Bank)** has been a Senior Economist in the Directorate-General—Economics at the European Central Bank since 2015. Before that she was Coordinator of the Competitiveness Research Network (CompNet) in the Directorate-General—Research, and she has also worked at the Instituto de Empresa Business School and in the Research and Economics Department of the Central Bank of Spain. She has published articles in the *European Economic Review*, *Small Business Economics*, and *Economics of Innovation and New Technology*, among other peer-reviewed journals. Her research topics are microanalysis of productivity and employment growth, innovation, and trade and competitiveness. She earned her PhD at the London School of Economics in 2003.

**Çağlar Özden (World Bank)** is a Lead Economist in the World Bank's Research Department. His research explores the nexus of globalization of product and labor markets, government policies, and economic development. His current research projects explore the determinants and patterns of global labor mobility; impacts of migrants on destination labor market outcomes; linkages between migration, trade, and foreign direct investment flows; medical brain drain; and linkages between aging and global economic integration. He has edited three books and published numerous papers in leading academic journals such as the *American Economic Review* and the *Economic Journal*. He is a Fellow of the Institute of Labor Economics (IZA) and of the Centre for Research and Analysis of Migration (CreAM) and serves on the advisory board of the Economic Research Forum. He received his undergraduate degrees in Economics and Industrial Engineering from Cornell University and his PhD in Economics from Stanford University.

**Georgi Panterov (World Bank)** is a Research Analyst in the World Bank's Office of the Chief Economist for Europe and Central Asia. His research interests are focused on machine learning, econometrics, blockchain, and cryptocurrencies. During his time at the World Bank, he has contributed to the *Golden Aging* flagship report, the *Critical Connections* flagship report, and the Europe and Central Asia economic update reports. Before joining the World Bank, he worked at Google, the US Department of Agriculture, and American University. He is currently a PhD candidate in Economics at American University in Washington, DC.

**Nadia Rocha (World Bank)** is a Senior Economist in the World Bank's Macroeconomics, Trade and Investment Global Practice. Prior to joining the Bank in 2016, she worked for five years in the World Trade Organization's Economic Research and Statistics Division. She was seconded to the Colombian Ministry of Trade to serve as a Senior Advisor on Trade during 2015. Her current work focuses on regionalism, trade costs, global value chains, and trade and gender. She holds a BA in economics from Bocconi University in Milan, an MA in Economics from Pompeu Fabra University of Barcelona, and a PhD in International Economics from the Graduate Institute, Geneva.

**Daria Taglioni (World Bank)** is the Principal Economist for the Europe and Central Asia and East Asia and Pacific Regions in the Economics and Private Sector Development Vice Presidency of the World Bank Group's International Finance Corporation. Prior to joining the World Bank Group, Daria worked at the European Central Bank and at the Organisation for Economic Co-operation and Development. Her research focuses on trade and competitiveness. She has published articles in the *American Economic Review* and *Journal of International Economics*, among other peer-reviewed journals. She holds a PhD in International Economics from the Graduate Institute of Geneva.

**Shawn Tan (World Bank)** is an Economist in the World Bank's Finance, Competitiveness and Innovation Global Practice and is currently working on private sector development and trade issues in the countries of Eastern Europe and the Western Balkans. He has worked on reports such as the *World Development Report 2016: Digital Dividends*, *Reaping Digital Dividends: Leveraging the Internet for Development in Europe and Central Asia*, and the high-growth entrepreneurship report and has written papers on international trade, firm productivity, and high-growth firms. Before joining the World Bank, he worked at the Singapore Economic Development Board, where he was a negotiator for Singapore's free trade agreements and bilateral investment treaties and worked on trade facilitation issues for multinational companies in Singapore. His research interests are broadly in international trade, economic geography, and firm productivity and performance. He holds a PhD in Economics from the University of Melbourne.

**Gonzalo Varela (World Bank)** is a Senior Economist in the Global Trade and Regional Integration Unit of the World Bank's Macroeconomics, Trade and Investment Global Practice. Prior to joining the World Bank, he was a Lecturer at the University of Sussex and at Uruguay's Ministry of Industry, Energy, and Mining.

His work agenda focuses on global integration and economic performance and on the analysis of trade policy and competitiveness. He holds a BSc in Economics from the Universidad de la República in Uruguay and both an MA in International Economics and a PhD in Economics from the University of Sussex.

**Hernan Winkler (World Bank)** is a Senior Economist in the World Bank's Jobs Group. He specializes in applied microeconomics, with a particular focus on issues related to labor markets, technological change, and the sources and consequences of poverty and inequality. His research has been published in peer-reviewed economics journals, including the *Review of Economics and Statistics* and the *Journal of Development Economics*. He was a lead author of the World Bank regional report *Reaping Digital Dividends: Leveraging the Internet for Development in Europe and Central Asia*. He has been part of the core teams of several regional reports, including *Diversified Development*, *Golden Aging*, and *Risk and Returns*. He was previously a researcher at the Center for Distributive, Labor and Social Studies (CEDLAS) at the National University of La Plata in Argentina, where he conducted research on poverty and distributional issues affecting countries in Latin America and the Caribbean. He holds a master's degree in Economics from the National University of La Plata and a PhD in Economics from the University of California at Los Angeles.

**Thea Yde-Jensen (World Bank)** is a Researcher in the World Bank Group's Poverty and Equity Global Practice, where she conducts research on issues related to livelihoods, labor market outcomes, and displacement. Her expertise and research interests particularly focus on examining the interlinkages of labor markets and inequality and poverty. Previously she worked as a Researcher in the Bank's Office of the Chief Economist for Europe and Central Asia, focusing on issues related to employment and firms' access to finance and international networks. Prior to joining the World Bank, she worked in the International Monetary Fund's Statistics Department and in the Department of Economics at Copenhagen Business School. She has a BS and an MS in Economics from the University of Copenhagen.



## Foreword

In mid-2014 when *Critical Connections* was first contemplated, the Europe and Central Asia (ECA) region was still emerging from the global financial crisis, growth was uncertain and tepid, and policy makers were largely focused on mitigating further financial and macroeconomic risks from ongoing weakness in the banking sector and large fiscal deficits. Appropriately, the policy discourse was largely targeted to shoring up near-term challenges, rather than on assembling the building blocks that would provide the foundation for restoring the promise of long-term resilient growth.

*Critical Connections* was born out of the desire to help policy makers focus their attention on their long-term goals of regional and global integration to capture the benefits of connectivity, from which ECA countries had advanced so far during the early years of market expansion in the 1990s and early 2000s.

What started simply as an exploration into policies to capture the gains of specialization and knowledge transfers has taken on much greater meaning in recent times. The trend toward regional and global integration is under serious threat as many voters, particularly in high-income countries, see nationalism and protection as a remedy to greater economic uncertainty. But as former UK Prime Minister Gordon Brown noted in a 2015 speech, “the problems that give rise to nationalism can’t be solved by nationalism and in an interdependent world the problems that give rise to isolationism and protectionism cannot be solved by isolationism and protectionism.”

While *Critical Connections* does not provide answers to assuage all the concerns about our changing global economy, it does provide an invaluable insight into understanding—at the firm and country level—the interdependence of our world and how it has historically operated, and currently operates, to advance economic growth and shared prosperity.

A key insight of this report is that ECA’s international connectivity through trade, foreign direct investment, migration, telecommunications, transportation, and other avenues facilitates the transfers of knowledge and technology that are critical to long-term growth and shared prosperity. These connections complement one another because of the tacit (learning by doing), rather than explicit (contained in books or blueprints), nature of knowledge transfers. Migration, for example, enhances knowledge spillovers through trade and foreign investment by migrants transferring information on foreign markets and supporting connections to them. Similarly, the internet and efficient transport links are both necessary for successful e-commerce.

Moreover, the depth of ECA's connections and the geographic composition of the connections both matter. Knowledge transfers are greater from countries that themselves have strong links to third countries. These transfers also emerge from linkages between firms in global value chains as well as foreign ownership and management practices that generate local spillovers.

While these connections are important for prosperity, however, one should not be naive about their impact. Despite its overall benefits, increased connectivity exposes ECA countries to shocks, particularly those emanating from countries at the center of international economic transactions, which may have contributed to economic insecurity. However, by providing alternative sources of external demand and financing, a broad range of connections can reduce those risks and help countries cope with both domestic and external shocks.

The European side of the ECA region is an ideal laboratory for observing the role of multidimensional connectivity in action. Regional supply chains are strong, and links between countries across the various forms of connectivity allow observations on how connectivity opens doors for the knowledge transfers that support resilient growth. Nonetheless, in many European countries, progress on deepening connectivity has stalled since the global financial crisis, and productivity growth attributed to connectivity has suffered.

In Central Asia, despite recent moves toward building greater interconnectedness, the region remains among the least connected globally. Because of both its geographical position and its limited infrastructure, many Central Asian countries are only weakly connected to other ECA countries and the global economy. The vast distances between Central Asia, Europe, and East Asia will remain an obstacle to connectivity. However, infrastructure investments and policies to improve integration through freer trade, infrastructure, and investment policies are likely to provide large growth benefits in Central Asia.

Many ECA countries can be proud of what they have achieved in building greater connectivity and advancing development during the past 25 years. But because the economic benefits of connectivity through knowledge and technology transfers are not obvious, while the challenge of economic uncertainty is, building the case for deepening connections requires solid and clear evidence. By recognizing the challenges as well as making explicit the potential opportunities of greater connectivity through various channels, *Critical Connections* can assist ECA's policy makers in building the foundations for deepening important connections in the coming decades.

Cyril Muller  
Vice President  
Europe and Central Asia Region  
World Bank Group

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Many people participated in the writing of the report. The main authors and contributors were

- **Overview:** David Michael Gould
- **Chapter 1:** David Michael Gould, Dror Kenett, and Georgi Panterov (with contributions from Angel Bogoev [American University], Michael Danziger [Center for Complex Network Research and Department of Physics, Northeastern University], Dobrina Gogova, Xin Yuan [Boston University], and Tlek Zeinullayev [Harvard University])
- **Chapter 2:** Paloma López-García (European Central Bank) and Daria Taglioni (with contributions from Francesco Chiacchio [European Central Bank], Alvaro Espitia, Katerina Gradeva [European Central Bank], Laura Gomez-Mera, Asier Mariscal [Carlos III University of Madrid], Nadia Rocha, and Gonzalo Varela)
- **Chapter 3:** Shawn Tan, Hernan Winkler, and Thea Yde-Jensen
- **Chapter 4:** Erhan Artuc and Çağlar Özden (with contributions from Gnanaraj Chellaraj, Julio Elias, David Michael Gould, Bingjie Hu, Zovanga Kone, Tu Chi Nguyen, and Michael Packard)
- **Chapter 5:** Cecilia Briceno-Garmendia, Mathilde Lebrand, and Megersa Abate (with contributions from Rodrigo Archondo, Gözde Isik, and Tetyana Kuchma)
- **Chapter 6:** Mathilde Lebrand
- **Chapter 7:** Omar Bamieh (University of Vienna), Matteo Fiorini (European University Institute), and Bernard Hoekman (European University Institute)
- **Spotlights 1 and 2:** Gonzalo Varela and Nadia Rocha
- **Spotlight 3:** Hernan Winkler
- **Content and Technical Editing:** William Shaw
- **Overview Editing:** Richard Alm

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# Abbreviations

AMI	average management index
BIT	bilateral investment treaty
BRI	Belt and Road Initiative
BvD	Bureau van Dijk
CIS	Commonwealth of Independent States
CMEA	Council for Mutual Economic Assistance
DCFTA	Deep and Comprehensive Free Trade Agreements
EBRD	European Bank for Reconstruction and Development
ECA	Europe and Central Asia
EEA	European Economic Association
EEC	European Economic Community
EU	European Union twenty-eight member countries
EU13	The thirteen EU members that have joined the union since 2004 (Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, the Slovak Republic, and Slovenia).
EU15	The fifteen original EU members (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom).
FDI	foreign direct investment
FDIRRI	FDI Regulatory Restrictiveness Indicators
GATS	General Agreement on Trade in Services
GDP	gross domestic product
GVC	global value chain
HIC	high-income country
ICT	information and communication technologies
LMIC	lower-middle-income country
MBI	Mobility Barriers Index
MDC	multidimensional connectivity
MFN	most favored nation
MIPEX	Migrant Integration Policy Index
MNE	multinational enterprise
NACE	European Classification of Economic Activities
NAFTA	North American Free Trade Agreement
NTM	nontariff measures

NUTS-3	nomenclature of territorial units for statistics (Nomenclature des Unités territoriales statistiques), level 3
OECD	Organisation for Economic Co-operation and Development
OLS	ordinary least squares
PMR	product market regulation
PPML	Poisson pseudo–maximum likelihood
PTA	preferential trade agreement
RTA	revealed technology advantage
SPS	sanitary and phytosanitary
TBT	Technical Barriers to Trade
TFP	total factor productivity
TiVA	Trade in Value Added
TRIMS	Trade Related Investment Measures
UMIC	upper-middle-income country
WDI	World Development Indicators
WEF	World Economic Forum
WITS	World Integrated Trade Solution
WMS	World Management Survey
WTO	World Trade Organization

## Countries and Economies

International Organization for Standardization three-letter country codes; italics designate countries in the Europe and Central Asia region

AFG	Afghanistan
ALB	<i>Albania</i>
ARE	United Arab Emirates
ARG	Argentina
ARM	<i>Armenia</i>
ATG	Antigua and Barbuda
AUS	Australia
AUT	<i>Austria</i>
AZE	<i>Azerbaijan</i>
BEL	<i>Belgium</i>
BEN	Benin
BFA	Burkina Faso
BGD	Bangladesh
BGR	<i>Bulgaria</i>
BHS	Bahamas, The
BIH	<i>Bosnia and Herzegovina</i>
BLR	<i>Belarus</i>
BLZ	Belize
BRA	Brazil
BRB	Barbados
BWA	Botswana
CAN	Canada

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CHE	Switzerland
CHL	Chile
CHN	China
COL	Colombia
CMR	Cameroon
CRI	Costa Rica
CYP	<i>Cyprus</i>
CZE	<i>Czech Republic</i>
DEU	<i>Germany</i>
DNK	<i>Denmark</i>
DOM	Dominican Republic
DZA	Algeria
ECU	Ecuador
EGY	Egypt, Arab Rep.
ESP	<i>Spain</i>
EST	<i>Estonia</i>
ETH	Ethiopia
FIN	<i>Finland</i>
FRA	<i>France</i>
GAB	Gabon
GBR	<i>United Kingdom</i>
GEO	<i>Georgia</i>
GHA	Ghana
GRC	<i>Greece</i>
GUY	Guyana
HKG	Hong Kong SAR, China
HRV	<i>Croatia</i>
HUN	<i>Hungary</i>
IDN	Indonesia
IND	India
IRL	<i>Ireland</i>
ISL	Iceland
ISR	Israel
ITA	<i>Italy</i>
JAM	Jamaica
JOR	Jordan
JPN	Japan
KAZ	<i>Kazakhstan</i>
KEN	Kenya
KGZ	Kyrgyz Republic
KWT	Kuwait
LBN	Lebanon
LTU	<i>Lithuania</i>
LUX	<i>Luxembourg</i>
LVA	<i>Latvia</i>
MDA	<i>Moldova</i>
MEX	Mexico

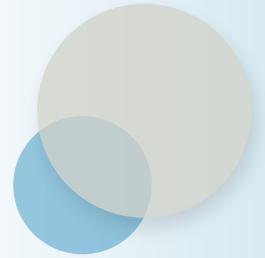
<i>MKD</i>	<i>Macedonia, FYR</i>
<i>MLT</i>	<i>Malta</i>
<i>MNE</i>	<i>Montenegro</i>
<i>MOZ</i>	<i>Mozambique</i>
<i>MUS</i>	<i>Mauritius</i>
<i>MYS</i>	<i>Malaysia</i>
<i>NAM</i>	<i>Namibia</i>
<i>NGA</i>	<i>Nigeria</i>
<i>NIC</i>	<i>Nicaragua</i>
<i>NLD</i>	<i>Netherlands</i>
<i>NOR</i>	<i>Norway</i>
<i>NZL</i>	<i>New Zealand</i>
<i>OMN</i>	<i>Oman</i>
<i>PAK</i>	<i>Pakistan</i>
<i>POL</i>	<i>Poland</i>
<i>PRT</i>	<i>Portugal</i>
<i>PRY</i>	<i>Paraguay</i>
<i>ROU</i>	<i>Romania</i>
<i>RUS</i>	<i>Russian Federation</i>
<i>SAU</i>	<i>Saudi Arabia</i>
<i>SGP</i>	<i>Singapore</i>
<i>SRB</i>	<i>Serbia</i>
<i>SWE</i>	<i>Sweden</i>
<i>SVK</i>	<i>Slovak Republic</i>
<i>SVN</i>	<i>Slovenia</i>
<i>SWZ</i>	<i>Swaziland</i>
<i>THA</i>	<i>Thailand</i>
<i>TJK</i>	<i>Tajikistan</i>
<i>TKM</i>	<i>Turkmenistan</i>
<i>TTO</i>	<i>Trinidad and Tobago</i>
<i>TUR</i>	<i>Turkey</i>
<i>TZA</i>	<i>Tanzania</i>
<i>UKR</i>	<i>Ukraine</i>
<i>UZB</i>	<i>Uzbekistan</i>
<i>XKX</i>	<i>Kosovo (not listed as an ISO standard country; the unofficial two- and three-digit codes are used by the European Commission and others until an ISO code is assigned)</i>
<i>YUG</i>	<i>Serbia and Montenegro (former Yugoslavia)</i>
<i>ZAF</i>	<i>South Africa</i>
<i>ZMB</i>	<i>Zambia</i>

## Regional Classifications Used in This Report

### Europe and Central Asia

Northern Europe	Southern Europe	Central Europe	Western Europe	Western Balkans
Denmark	Greece	Bulgaria	Austria	Albania
Estonia	Italy	Croatia	Belgium	Bosnia and Herzegovina
Finland	Portugal	Czech Republic	France	Kosovo
Latvia	Spain	Hungary	Germany	Macedonia, FYR
Lithuania	Cyprus	Poland	Ireland	Montenegro
Sweden	Malta	Romania	Luxembourg	Serbia
		Slovak Republic	Netherlands	
		Slovenia	United Kingdom	
South Caucasus	Central Asia	Russian Federation	Turkey	Other Eastern Europe
Armenia	Kazakhstan			Belarus
Azerbaijan	Kyrgyz Republic			Moldova
Georgia	Tajikistan			Ukraine
	Turkmenistan			
	Uzbekistan			





## Critical Connections

The countries of the Europe and Central Asia (ECA) region, along with much of the rest of the world, find themselves engaged in a revival of one of the fundamental questions of economic policy: how much to open to the rest of the world. At the turn of the century, the issue seemed largely settled, and most nations viewed greater openness as a key component of the path to prosperity. In these heady days, the European Union (EU) deepened with a drive toward greater integration and expanded by incorporating nations transitioning to market-based economies. More recent events—most notably, the global financial crisis and the tough times that followed—sowed the seeds of doubts about the benefits of globalization, leading to a rise of protectionist and nationalist economic sentiments, exemplified by Britain’s referendum to withdraw from the EU. In 2018, how much to open to the rest of the world now dominates the political economy of the ECA region, not just within the advanced EU economies, but also among the emerging economies of the region. Deciding where to draw the line between openness and protectionism has become a pivotal and divisive issue, often tinged with emotion. With this publication, the World Bank offers new research on the process of economic integration, showing its potential benefits without ignoring the downsides.

### **Main Findings of *Critical Connections***

- The ECA region’s international connectivity through trade, foreign direct investment (FDI), migration, telecommunications, transportation, and other avenues



facilitates the transfers of knowledge and technology that are critical to long-run growth and shared prosperity. These connections complement each other. For example, migration encourages trade and foreign investment by providing knowledge spillovers between host and home country markets and supporting connections to them. Similarly, the internet and efficient transport links are both necessary for successful e-commerce. Therefore, a balanced approach to increasing all dimensions of connectivity is desirable.

- The depth of overall connections and the geographic composition of the connections both matter. Knowledge transfers are greater from countries that themselves have strong links to third countries. These transfers also emerge from firm linkages in global value chains as well as foreign ownership and management that generate local spillovers.
- Deep integration of countries into the EU along many dimensions has generated important benefits to growth through knowledge transfers. Central Asia, the South Caucasus, and the Western Balkans have benefited from regional connections as well, but the gains have been less pronounced. Much of the difference is due to the lack of direct and indirect connectivity to the wider global economy in the eastern part of ECA.
- Despite its overall benefits, increased connectivity has encountered opposition—most notably, Britain’s June 2016 vote to exit the EU. National challenges often contribute to the backlash, but increased connectivity can expose ECA countries to external shocks, particularly those emanating from countries at the center of international economic transactions. By providing alternative sources of external demand and financing, however, a broad range of connections can reduce those risks and help countries cope with both domestic and external shocks.

## Introduction

The ECA region has a rich history of regional integration and connectivity to the broader world economy, which has stimulated the growth of knowledge and technological innovation. Indeed, through migration, trade, investments, and other interactions, ECA countries have depended on, and benefited from, connectivity with other countries for centuries. The Silk Road, formally established during China’s Han Dynasty in the second century BCE, facilitated more than the exchange of commercial goods. It was also a conduit for art, religion, philosophy, technology, language, science, and architecture (Starr 2015). Similarly, the Age of Discovery (1453–1660 CE) led to the deepening of a global community that was associated with profound advances in commerce and culture. As new navigation technology made sailing long distances possible, Europeans took to the seas to forge direct trading relationships with China, Indonesia, and Japan. Historians contend that it was the spice trade that fueled the development of faster boats, encouraged the discovery of new lands, and fostered new diplomatic relationships between East and West (Parthesius 2010; Bernstein 2013).

In recent times, the most prominent feature of ECA connectivity has been regional integration through the gradual expansion of what is now the EU. The 1951

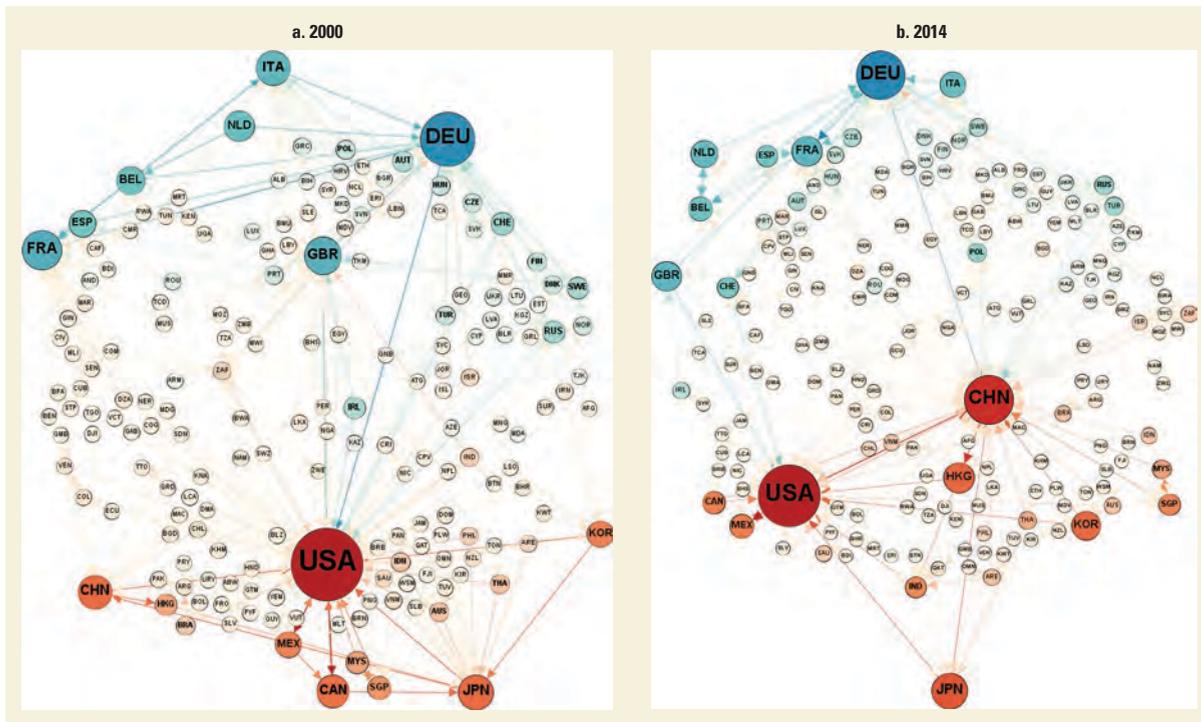
European Coal and Steel Community, a sectoral integration initiative among six European states, led to a much more ambitious agreement to form a European Economic Community in 1957. Over the next half century, the Community grew incrementally in geographic reach, issue coverage, and depth of policy cooperation. Within the EU, economic connections have progressively deepened from the initial lowering of trade barriers through the Single Market's convergence of regulation and finally the adoption of the euro as a common currency by 19 member states. Today, the 28-country EU incorporates the free movement of goods, services, capital, and people, with associated supranational common institutions—all the hard-won results of a multigenerational push toward greater connectivity.

A major feature of European integration in the past 20 years has been the process of EU accession—most notably by 10 Baltic and Central European countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia in 2004, followed by Bulgaria and Romania in 2007). Until the dissolution of the Soviet Union in 1991, the 10 nations that joined the EU had in one form or another been part of the ECA region's second major regional bloc: the Council for Mutual Economic Assistance. The perceived advantages of connectivity led to a looser form of economic integration and cooperation between Russia and the former Soviet republics—the Commonwealth of Independent States (CIS). In the past decade, Russia has sought to deepen the CIS into a common market and economic union and pursued a process of deepening economic integration with a subset of its neighbors through the creation of a Eurasian Economic Union. However, while progress has been made, the strength of global connectivity in the CIS remains much lower than in the EU.

The ECA region's growing participation in global and regional supply chains has greatly increased the importance and variety of international economic connections across the region. These forces have expanded ECA countries' regional connections more rapidly than their connections outside the region. Nevertheless, as shown in the example of trade connectivity (figure 1), many ECA countries have achieved substantial increases in global connectivity through their links to other ECA countries, such as Germany (DEU in the figure), France (FRA), or the United Kingdom (GBR), that have strong global connections.

The ECA region's persistent efforts to integrate reflect at the very least an intuitive appreciation of the potential benefits from greater connectivity. More formally, economists have recognized the superiority of openness over autarky. In studying linkages between nations, they have focused on how knowledge transfers through international connectivity boost long-term growth, rather than one-time jumps in output due to gains from specialization (Romer 1990). Much of the knowledge gain from connectivity comes from "tacit" knowledge—the kind that comes through learning by doing and face-to-face interactions. Unlike "explicit" knowledge, it cannot be transferred in texts and blueprints.

When looking at connectivity and knowledge transfers, analysts typically consider one channel at a time—such as trade, FDI, migration, telecommunications, or transport links. While many cross-country studies find, for example, that the level of trade or FDI relative to gross domestic product (GDP) is positively associated with growth, they generally do not consider how many forms of connectivity work together. For example, it is hard to imagine trade taking place on the historic

**FIGURE 1** Exports of manufactured goods

Source: Calculations based on data from the United Nations Conference on Trade and Development.

Note: The size of each country node reflects the total volume of trade. Each node has two outgoing links, which point to the country's two top export partners. Countries in the Europe and Central Asia region are shown in shades of blue. The methodology for plotting the countries attempts to show clearly the connections between countries in the global network of countries. The largest country nodes are pulled to the outer boundaries of the figure, but the pull is counterbalanced by the number and strength of connections with partner countries. Consequently, country nodes will tend to be grouped together if they share common connections.

Silk Road without migration and transportation networks, or the recent development of e-commerce without high-speed internet and an efficient means of transferring goods from one country to another.

The importance of each connectivity channel for growth is likely to be affected by the strength of other channels—particularly when technology transfers depend on both tacit and explicit knowledge. For example, FDI by higher-income ECA economies in those with lower incomes can be an important source of knowledge transfers through exposure to sophisticated production techniques and management styles that are learned “on the job.” Migrants often learn important skills working abroad, and workers and managers from the investing country typically accompany the FDI. Thus, FDI and migration can work together to accelerate technology transfers within ECA. In Moldova, for example, connections developed through migration to Northern, Western, and Southern Europe in the 1990s subsequently generated Italian investment in the garment industry as well as German investment in factories for the assembly of electronic car components. Because of these initial connections and foreign investments, Moldova is now developing a service and

manufacturing industry for the local market, creating its own brands, and exporting to other ECA countries.

In addition to being mutually reinforcing, connectivity channels vary in depth and geographic composition. Being well connected to highly connected countries can provide benefits beyond being well connected to comparatively isolated countries. The advanced economies in Europe have provided a gateway for knowledge transfers from outside of ECA. Poland, for example, leveraged its growing ties to Germany to develop connections with that country's trading partners and expand trade to broader markets within Europe and beyond. In the ECA region and other parts of the world, greater connectivity has delivered overall economic benefits for growth and development. Regional and global connectivity have been a tremendous "convergence machine," raising living standards in lower-income countries to those of wealthier middle- to high-income countries (see World Bank 2012).

The gains, however, are not evenly distributed or universally recognized. The 2007 global economic crisis and various commodity price shocks underscored the importance of understanding the potential risks of increased connectivity transmitting shocks from one country to another.<sup>1</sup> Voters, both in Europe and elsewhere, are now questioning whether the benefits of greater connectivity are worth the costs. In addition to the United Kingdom's 2016 vote to exit the EU (Brexit), recent elections in several European countries reflect an underlying skepticism regarding the benefits of deepening cooperation, with voters increasingly favoring parties seeking greater national autonomy instead of greater regional integration. Some analysts have attributed the lack of enthusiasm to concerns over the large migration flows and recent influx of refugees. Certainly, large sudden shifts in migrant flows, due to natural disasters or wars, bring critical societal issues into play for domestic policy consideration. But larger questions have been raised about the downsides of regional integration and globalization in general and the role that deeper integration initiatives have played as a driver in the rise of populism (see, for example, Rodrik 2018).

Thus far, the skepticism has not led to a widespread retreat from integration among ECA countries. The institutions and policies that promote regional and global connectivity remain largely intact, with most countries continuing to benefit. However, ECA integration has been slowing, and the challenges and questions call for a better understanding of ECA connectivity and its economic impacts. Analyzing the evolution of ECA's regional and global connectivity calls for paying particular attention to how the various types of connections have interacted with one another and why connectivity in the region and in the larger global network has played a key role in boosting growth and living standards. While recognizing the benefits of greater connectivity, it is important to acknowledge the potential downside risks through the transmission of economic shocks as well as the choices countries face regarding which types of connections to strengthen with various partner countries.

This short publication summarizes the main findings of the World Bank flagship study *Critical Connections*.<sup>2</sup> Its primary purpose is to offer a deep analysis of ECA connectivity and how it has evolved over the past two decades. In a key innovation of the study, a network analysis measure of *multidimensional connectivity* captures the relationship between different forms of connectivity and their joint impacts on



While recognizing the benefits of greater connectivity, it is important to acknowledge the potential downside risks through the transmission of economic shocks.

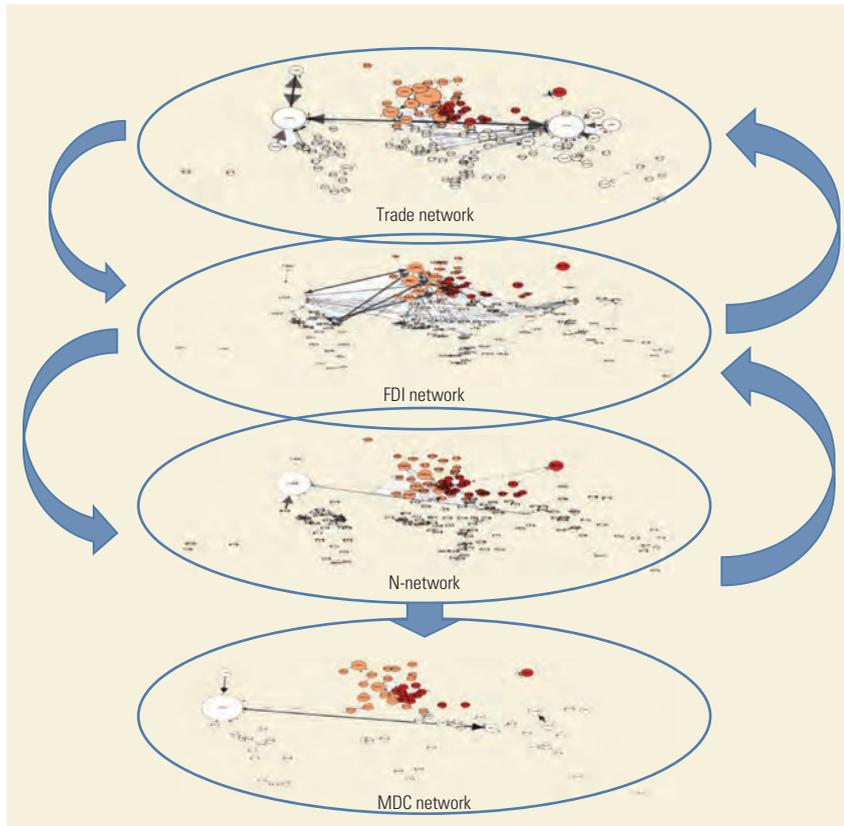
growth and the transmission of shocks. The next step is to examine how knowledge flows through trade and investment channels from the ECA's frontier firms to less technically advanced companies, improving productivity at the firm level. In the ECA region, firm connectivity does not just exert its influence through foreign investment; it also works through enhancing management practices. Ties between firms are associated with better outcomes in foreign-owned or -managed firms as well as with spillover effects that improve outcomes in locally owned and managed firms. Another complementary channel of ECA connectivity is migration. A new methodology for filling in large gaps in our knowledge of ECA migration, particularly regarding skills and gender, provides insights into the trends and determinants of migration and migration's economic impact on the region.

Facilitating the movement of people and goods across the ECA region is the focus of the next layer of connectivity: infrastructure linkages. Another key innovation looks at the time and cost involved in moving goods and people across the region, rather than the kilometers and density of roads and rail links. This network analysis yields a richer perspective on the ECA's transport links. The development of supply chains has been a key organizational outcome of the depth of ECA informational channels and conduits for connectivity. The development of Europe's supply chains ("Factory Europe"), and the efficiency gains they provide, reflects the successes of narrowing policy barriers to trade, investment, migration, information and communication technology (ICT), and transport. Finally, ECA countries' policy progress in supporting international connectivity over time and relative to other countries is evaluated to guide future policy actions.

## **Multidimensional Connectivity a Key to Europe and Central Asia's Development and Growth**

International connections include trade, FDI, migration, ICT, and transport links. Most studies measure the impact of each of these channels individually. This study takes a different approach, creating an indicator that combines all channels (networks) in a functional form that recognizes their complementarity—the *multidimensional connectivity index* (represented in figure 2 as the MDC network). The measure reflects both the depth of each channel between each pair of countries (e.g., the size of bilateral trade relative to each country's GDP) and the benefits a country may reap from being connected to another well-connected country (e.g., Croatia's trade with Germany is likely to boost knowledge spillovers more than Croatia's trade with Albania owing to Germany's wider global connections in addition to its higher level of technology).

Compared with traditional approaches, this method more accurately measures a country's exposure to knowledge flows via direct and indirect international connections. The analysis presented in this study emphasizes the importance of complementary and balanced connectivity across the various channels. The impact on growth of any single connectivity channel is expected to decline as additional knowledge gains from the channel diminish—unless other channels of connectivity grow as well. In other words, policies to improve trade without complementary policies to improve investment and transport will



**FIGURE 2** Multidimensional connectivity combines many channels of connectivity

Note: This figure presents an indicative representation of the multidimensional connectivity (MDC) network that incorporates the relationship between all networks—trade, FDI, and other measured global networks (N)—into a single collapsed network. A modified form of PageRank centrality for each country (node) is developed based on this collapsed network and used as an indicator of how overall connectivity influences growth overall and growth of the bottom 40 percent of the income distribution. FDI = foreign direct investment.

have diminishing returns. Thus, promoting balanced connectivity across trade, transport, foreign investment, and other channels is likely to be more beneficial than focusing on enhancing only one channel.

The various channels exhibit some degree of substitutability, but complementarity dominates. In some contexts, for example, trade may substitute for FDI because firms can either export a product to a foreign market or invest in the foreign market to produce there. However, the information flows from trade tend to complement those from FDI. Firms may discover opportunities to export to a foreign market because of their exposure through investing there. Thus, improving connectivity in one dimension improves connectivity through other channels.

In terms of per capita levels in ECA subregional multidimensional connectivity (table 1), Western Europe has the highest global ranking, followed by Northern, Central, and Southern Europe, while Russia, Turkey, and Eastern Europe are in the middle range, and the Western Balkans, Central Asia, and the South Caucasus have the lowest levels of overall connectivity. Not surprisingly, higher per capita levels of connectivity are associated with higher levels of development,

**TABLE 1** Multidimensional Connectivity Varies by ECA Subregion, with the Highest Connectivity in the Western Part of the Region and the Lowest in the Eastern Part

ECA subregions	Multidimensional connectivity	Trade	FDI	Migration	ICT	Airline	Portfolio flows
<i>High connectivity</i>							
Western Europe	6	6	6	9	9	15	19
Northern Europe	12	12	17	26	21	23	22
<i>of which Baltics</i>	30	28	36	38	50	28	21
Southern Europe	25	24	26	21	28	23	22
Central Europe	31	27	34	36	41	46	46
<i>Medium connectivity</i>							
Russian Federation	55	53	61	28	63	64	83
Turkey	57	51	67	33	73	79	40
Eastern Europe	62	59	60	81	54	57	76
<i>Low connectivity</i>							
Western Balkans	88	75	97	45	88	86	99
Central Asia	94	99	93	101	101	103	101
South Caucasus	104	104	102	64	104	104	93

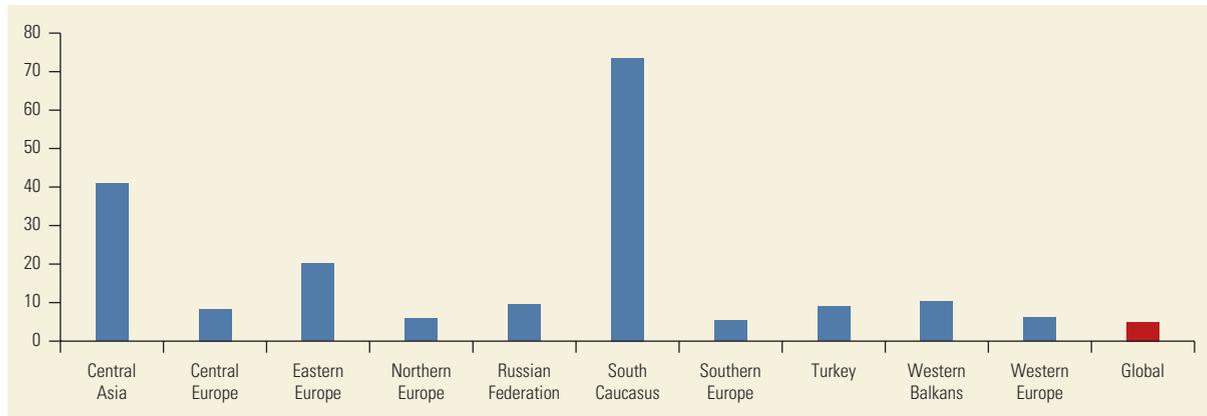
Note: The table shows global rankings, from best to worst, in combined per capita connectivity, with lower values indicating better connectivity. Subregion indicators are median values of the subregion's countries ECA = Europe and Central Asia; FDI = foreign direct investment; ICT = information and communication technology.

reflecting both the number and depth of connections a country has. Tables A.1 and A.2 show individual country rankings of multidimensional connectivity on an absolute and a per capita basis, respectively. Central Asia and the South Caucasus rank low on overall connectivity, but because they started from a low base, they also saw the greatest improvement from 2000 to 2014 (figure 3). The South Caucasus saw connectivity increase by nearly 75 percent, while Central Asia saw connectivity increase by more than 40 percent. Eastern Europe and the Western Balkans, although also starting from relatively low levels, have not seen increases as rapid, with connectivity increasing only 20 percent and 10 percent, respectively. The key challenge for these regions is to find ways to improve balanced connectivity, particularly through easing domestic constraints on doing business and facilitating trade, FDI, airline, and ICT connectivity. For the ECA region as a whole, while improvements in connectivity have slowed since 2008, it still has grown faster than global connectivity since 2000, reflecting the EU integration process as well as strides taken in transition economies.

Using this study's new MDC measure, we find a closer association with growth than when considering individual connectivity indices separately. In the ECA region, the depth of a country's international connections in 2000 contributed to growth over the subsequent 16 years, after accounting for other fundamental determinants of growth typically used in cross-country studies (such as initial GDP, education, size of government, inflation, investment rate, and quality of governance). This is because a deepening of each channel tends to increase the

**FIGURE 3** Europe and Central Asia's connectivity has grown, but there are wide variations across subregions

*Growth in connectivity, percent, 2000–14*



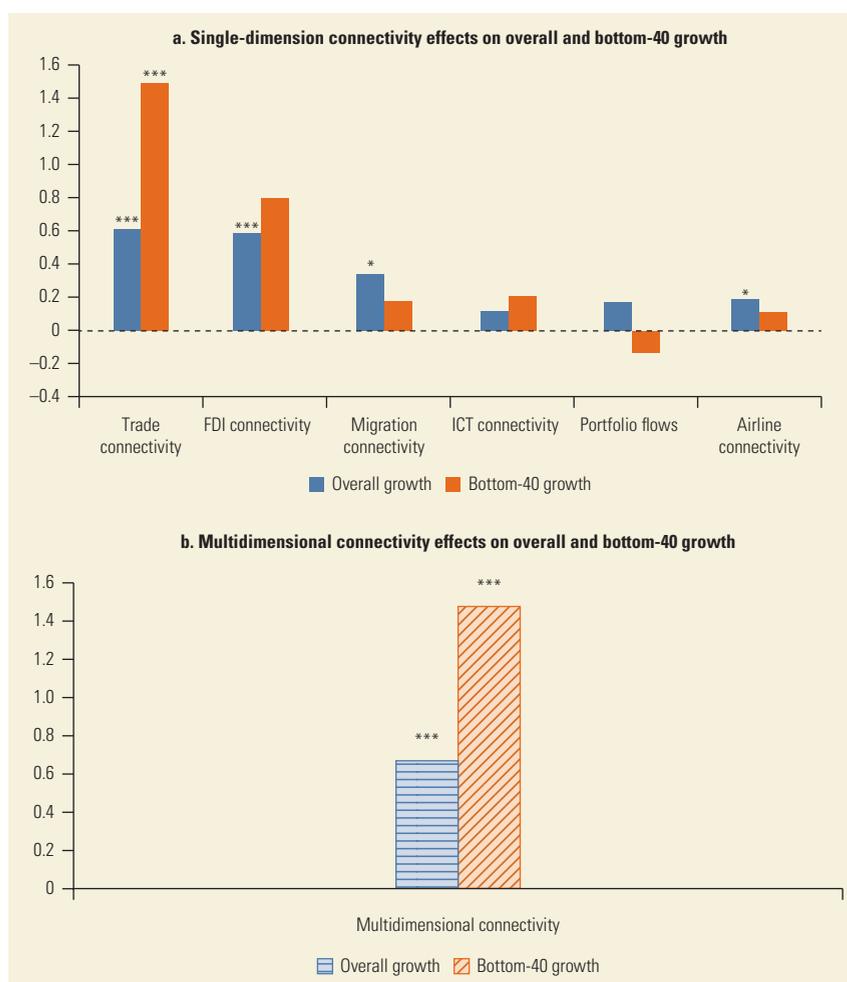
Note: Subregional and global indicators are median growth rates.

growth impact of other channels. The association between MDC and growth is shown in figure 4, along with each individual component connectivity channel. The level of trade connectivity has the most significant individual impact on growth, followed by measures of connectivity through FDI, migration, and airline flights. Trade connectivity is statistically significant and associated with more rapid income growth of the bottom 40 percent of the income distribution, but the other connectivity indicators are not, perhaps because the bottom 40 percent benefit more directly from trade and less so from other forms of connectivity.

The increase in international connectivity over the past decade has occurred in tandem with severe disruptions to the international economy, most notably the global financial crisis. Greater connectivity may have increased ECA countries' exposure to such shocks, but it may also have increased countries' ability to cope with them. Least vulnerable to shocks are countries with very high levels of connectivity *and* countries with very low levels of connectivity. The former can more easily find alternative export markets or sources of finance, and the latter are more insulated from the global economy. Countries in the middle of the range tend to be the most vulnerable to shocks for lack of easy alternatives to compensate for declines in connectivity. One example is countries highly dependent on a well-connected country—as shown in figure 5 in the case of a shock originating in Germany.

Using multidimensional connectivity to better understand the transmission of shocks also indicates that ripples radiate across countries indirectly connected to places experiencing hard times. The impacts are not always obvious. Take, for example, the potential impact of Brexit. In this example, a 20 percent drop in all connections between the United Kingdom and the 27 remaining EU countries (EU27) is simulated. As expected, the United Kingdom suffers the greatest harm, followed by small countries of the EU27, such as Malta and Ireland, that get most of their global connectivity through the UK. However, other countries outside the EU that are not directly affected by Brexit, such as

**FIGURE 4** Connectivity's effects on overall and bottom-40 growth



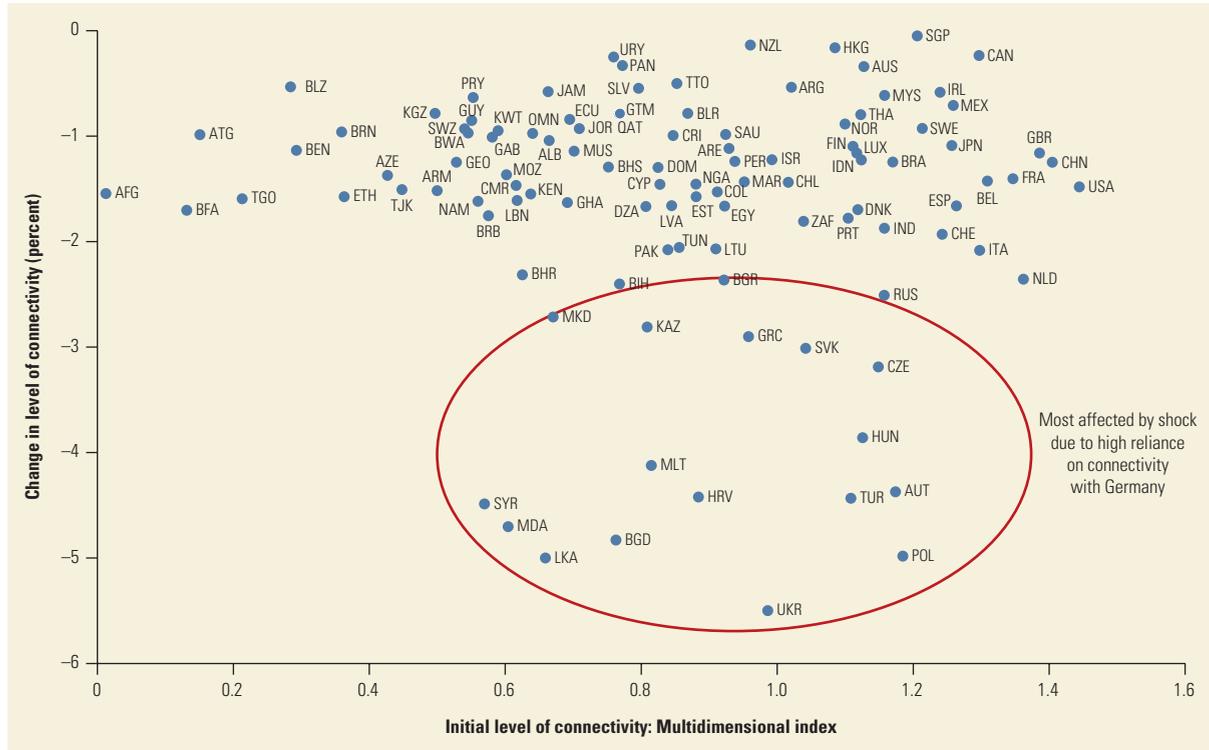
Note: All coefficients (except those on multidimensional connectivity) are estimated with ordinary least squares regression; multidimensional connectivity is estimated using a maximum likelihood procedure. The connectivity variables, including multidimensional connectivity, are normalized using the standard normal distribution; therefore, the size of the coefficient represents the annual growth impact of a one-standard-deviation change. FDI = foreign direct investment; ICT = information and communication technology.

Significance level: \* = 10 percent, \*\* = 5 percent, \*\*\* = 1 percent.

Norway, Senegal, Libya, and Fiji, are nonetheless indirectly affected through the connections of connections (table 2). Interestingly, these countries are more affected by Brexit than some EU countries, such as Austria, Estonia, Lithuania, Romania, and Bulgaria.

How connectivity transmits shocks is relevant to the past decade's shift in public sentiment away from openness and toward a more inward-looking stance. At the same time, the new mood increases the need to better understand how connectivity works to improve economic performance. The next few sections

**FIGURE 5** A shock originating in Germany has the largest impact on countries that gain their global connectivity through Germany  
*Shock: 10 percent fall in all types of connectivity*



**TABLE 2** EU and Non-EU Countries Most Affected by Brexit

1. United Kingdom	15. Italy
2. Malta	16. Poland
3. Ireland	17. Germany
4. Cyprus	18. Latvia
5. Netherlands	19. Finland
6. Denmark	20. Hungary
7. Luxembourg	21. Czech Republic
8. Sweden	22. Senegal
9. France	23. Libya
10. Spain	24. Suriname
11. Norway	25. Slovenia
12. Greece	26. Fiji
13. Portugal	27. Iceland
14. Belgium	28. Austria

Note: The table ranks countries according to the impact on the countries from Brexit, with a ranking of 1 indicating the greatest impact. EU = European Union.

describe the ECA region's recent experiences with the key channels of greater connectivity: knowledge transfers, foreign ownership and management, migration, infrastructure, and supply chains.

## Europe and Central Asia Connectivity Is a Critical Source of Knowledge Transfers

ECA connections with other countries through trade, investment, and production sharing are important because they increase access to technology and ideas critical to growth. Importing firms learn from exposure to more diverse and sophisticated inputs to their production, and exporters learn through opportunities to achieve economies of scale, upgrade workers' skills, and improve products to compete in foreign markets. Local firms involved in FDI learn through technology transfers and exposure to high-skilled workers. Moreover, local firms not involved in trade or FDI also may learn through exposure to, or competition from, more internationally connected firms. All of this emphasizes the critical importance of openness to international transactions for gaining access to the knowledge essential for growth and productivity enhancements. Romania's greater openness after it joined the EU led a Belgian logistics provider and an American software company to extend global value chains (GVCs) into the country, creating spillovers that benefited the local economy (box 1).

### BOX 1 Global Value Chain Spillovers in Romania

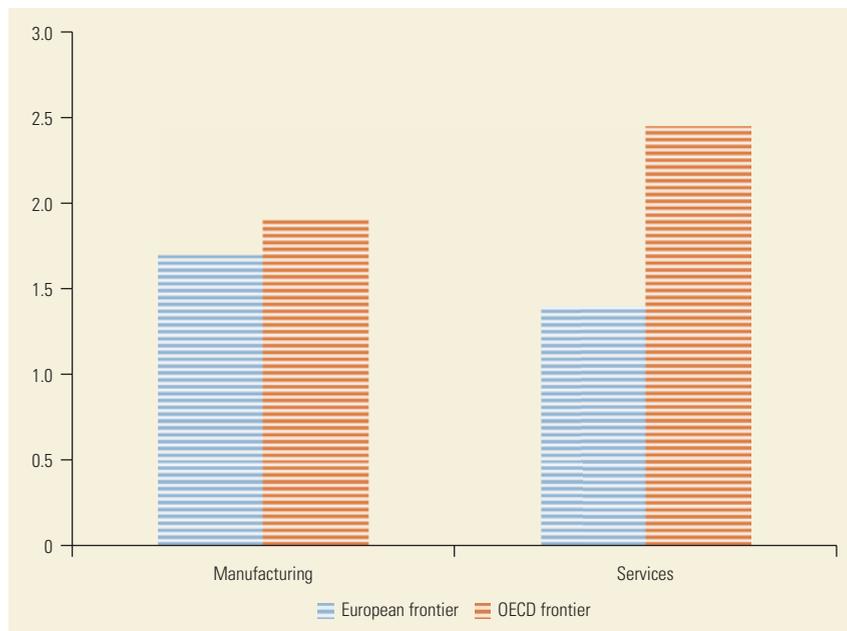
H. Essers and Oracle are two examples of foreign companies investing in Romania that illustrate benefits from foreign investments.

H. Essers is a leading European logistics firm with headquarters in Belgium, focusing on chemicals, pharmaceuticals, health care, and high-quality products. After its integration with a Dutch company already doing business in Romania, the Belgian firm increased its presence in Romania, with an eye on Eastern Europe and Central Asia. Knowledge and know-how coming from traditional logistics hubs like the Netherlands and Belgium subsequently improved Romania's logistics performance. Logistics is the backbone of supply chains, making production fragmentation and the smooth coordination of its stages possible. Knowledge spillovers occur through clients' learning good practices in quality norms, information technology, and cold chains.

Oracle is a major multinational company headquartered in the United States, specializing in developing and marketing database software and technology, cloud-engineered systems, and enterprise software products. In the mid-2000s, it opened a branch in Bucharest and began to hire local engineers for routine software development. In addition to short-term spillovers, Oracle's entry has spurred a new generation of entrepreneurs who got their start at the company's operations in Bucharest and went on to create their own businesses. One of them is Softelligence, a Romanian software company that designs tailored mobile applications for financial institutions. The low cost of entry for new entrepreneurs in this industry—coupled with competitive wages, a qualified workforce, and excellent internet connectivity—has boosted this sector and diversified the economy.

Europe compares well to the global frontier in manufacturing productivity, but it lags behind the global frontier in services and in some innovation-based growth industries. Technology creation in European manufacturing is very similar to that in other advanced economies, as measured by the gap in labor productivity growth between frontier firms in Europe and the Organisation for Economic Co-operation and Development (OECD) countries (figure 6).<sup>3</sup> However, labor productivity growth is lower in European services firms than in firms at the OECD frontier. The numbers suggest that the continent could be served well by pursuing better connectivity to the global frontier firms in the services sector. Similar sectoral differences between the most advanced European and global firms can be seen in the intensity of investment in research and development (R&D).

FDI inflows, FDI outflows, and imports are all important to productivity growth across the world; as such, they are conduits for the transmission of both tacit and explicit knowledge. Empirical evidence suggests that when a pair of countries are linked through FDI or trade, an increase in R&D investment in one is associated with an increase in total factor productivity (TFP) in the other. In other words, FDI and trade help international R&D spillovers materialize.<sup>4</sup> When the focus is trade as a conduit of R&D spillovers, evidence reveals that the quality of domestic institutions is an important factor that facilitates spillovers. Better business environments, the quality of tertiary education systems, and stronger patent protection are associated with stronger R&D spillovers.



**FIGURE 6** Europe lags behind the frontier in services  
Average annual labor productivity growth, percent, 2010–13

Source: Calculations based on data from the Organisation for Economic Co-operation and Development (OECD) and Amadeus.

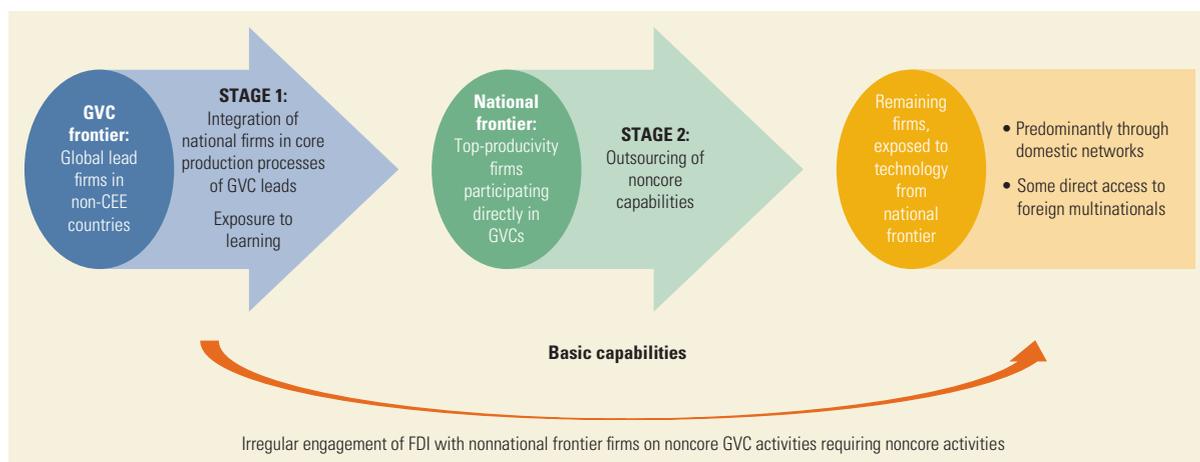
Note: Sample is based on firms with more than 20 employees. The European frontier is among the EU15 (that is, the original core countries of the European Union). The technology gap is proxied by the difference in productivity growth between frontier firms and other firms (laggards) in the same sector and year.

Productivity increases in most firms are generated by the absorption of knowledge from other sources, rather than through their own investment in creating new knowledge. A firm's potential to learn from existing knowledge can be measured by the difference between the firm's TFP (or its TFP growth rate) and that of the most advanced firms in the sector. In Europe, advanced firms tend to be larger, have higher levels of capital relative to labor, invest more in intangibles (such as marketing practices), and have more-educated workers than other firms, although some of these differences vary by sector.

The transfer of knowledge from international sources tends to follow a two-stage process (figure 7). First, the most advanced domestic firms absorb knowledge from the most advanced firms globally, often through participation in GVCs that involve production sharing through trade, investment ties, and contractual agreements. Second, less advanced domestic firms absorb this knowledge through their exposure to the most advanced domestic firms. By contrast, the direct technology transfer between the most advanced global firms and the less advanced domestic firms tends to be limited. Econometric evidence for the ECA region confirms that a rise in TFP growth among advanced domestic firms (defined as the top 20 percent of domestic firms by TFP in each sector) leads to a similar increase in TFP among other domestic firms, but an increase in TFP among the most advanced global firms has little direct impact on the less advanced domestic firms.

This analysis sheds light on the productivity slowdown in many ECA countries after the global economic crisis. Productivity growth in Central and Eastern European EU members fell by 8.2 percentage points in 2008–14, compared to 2000–07 (figure 8). The crisis was transmitted through global supply chains and sharply reduced domestic firms' engagement in these chains, which serve advanced markets in Europe and the United States. This decreased opportunities for firms in Central and Eastern Europe to learn, led to a fall in their R&D spending as a share of GDP, and lowered their propensity to introduce new

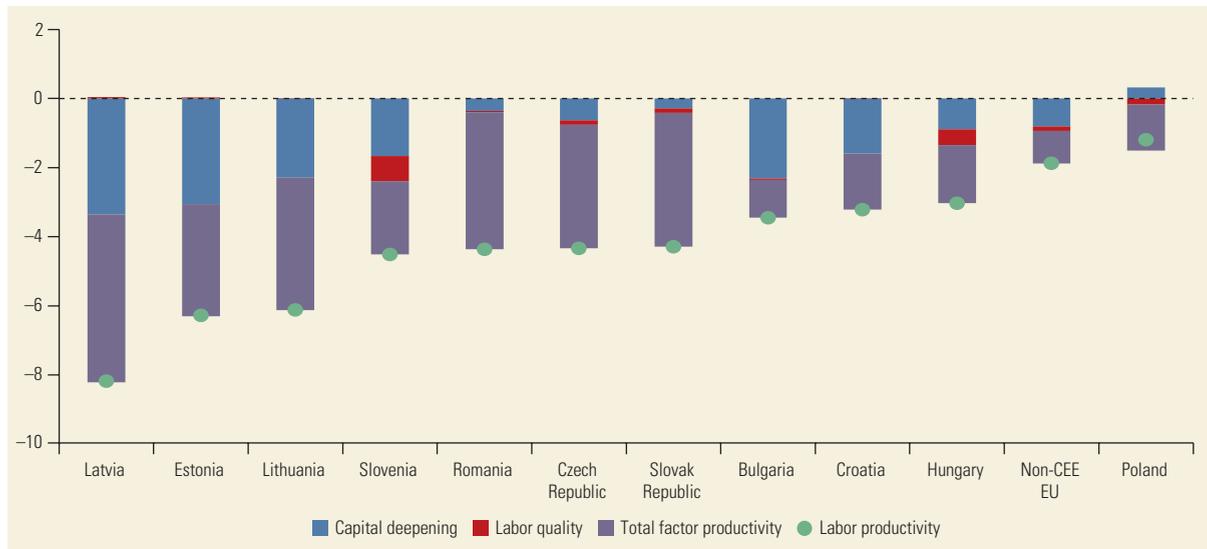
**FIGURE 7** How technology flows from European frontier firms (global value chain lead firms) to the remaining European firms



Note: CEE = Central and Eastern Europe; FDI = foreign direct investment; GVC = global value chain.

**FIGURE 8** Productivity growth was lower in Central and Eastern Europe during the crisis

*Difference between labor productivity growth in Central European EU countries and that in Eastern European EU countries, 2000–07 versus 2008–14*



Source: Calculations based on Conference Board data. Overall macroeconomic data may reflect both sectoral changes and within-firm productivity growth.

Note: "Non-CEE EU" refers to the unweighted average for Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom. CEE = Central and Eastern Europe; EU = European Union.

products or processes—as shown in the World Bank's Enterprise Surveys. In this instance, exposure to international volatility was a major driver of slower growth following the crisis. However, the "cure" of reducing firms' exposure to international volatility through restrictions on trade or FDI would be worse than the disease, because such policies would diminish firms' opportunities to learn through participation in global supply chains and other international transactions. This would particularly depress growth in less advanced countries, where firms are further from the productivity frontier and thus have greater opportunities to learn through connections with foreign markets.

International knowledge flows and their productivity impacts take place within companies—so their internal operating characteristics are likely to be important in determining whether connectivity gains are large or small. A critical factor is management. Looking at micro data, the next section focuses on how foreign management, regardless of ownership, can influence firm outcomes.

### Foreign-Owned and -Managed Firms Tend to Perform Better and Contribute to Local Firms' Productivity

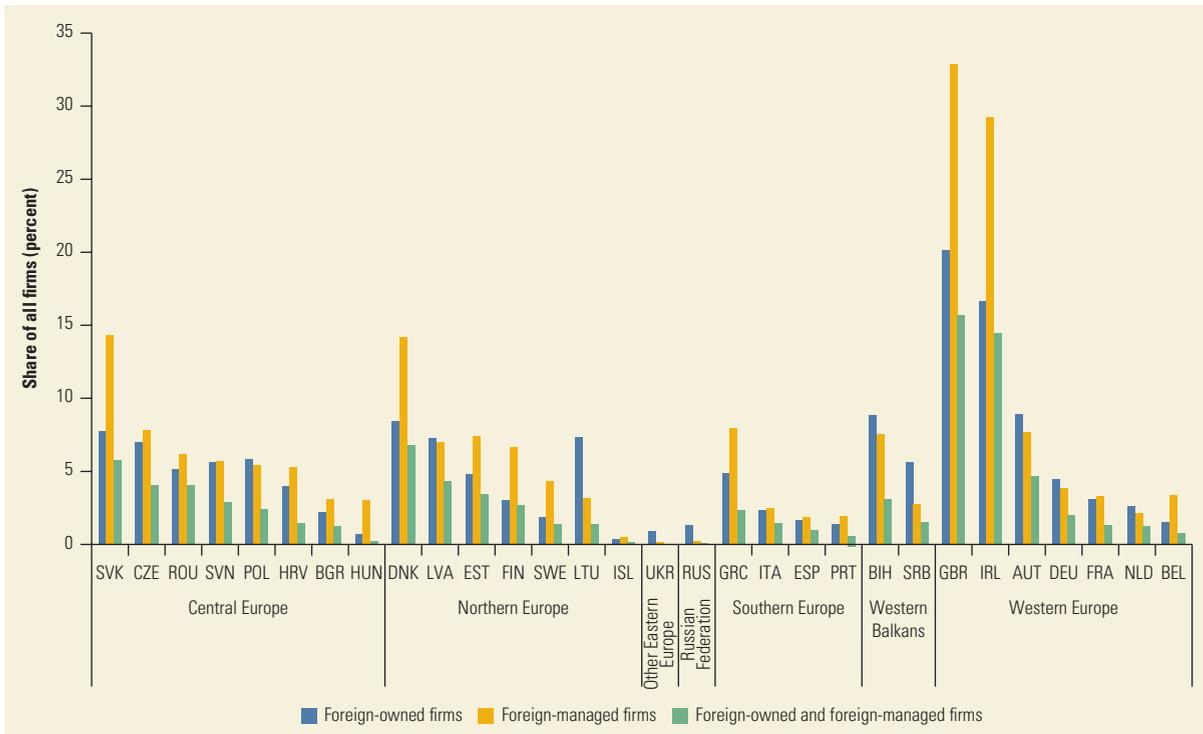
The share of ECA firms owned by foreigners (excluding firms owned by parent companies located in tax havens) ranges from negligible, in countries such as Belgium, Bulgaria, Hungary, Russia, Ukraine, and most Southern European

countries, to 5 percent or more in most of Central Europe, Latvia, Lithuania, and the Western Balkans, to more than 32 percent in Ireland and the United Kingdom. More than half of foreign-owned firms in ECA also have predominantly foreign management (figure 9). Across the ECA, foreign-owned firms tend to be larger than domestic firms, although the age of foreign-owned firms is not, on average, significantly different from that of local firms (figures 10 and 11). Many ECA firms are owned by people or firms in large, rich economies, such as Germany or the United States. However, geographic proximity, common language, cultural heritage, trade ties, and immigration from the source country are also important determinants of foreign ownership (table 3).

Firms that are foreign owned or foreign managed tend to achieve higher growth in operating revenues, employment, and average wages than other firms (figure 12). Foreign-owned firms with foreign management have 28.3 percent higher growth in operating revenue, 19.6 percent higher job growth, and 16.8 percent higher wage growth than local firms.

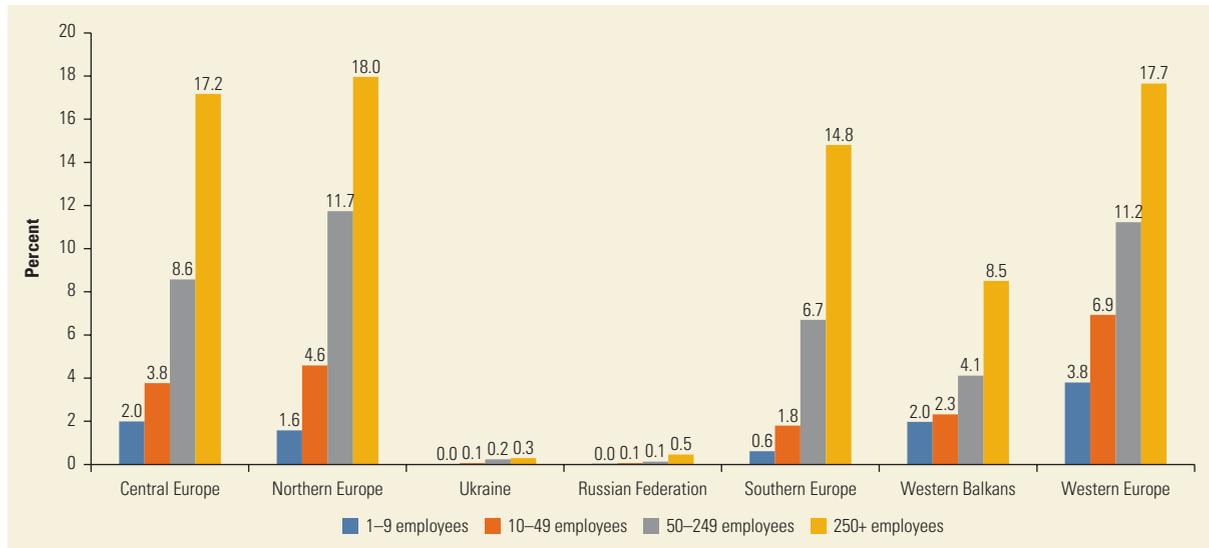
Foreign affiliates with local managers also perform better than local firms, although less so than foreign firms with foreign management. However, it is unclear whether the foreign firms’ better performance reflects the impact of foreign ownership or management or foreign companies’ tendency to invest in the most productive regions, sectors, or firms.

**FIGURE 9** Foreign-owned and foreign-managed firms in ECA, 2013



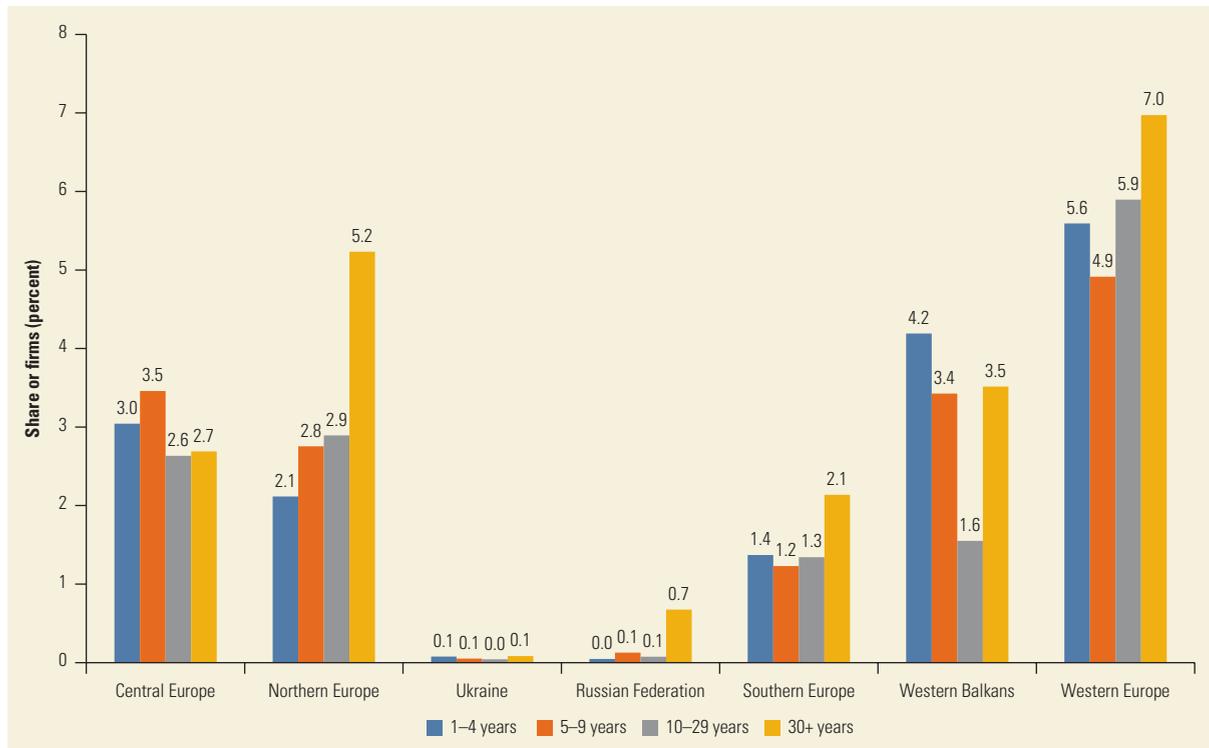
Source: Calculations using Orbis data.  
 Note: Sample excludes firms with owners in tax haven countries. ECA = Europe and Central Asia.

**FIGURE 10** Large firms are more likely to be foreign owned in ECA  
 Share of foreign-owned firms by number of employees, 2013



Source: Calculations using Orbis data.  
 Note: Sample excludes firms with owners in tax haven countries. ECA = Europe and Central Asia.

**FIGURE 11** There is no clear relationship between a firm's age and the likelihood of its being foreign owned  
 Share of foreign-owned firms by age of firm, 2013

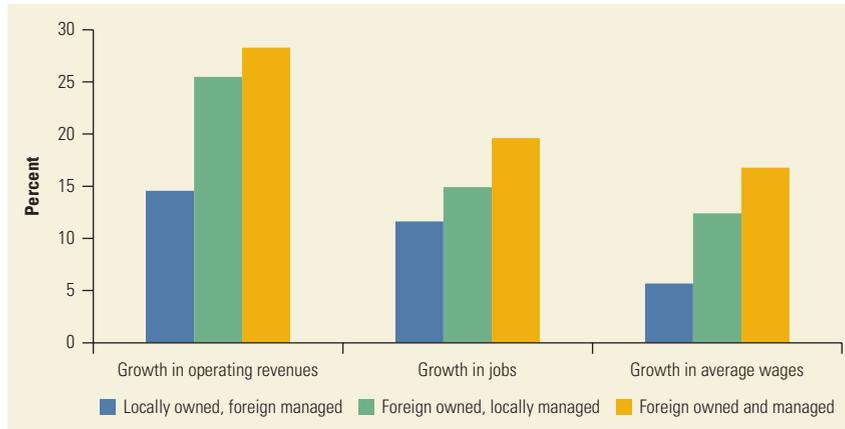


Source: Calculations using Orbis data.  
 Note: Data for 2013. Sample excludes firms with owners in tax haven countries.

**TABLE 3 Most Foreign Firms in ECA Are Owned by German and US Firms**

Region	Most common global ultimate owner										Others (from left to right, top to bottom): Denmark, Norway, Russian Federation, Belgium, Croatia, Slovenia, and Japan
	Germany	United States	United Kingdom	Netherlands	Austria	France	Italy	Finland	Sweden		
Central Europe											
Northern Europe											
Ukraine											
Russian Federation											
Southern Europe											
Western Balkans											
Western Europe											

Note: Sample excludes firms owned by tax haven countries. Each row in the table shows the five (or more, if there is a tie) most common countries of ownership, among the top ten countries of ownership, for each country or region at left. For the Russian Federation and Ukraine, the rows show the five countries with the largest ownership shares. ECA = Europe and Central Asia.



**FIGURE 12** Foreign-owned and -managed firms perform better than local firms

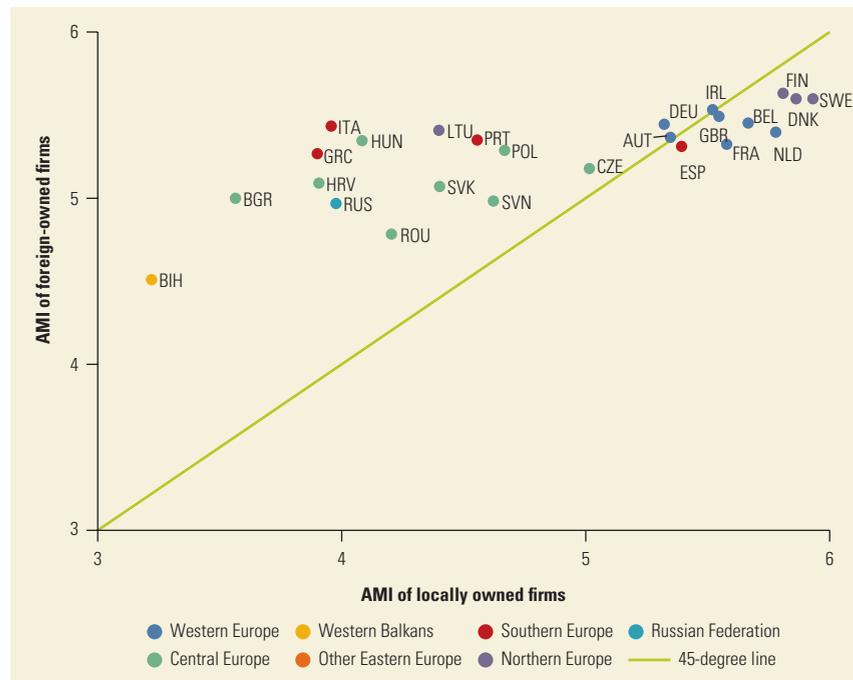
Note: Each bar in the figure represents the difference in growth (of the type labeled) between the type of firm depicted in that bar and that of firms that are both locally managed and locally owned. All underlying coefficients are statistically significant.

Transfer of management practices from the source country is likely an important reason for the better performance of foreign firms. For example, US-owned firms in Europe have management practices that place more emphasis on merit in determining career success, which is associated with greater use of ICT, than do domestic firms or firms owned by other countries (Bloom et al. 2018). On average in the ECA region, but not in the most advanced ECA economies, foreign-owned firms tend to have better management practices than local firms (figure 13). The source country's management quality is significantly related to the performance of its foreign affiliates: foreign affiliates from countries with better management practices perform better than other foreign affiliates, even after differences between the source countries' income levels, financial development, population, and stock of immigrants are taken into account.

Local firms without foreign ownership or management can also benefit from the presence of foreign-owned firms (figure 14). Local firms can learn from observing management practices and technology in foreign affiliates, or through hiring workers trained in foreign affiliates. However, evidence of such effects across industries is mixed. Better-performing foreign affiliates also may affect local firms through competition—by forcing them either to improve or to exit the market. Local firms tend to achieve significantly higher growth in operating revenues and wages in regions or sectors in ECA countries with higher shares of foreign firms than in sectors in which foreign affiliates are less prevalent.

For small and young firms, there is no statistically significant relationship between the share of foreign firms in a sector and local firms' employment growth. A possible interpretation of this result is that the presence of foreign firms forces some successful small and young local firms to become more efficient by increasing capital relative to labor, slowing job creation. In addition, other firms that cannot compete shed labor (to more efficient firms) or close. Again, these relationships may in part reflect foreign owners' decisions to invest in better-performing sectors or regions.

**FIGURE 13** Foreign affiliates tend to have better management practices than local firms



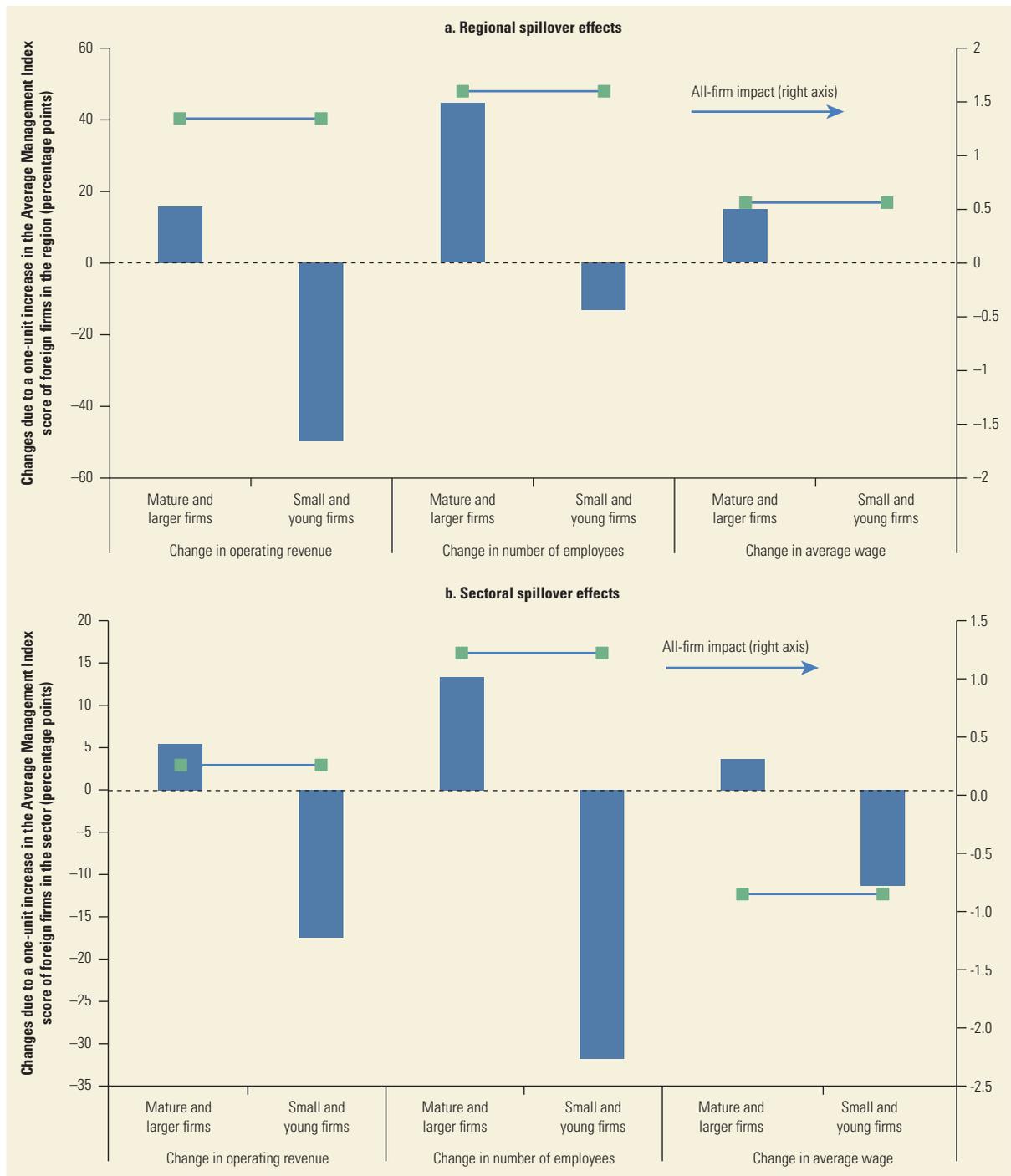
Source: Calculations using data from the World Economic Forum (WEF) Global Competitiveness Survey and Orbis.

Note: A country's Average Management Index (AMI) is based on the WEF Global Competitiveness survey that measures the quality of national business schools and the reliance of professional management. This index is also highly correlated with the World Management Survey, which is more comprehensive, but not as widely available.

Because of competition from better-managed companies, larger and older firms are more likely to upgrade and adjust compared with younger and smaller firms. Increases in the quality of management in foreign affiliates are associated with faster growth in operating revenues, wages, and employment in local firms more than four years old and having more than 50 employees, but lower growth in these performance indicators in younger and smaller firms.

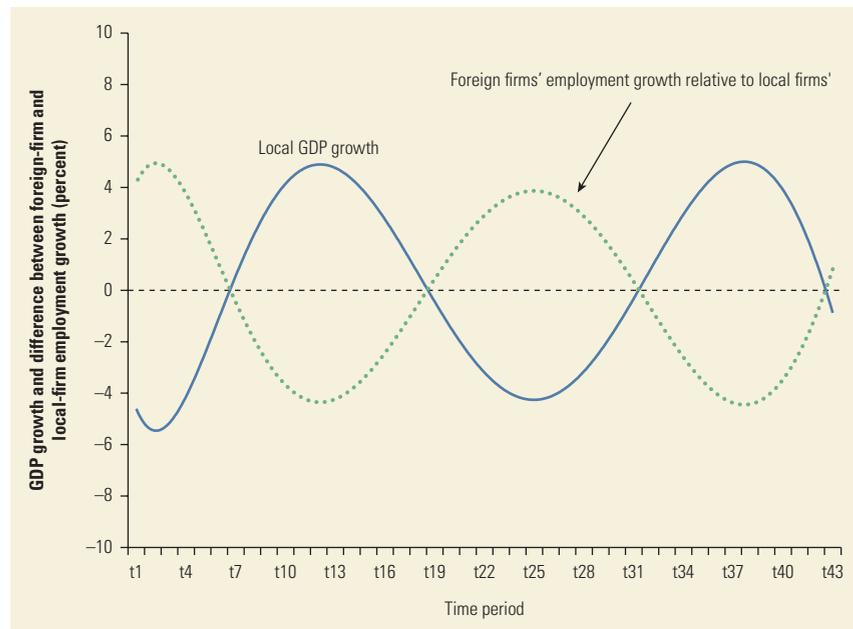
Foreign ownership of firms tends to reduce the level of employment volatility in a country's domestic economy. Interestingly, once a number of variables that influence firm performance are controlled for, the performance of an average foreign firm in the ECA region is not statistically correlated with local economic growth. Foreign firms are less responsive to local economic conditions than local firms, regardless of whether foreign and local economies have the same business cycle. This could reflect better access to finance during an economic upswing in the parent country or a search for opportunities abroad when the parent company's profits at home are limited relative to the destination country. Regardless of the economic conditions in the parent country, foreign companies' employment decisions seem to be less procyclical with respect to the domestic economy than domestic companies: the former tend to create fewer jobs when the local (host) economy expands (figure 15). Likewise, this also means that foreign companies tend to destroy fewer jobs than domestic firms when the local economy experiences a recession, possibly reflecting access to external factors that allow foreign companies to buffer the

**FIGURE 14** The positive spillovers of well-managed foreign firms seem weaker for small and young firms



Note: Small firms are those with 49 employees or fewer; young firms are those four years old or younger. Each bar represents the effect of increasing by one point the Average Management Index scores of foreign firms. The bars in each panel show the baseline effect (mature and larger firms), the baseline effect plus the interaction term associated with size, and the baseline effect plus the interaction terms associated with size and age simultaneously.

**FIGURE 15** Foreign firms' employment decisions are less procyclical than those of their domestic peers



impact of the decline in economic activity. In other words, while foreign firms seem to contribute less to job creation than their local counterparts when the local economy is growing, they seem to bring more stability to the labor market during a downturn in economic activity because they lay off workers to a lesser extent than local companies do.

It is just a short step from foreign owners and managers to the broader topic of migration, a hot-button issue in recent years. The next section focuses on how the ECA region's increasing migration facilitates trade, knowledge transfers, and other benefits associated with greater connectivity.

## Economic Migration Has Been Beneficial to Europe and Central Asia

In general, openness to migration, including that by foreign managers, helps many countries gain the skills, technology, and resources required to improve efficiency and compete in an increasingly complex, globalized world. In destination countries, workers who are close substitutes for immigrants (e.g., they have similar skills) may lose as a result of lower wages or diminishing job opportunities. At the same time, workers with skills complementary to those of immigrants may benefit. While the net economic effect for the country overall is positive, income distribution impacts may be positive or negative depending on the skill mix of the native and immigrant populations. Outside of economic considerations, large sudden shifts in migrant flows as a result of natural disasters or wars, such as the recent Syrian refugee crisis, bring humanitarian and local social impacts into play for the host country. These are critical societal issues for domestic policy consideration but are outside the purview of this analysis.

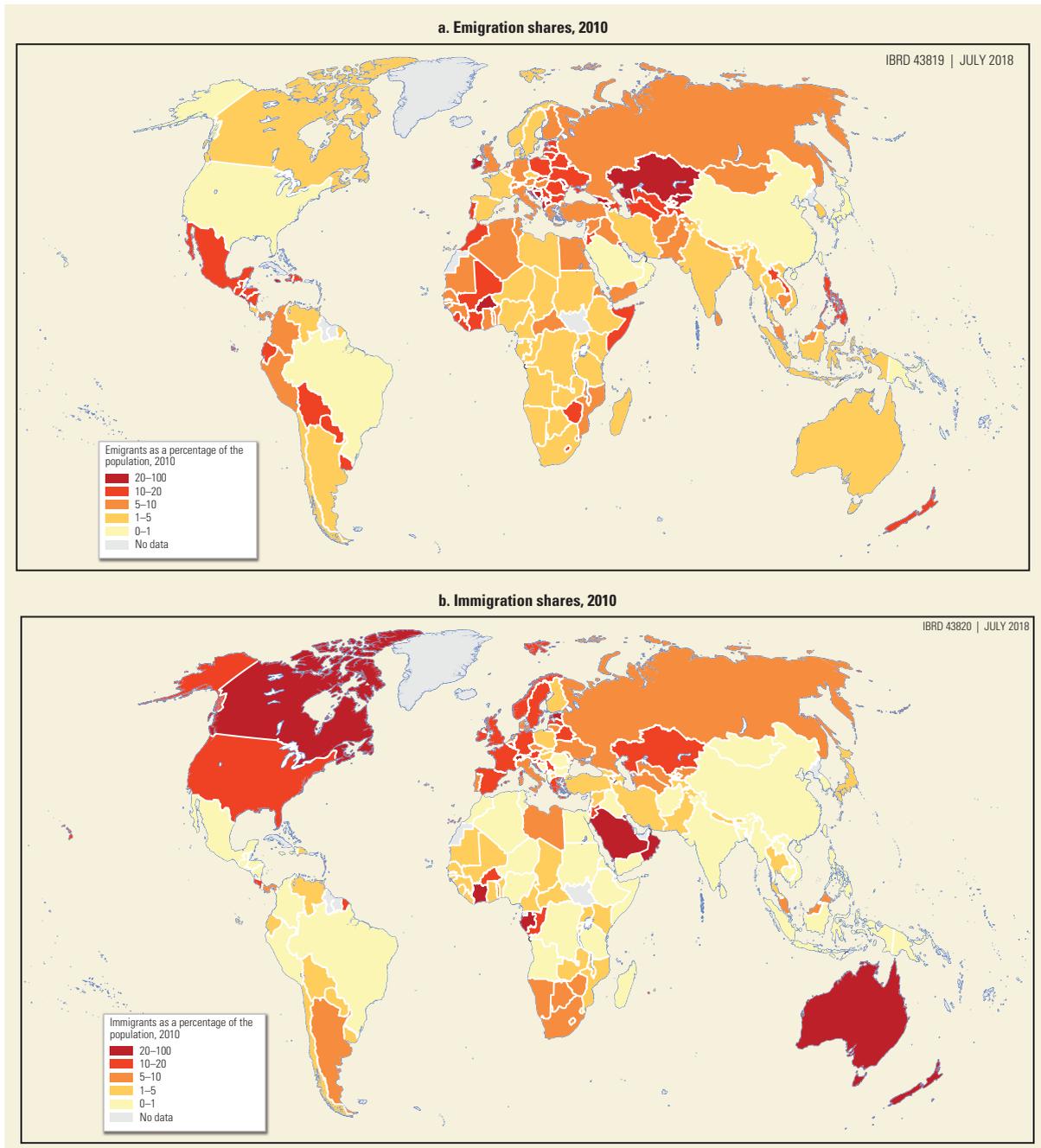
Both emigration and immigration rates in many ECA countries are higher than the global average (map 1), mostly driven by the removal of barriers to mobility within the EU and large migration flows following the opening up of Eastern-bloc countries. High levels of ECA migration have encouraged greater cross-border investment and trade (for example, by helping firms learn about foreign markets) and have facilitated the sharing of technology and knowledge between countries (for example, through schooling and language skills attained abroad).

A large diaspora can generate substantial economic benefits for many origin countries in the ECA region. Remittances are an important source of income, have a positive impact on long-term economic growth and poverty reduction, and can improve access to capital markets. Diasporas are also a significant source of investment, export demand, and knowledge transfers for ECA economies, particularly given the disproportionately high flows of skilled emigrants from regional countries (see box 2). Finally, the increasing share of migrants going to the United States and Northern, Western, and Southern Europe may have contributed to improving institutions in ECA transition economies by increasing their populations' exposure to the norms of competitive democratic countries.

What determines migration connectivity? To answer this question, this report develops a global bilateral migration matrix showing the number of migrants between all country pairs. Constructing the matrix requires estimating migration flows for the many countries missing such data and then estimating the global relationship between population flows and various drivers of migration (figure 16). Most migrants move to countries with similar or higher levels of per capita income. Migration tends to increase as the distance between countries decreases. A large share of low-skilled migrants move to neighboring countries, but high-skilled migrants are more likely to move to nonneighboring countries, reflecting the tendency for high-skilled emigrants from developing countries to move to high-income OECD countries (especially English-speaking countries). Sharing a similar language also has a positive effect on migration flows, particularly for skilled migrants, whose jobs often require strong language skills. Finally, the existence of a diaspora tends to increase the flow of migrants (particularly for unskilled workers) by reducing the costs of information, financing movements, and perhaps reducing the risks involved in migration.

Some characteristics of ECA migration differ from these global patterns. Migrants from ECA countries (other than the advanced European economies), regardless of education level or gender, tend to move to other countries within the region. By contrast, migrants in other regions are no more likely to move within the region, once distance between countries and common borders are taken into account. High-skilled (but not low-skilled) migrants from former Soviet Union countries tend to go to other former Soviet Union countries, where they find similar institutions (a legacy of the Soviet Union) and close economic integration. Differences in the size of the working-age population (those 25–65 years of age) are also important determinants of migration flows. Countries with larger and younger working-age populations tend to have larger emigration to countries with smaller and older working-age populations. Because of aging populations in Central and Eastern European countries, a smaller working-age population emigrates from those countries. Central Asia, however, remains a

**MAP 1** Emigration and immigration shares have seen the highest increase in Europe and Central Asia



Source: World Bank 2018.

Note: Reported data for Central Asia for 2010 are particularly spotty; therefore this figure relies heavily on an estimation methodology developed by the World Bank staff.

**BOX 2 Marius Stefan of Autonom Romania: Knowledge transfers through travel and studies abroad**

Marius Stefan, a Romanian national, graduated with an MBA from the University of Maryland in 2004.<sup>a</sup> His proud parents flew in from Romania for the ceremony, and Marius decided to show them around the US East Coast on a short road trip. Marius did it the way he learned from friends: he rented a car.

His father was amazed that a private individual—from a foreign country, no less—could rent a car so easily. Such businesses were unknown in Romania. Marius had a good understanding of the car rental market from one of the case studies from his MBA program, and he explained the business model to his father.

After seeing how it was done and listening to his son, Marius's father made an unexpected proposal: that they would open a car rental business in Romania. Marius's family was from Piatra Neamt, a small town in one of the poorest regions in north-east Romania. It had almost no tourism and little economic activity at the time. While starting a business was exciting, Marius thought there was no potential and quickly forgot the conversation.

Marius returned to Romania and worked in several small businesses in Bucharest, the country's capital. But his father kept reminding him about his proposal to start a car rental business in his home town. Marius finally relented and agreed to ship three vehicles to Piatra Neamt to gauge the potential for car rentals. To his surprise, the rent-a-car business became an overnight success. Within a few weeks, employees at the business were calling Marius in Bucharest, asking why the company had just three cars. There were always more people wanting to rent, but too few cars to satisfy the demand.

Marius traveled from Bucharest to Piatra Neamt to investigate and found a simple explanation. When the country joined the European Union, more

than three million Romanians emigrated—most moving from the economically depressed region around Piatra Neamt to Spain and Italy. Many of the migrants returned to Romania frequently, and they were glad to have the opportunity to rent a car. When Marius realized the potential, he decided to act on a lesson from business school: after a pilot project is successful, focus all your efforts on scaling up as rapidly as possible.

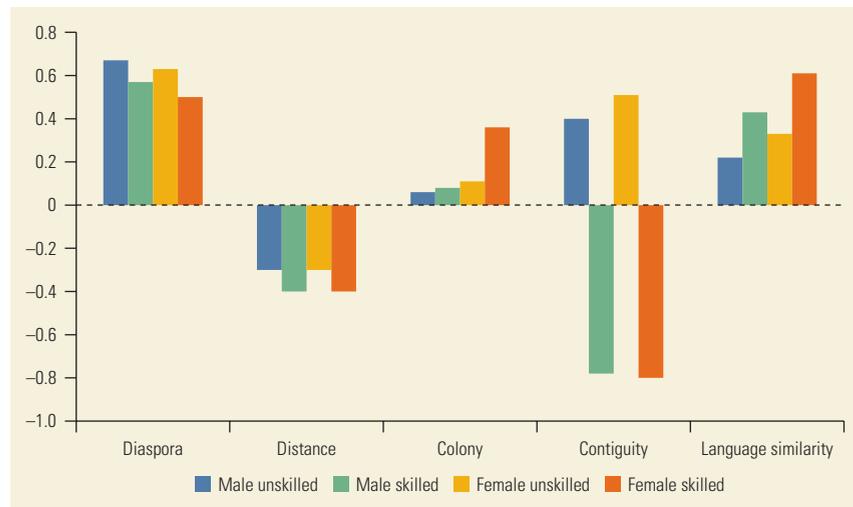
Marius's brother had been educated in France and had been working in Paris as an international consultant. After a year of successful business development, Marius added his brother's experience and knowledge to the business, and they have been working together as the enterprise has expanded beyond anyone's dreams.

Autonom now operates in 46 locations, employs 300 workers, and offers more than 5,000 cars for rent. The company is going through a stage of accelerated growth. It is developing a division for long-term rentals (operating leases) both organically and through acquisitions. It recently acquired the operational leasing division of Banca Transilvania, the largest bank in Romania, and the plan is to double the company's turnover and assets in 2018. While developing the business across Romania, the company started to expand abroad. It started Autonom Hungary three years ago and Autonom Serbia in May 2018—in effect, transitioning from a national champion to a regional player.

None of this would have happened had the Stefan brothers not migrated abroad. An idea sparked by a routine car rental in another country, combined with the knowledge gained by studying abroad, helped Marius and his brother build a successful company that testifies to the power of connectivity and its knowledge transfers.

a. This box was based on discussions with Marius Stefan in 2018. The author thanks Mr. Stefan for being so generous with his time.

**FIGURE 16** ECA migration is driven by geography, language, historical ties, and past migration



Note: Calculations are for 2010. “Skilled” migrants are those completing tertiary education. The size of the bars in the figure represents the coefficient of a regression equation and the percentage point impact on migration from a percentage point change in the migrant and home/host country attributes. Regressions also include regional dummies, such as migration within Europe and Central Asia (ECA) subregions and within the rest of the world.

subregion with a relatively young working-age population and has relatively large emigration. In addition, while women make up slightly less than half of global emigrants, they are the majority of ECA emigrants, possibly because of their higher skill levels relative to the global pool of emigrants.

Migration and the other connectivity components discussed in previous sections require highways, railroads, air links, and cargo transport to reach their full potential. The next section examines the role infrastructure plays in enhancing the ECA region’s connectivity. While all forms of transportation are important in this regard, this research project focuses on the differences in cost and time needed to move goods and people among various countries.

### Strong Infrastructure Transport Links Provide Important Support for Connectivity

Transport infrastructure forms the bedrock for international (and domestic) connectivity. This is obvious in the cases of trade in goods and migration, but services trade and investment flows also require supportive logistics, travel-related services, and infrastructure and may be linked to goods trade. Measuring the extent to which a country’s transport infrastructure facilitates connectivity through the channels mentioned is complicated. Many traditional infrastructure indicators—such as kilometers of roads and rail, their condition, or the density of connections—provide only limited information on the economic value of transport connections. To get an alternative view, this study looks at new data on transport services and network analysis tools to measure the economic value of ECA countries’ connections through roads, railroads, and to a lesser extent maritime transport.

The economic value of connections is measured here by the cost of transport, the time required, and the importance of the destination country in the overall transport network. Time is a particularly important consideration when the type of product (for example, perishable goods or parts and components traded within supply chains) or the nature of the passenger trip (for example, urgent business) requires rapid and reliable transport. Information on these dimensions is therefore essential for evaluating infrastructure investments' real impact on growth and welfare.

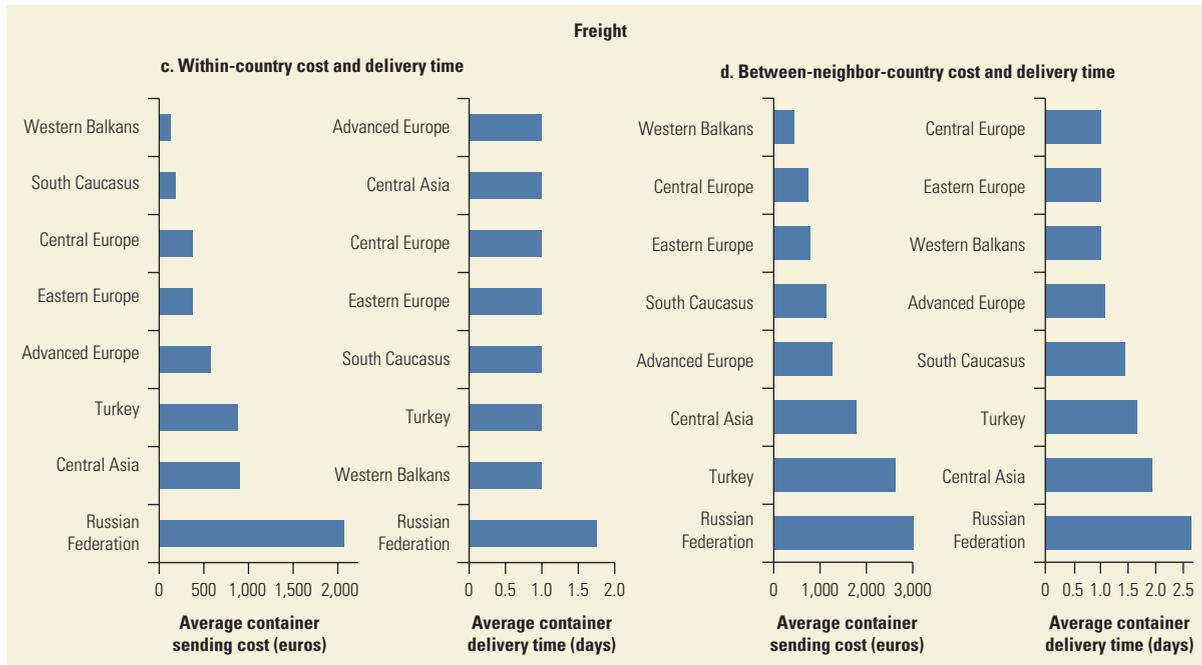
With some exceptions, domestic travel in the most advanced economies tends to take less time and be more affordable for residents (given the high incomes in these countries) than travel in other countries (figure 17). By contrast, the time required to deliver a container from one main city to another within a country differs little across ECA subregions, except in the case of Russia, for which distance between major cities plays a large role. However, time required for cargo shipments between countries is quite high in a few countries that serve as gateways to their neighbors (e.g., Belgium, Luxembourg, and the Netherlands), likely owing to the high level of congestion in their highway systems.

The cost and time required for passengers to connect with neighboring countries varies greatly within ECA, from the highest levels in Central Asia to the lowest in the Western Balkans. Advanced Europe's high-level road and rail infrastructure also delivers fast travel times at relatively low cost for residents, given their high incomes. Transport takes up a larger share of income in poorer ECA

**FIGURE 17** Transport connectivity (cost and time) between and within ECA countries  
Regional averages



continued

FIGURE 17 *continued*

Note: Within-country transport connectivity as measured here is multimodal, averaging across road, rail, and bus modes the price that must be paid to travel to a representative main city in the country. Transport connectivity between neighboring countries as measured here is multimodal between a country's capital city and main cities of neighboring countries. Only countries with complete data for time and cost for all modes (road, bus, and rail) are included. Within-country freight transport connectivity for a given city is measured as the average price to send a container from that city to the other main cities within a country. Between-neighbor-country freight transport connectivity is measured as the average price to send a container from a country's capital city to the main cities of neighboring countries. "Advanced Europe" includes countries in Western, Southern, and Northern Europe that signed the Maastricht Treaty or joined the European Union before 1995. ECA = Europe and Central Asia.

countries, with most Central European and Baltic countries in the middle of the pack. The average cost and time required to ship a container from a country's capital city to the main city of neighboring countries varies little among most subregions, except for higher costs and time in Central Asia, Russia, and Turkey.

Central Asian countries have much higher travel costs for both road and container transport and much longer travel times than other ECA regions. These countries might get help in integrating and improving their connectivity through recent or expected infrastructure projects gathered under the Belt and Road Initiative, a long-term project designed to reduce the cost of transport from China to Europe. Along with Portugal and Spain, the island countries Cyprus, Ireland, and Malta are also among the countries with the highest costs and longest time to reach the rest of the ECA network. South Caucasus performs better in terms of costs compared to time, whereas in Western Europe the opposite is the case. Central and Eastern European countries have relatively cheaper and faster connections to the rest of the network. The similarity in these rankings largely reflects road transport costs, which are determined in part by infrastructure quality and its impact on average speeds. The cost of

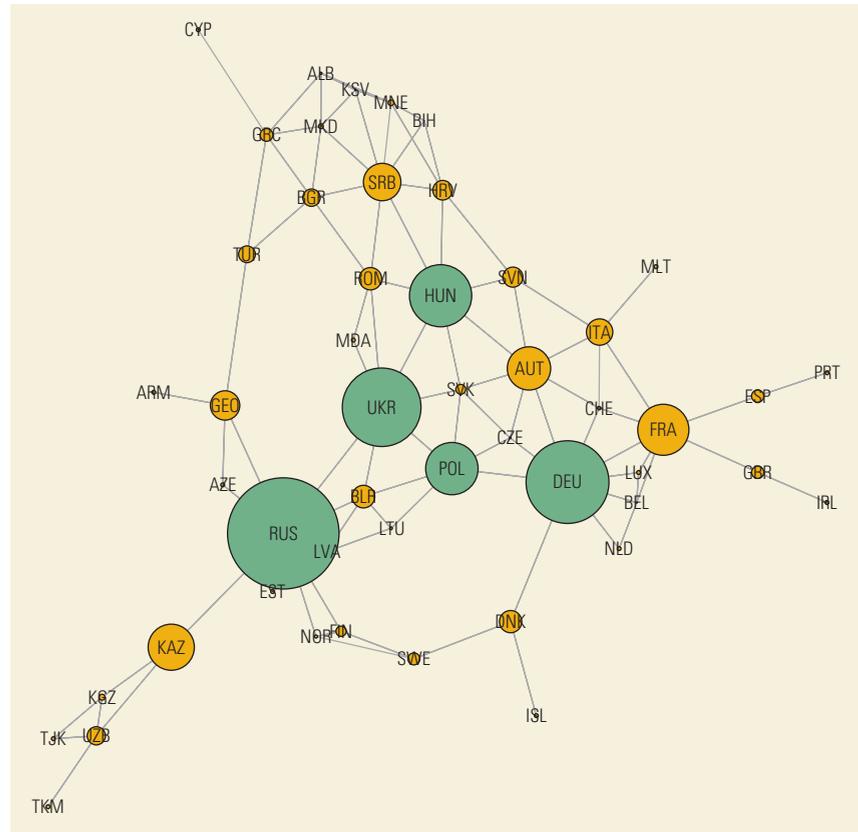
moving containers is another matter. Unlike passenger road costs, this cost reflects other parameters, such as logistics costs, the presence of rent seekers, and the degree of competitiveness among service providers. As a result, countries' cost versus time performance is more diverse when looking at the cost of moving containers rather than people. Countries like Armenia, Greece, Kosovo, the former Yugoslav Republic of Macedonia, and Turkey have relatively better connectivity in terms of container costs than they do in terms of time. Montenegro, Norway, Slovenia, and others have relatively better time connectivity than cost connectivity. Understanding country specificities requires a deeper look into institutional factors, the quality of logistics, and the competitiveness of the transport sector.

In addition to cost and time, determining the economic value of connections requires considering destination countries' place in the network. The availability of close connections varies greatly within the ECA region: the total number of a country's neighbors (or neighbors of neighbors) ranges from 2 to 22, and the level of aggregate GDP in the countries adjacent to a country varies significantly from country to country. Thus, some connections have a higher value than others in terms of access to a larger market. So in planning transport investments, a country should consider whether a particular investment improves access to a relatively isolated country or to a country with connections to a wider network.

Transportation infrastructure channels the movement of goods and people along major cross-country networks and, within networks, corridors. The comprehensive nature of the economic benefits that accrue to countries from being on a particular corridor, or at a specific crossroads of a network, remains an open question. A key question is whether roads or rail that pass through countries provide economic benefits if ancillary businesses associated with the corridor fail to materialize. If a country's economic and business environment is sufficiently attractive for investment, however, transit flows may increase export and import opportunities for firms along these routes (or corridors), develop new sectors such as logistics services, and generate nonmaterial benefits (flows of ideas and knowledge) to boost productivity. Firms located in transport hub countries may benefit from lower production costs and an improved ability to deliver on time. Higher transport network connectivity might be desirable for increasing a country's participation in regional and GVCs, attracting FDI, or increasing its participation in development corridors.

It is important to identify the most *critical* countries in transport networks. Doing so reveals which countries have more control over transportation networks' operability and what shocks in these countries imply for other connected countries. Measuring critical transport networks can help countries target investments to reduce their vulnerability to specific country shocks that might impede access to markets or other areas of the network. More generally, critical countries in the transport network are those where disruption would have a major impact on subnetworks or countries that can be de facto disconnected. For container costs, Russia is the most critical country in the network in Eurasia (figure 18). A country's cost-driven criticality reflects the increase in costs that a shipper (in the case of containers) would incur if it had to avoid that

**FIGURE 18** Cost-driven criticality in container network for Europe and Central Asia



Note: The results shown in the figure capture only the Europe and Central Asia (ECA) transport network and do not include connectivity to countries outside ECA. Consequently, large ports (e.g., Rotterdam) that are connected to the United States or China will not appear as critical, although they are in the larger global context. Circle size indicates level of criticality (larger diameter = greater criticality). For illustrative purposes, the circles representing the top five countries in criticality are colored in green. Lines between nodes indicate the presence in the physical network of an optimal corridor connecting countries. Locations of circles and countries are not linked to geography in any way. Results for time-driven criticality are not presented, as the results are very similar to those presented.

country in shipping cargo. Germany, Ukraine, Hungary, and Poland are among the five most network-critical countries. As expected, islands or isolated countries have a very low criticality. While France is not a top-five country in terms of network criticality, disruptions in the French transport network would affect connectivity to the rest of the ECA region for Spain, Portugal, the United Kingdom, and Ireland: Portugal's connection to the European network is contingent upon Spain's, and so forth.

Different goals for transport networks may imply quite different investment priorities:

- Countries may choose to strengthen partnerships—for example, to reach large markets, participate in supply chains, or connect to countries with high levels of technology (so the potential for learning is greater). As revealed by the cost and time of freight transport, ECA countries can be grouped into three categories in terms of partnerships: (a) the Western Balkans and Central Europe incur lower costs to reach the largest economies of Europe; (b) countries in Central

Asia and South Caucasus together with Russia incur lower costs to reach countries with similar technology levels; and (c) countries in Advanced and Eastern Europe, as well as Turkey, incur lower costs to reach either the largest ECA economies or countries with more sophisticated technology.

- Another possible goal among countries is to maximize the size of the market made accessible by their transport systems. Advanced Europe captures the largest amount of GDP per unit cost of transport (a container, private car, or railway ticket) among ECA subregions, followed by Eastern and Central Europe (85–90 percent of Advanced Europe’s market potential), South Caucasus and Turkey (50 percent), and Central Asia (40 percent). While the size of investments and the quality of services are important, many countries’ ability to increase their market connectivity by improving transport is limited by long distances from markets and difficult terrain.
- Countries also may choose their investments to maximize their integration within the ECA transport network. Some connections contribute more to a country’s overall connectivity with the region than others. The Czech Republic, the Slovak Republic, and Austria are the three most integrated countries in the ECA network, while Central Asia remains poorly integrated. Factors over which a country has no control, such as the number of neighboring countries it has, are also key elements in determining its degree of integration, but its transportation network is more important.

More cooperation among countries, especially along corridors, could increase the global benefits of transport investments. When it comes to the Belt and Road Initiative, for example, the benefit of investments for the network as a whole varies by individual segment. Reducing the cost of shipping a container in the Kazakhstan-China segment would have the largest impact on Kazakhstan’s ability to reach foreign markets, but Russia and Germany also would benefit significantly. Improving the Belarus-Russia segment would mostly benefit Belarus. A cost reduction on the Poland-Belarus segment would have the smallest impact on the network as a whole.

Although it would provide broad support for all aspects of ECA connectivity, better infrastructure has particular relevance for cross-border supply chains. Today’s businesses, rather than being concentrated in a single country, find their production of goods is now divided among plants in different countries, with each assigned production of particular components or the assembly of components from other plants. The final consumer product may thus reflect inputs from a number of countries.

## **The Growth of Supply Chains Reflects Greater Connectivity and Has Facilitated Increased International Knowledge Flows**

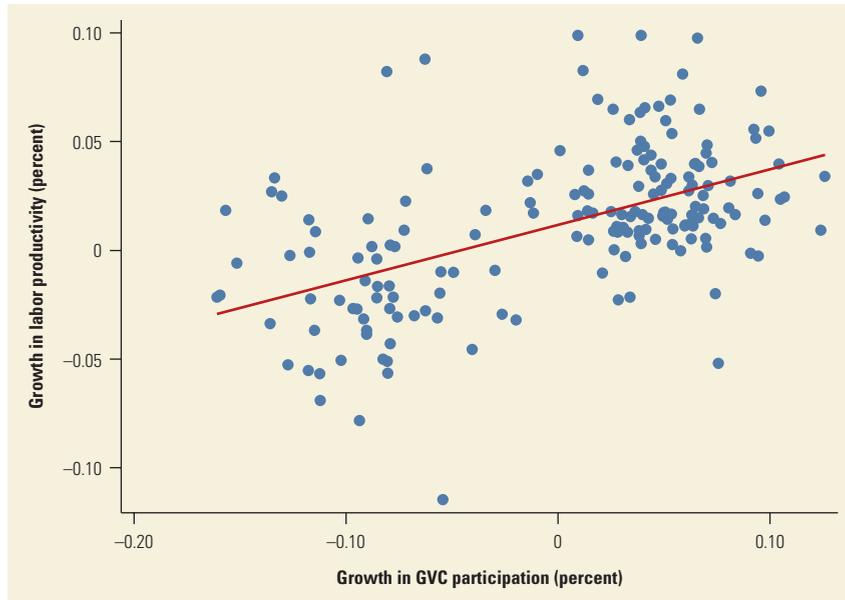
Regional supply chains are deepening around the world and are focused in three clusters—Asia, Europe, and North America. Europe’s supply chain is largely focused on Germany, particularly in motor vehicles, retail, and machinery and equipment. Despite enormous reductions in the prices of transport and communication,

geographic proximity continues to be important in coordinating production throughout supply chains. In fact, the importance of regional supply chains increased somewhat faster than that of global supply chains from 1995 to 2011.

Proximity remains important for several reasons. Suppliers often need complex information (tacit knowledge) that cannot easily be codified in blueprints or instruction manuals (explicit knowledge), requiring frequent, face-to-face communications with lead firms that are difficult and costly to achieve when plants are separated by thousands of kilometers. Proximity is associated with similarities in culture and language as well as migration networks—both of which facilitate these detailed information transfers. On-time delivery and reliable quality are critical in supply chains, where the lack of an intermediate input can slow production all along the chain. Therefore, lead firms may place greater emphasis on allocating production to close-by firms they know, rather than seeking cheaper locations at greater distance. Locating plants in proximity to one another can help improve the allocation of workers and machines across firms, facilitate the transfer of knowledge across plants, and enable more efficient use of infrastructure and other public services. Finally, regional integration agreements such as the EU encourage supply chain production through regional partners by lowering costs at the border, establishing similar legal and regulatory frameworks, and providing confidence in the stability of integration frameworks over time.

The growth of supply chains has generated substantial benefits. Participation in supply chains can expand the range of goods produced in developing countries. For example, a poor country that finds it difficult to compete with more sophisticated firms in the production of complex electronic products may be able to exploit its advantage of low-cost labor to assemble such products from components produced elsewhere. The transfer of knowledge is heightened in supply chains, which often involve intensive contacts with more sophisticated firms through trade, investment, and the movement of technicians and managers. Exposure to such knowledge can improve productivity. The growth of supply chains can also increase productivity through more intense competition, greater specialization (which can improve worker performance through learning by doing), and access to increased diversity of inputs. In OECD countries, growth in a country's participation in supply chains is associated with growth in its real labor productivity (figure 19), although this association may partly reflect the fact that more productive countries are more likely to participate in supply chains.

Increased participation in European (and Asian) supply chains has been associated with rising revenues from exports of both goods and services, even after subtracting the value of associated imports. To be more precise, participation in supply chains boosts the gross exports recorded in the balance of payments statistics. However, a substantial share of these export revenues must be devoted to paying for imported inputs used in the production of the goods, so the funds channeled to domestic profits and wages (i.e., domestic value added) may be a small fraction of gross export revenues. ECA countries that have increased their participation in supply chains tend to achieve a more rapid increase than other countries in the domestic value added generated by exports. From 2000 to 2011, for example, Turkey and Poland experienced



**FIGURE 19** Participation in global value chains is correlated with higher labor productivity

Source: World Bank labor productivity data and country global value chain participation index for member countries of the Organisation for Economic Co-operation and Development over the period 2009–11.

Note: Each dot in the figure represents one country for one year. GVC = global value chain.

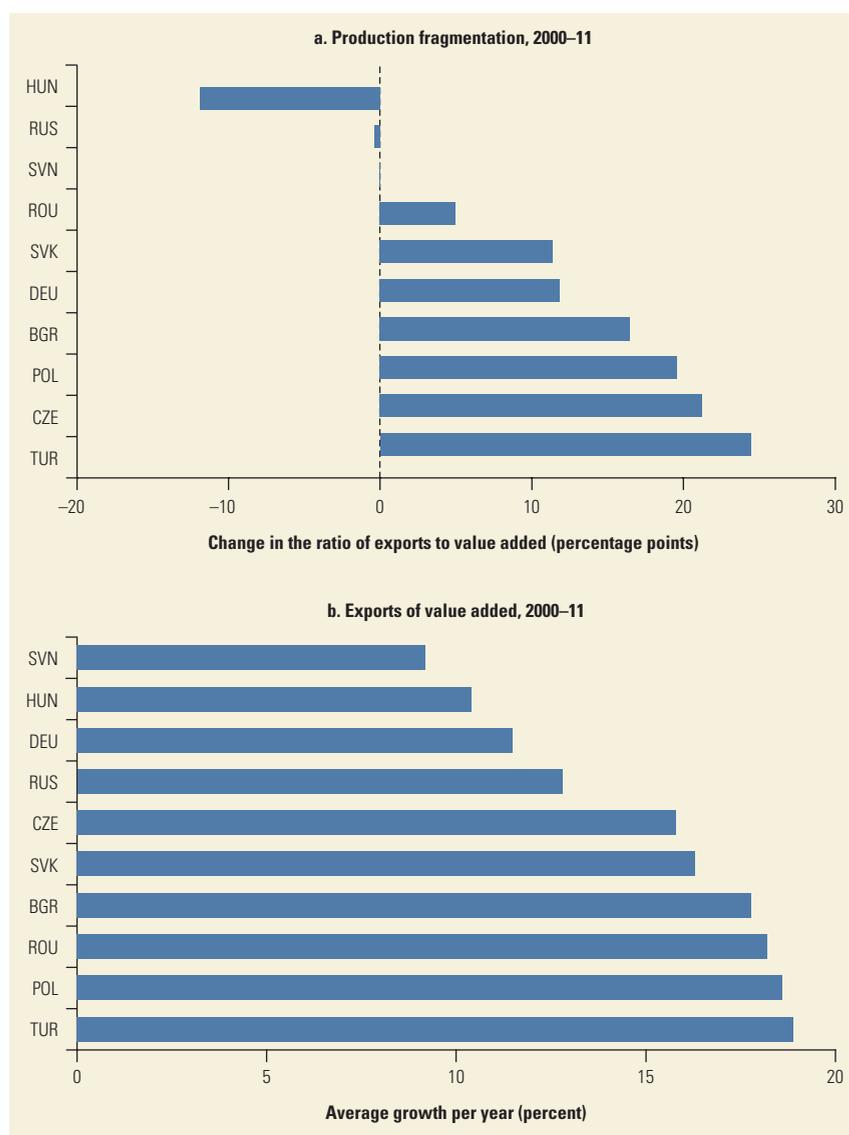
some of the largest percentage increases in the share of exports through supply chains among transition countries (figure 20, panel a) as well as the highest growth rate of exports of value added (figure 20, panel b). By contrast, Slovenia, Russia, and Hungary saw decreases in the share of exports through supply chains over the same period and only modest growth of value-added exports.

Greater participation in supply chains also tends to increase a country's dependence on other countries, potentially raising economic volatility in some segments of the country's economy. For example, a natural disaster in Indonesia that interrupts the production of an intermediate good may idle workers in the Czech Republic and reduce the profits of German retailers.

Finding the central sectors and the major cross-border links is important to understanding how positive or adverse shocks spread through production networks in the ECA region. A country or a sector that is central might be able to spread ideas to the rest of the network, but it might also more frequently receive shocks from the rest of the network.

The ECA production network is organized around several clusters that include sectors (for example, retail trade and motor vehicles) from different parts of the region. Having sectors from different regions in the same production cluster illustrates the interdependence of country-sectors across most ECA countries through input-output linkages. By evaluating which countries and sector clusters are most critical for production in ECA, it becomes clear that motor vehicles in Germany are the most central sector in the ECA production network. This sector largely relies on wide-reaching regional value chains to organize its production. The retail sectors in Italy, France, Germany, and Russia are all

**FIGURE 20** Among the transition countries, greater production fragmentation is associated with a more rapid increase in the flows of value added in exports



Source: Calculations based on Organisation for Economic Co-Operation and Development Trade in Value Added database.

important as well, but Germany's machinery and equipment sector is among the most critical value chain sectors. Outside of the mature EU countries, manufacturing clusters in Poland, Russia, and Turkey play a secondary role. By far, France, Germany, and Italy are the most important centers for the ECA trade production network, followed by Russia and Turkey. The least central countries are the Baltic countries, the Eastern European countries, and Portugal.

To this point, *Critical Connections* has focused on important aspects of connectivity in the ECA region. The phenomenon is multidimensional, with its various components working together to increase productivity. The gains, not shared equally among or within countries, are spurred by foreign ownership and management, migration, vital infrastructure, and supply chains.

Connectivity, however, carries risks and ignites changes in national economies. The remaining task for the study centers on ECA policies: first, the ECA region's recent record on promoting connectivity, and second, the challenges and opportunities that remain.

## **European and Central Asian Countries Have Moved toward More Open Policies**

While most economic policies can affect international connectivity in some way, this study's evaluation of ECA policy progress focuses on a set of areas that have important implications for openness to international connections. These include policies governing import tariffs, preferential trade agreements (PTAs), inward FDI, bilateral investment treaties (BITs) that protect investors from expropriation and adverse changes in investment policies, product market regulations, sectoral domestic regulations, visa regimes, and integration of migrants.

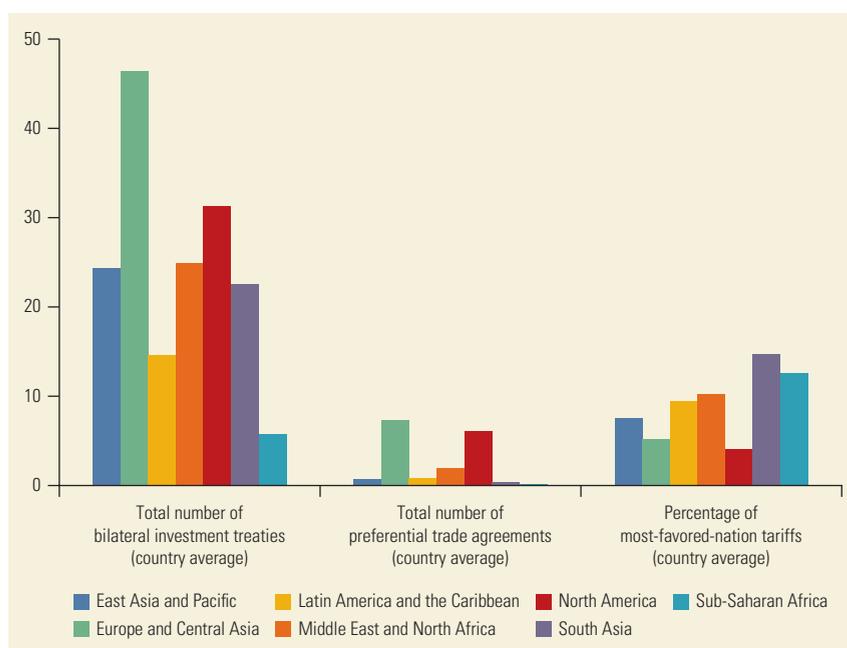
ECA countries have made important progress on policies to boost international connectivity. In part, this has reflected individual countries' efforts to open themselves up to the global economy, particularly following the collapse of the Soviet Union. However, regional agreements have also played a critical role, including the increasing sectoral coverage and depth of agreements within the EU, the expansion of the EU membership, and the formation of the Eurasian Economic Union, composed of Armenia, Belarus, Kazakhstan, and Russia.

The EU also has entered into more than 50 PTAs with countries in and around Europe. Over time, these agreements have shifted their primary focus away from reducing trade barriers, expanding to include liberalizing trade in services, public procurement markets, and cross-border investment. In addition, they have added provisions governing how the agreements are implemented through national regulatory regimes (figure 21). This broader agenda requires more complex decisions than negotiations over tariff levels. For example, regulations designed to achieve such objectives as safeguarding the health and safety of consumers (which are consistent with a trade agreement) have a greater scope than regulatory measures that serve only to protect domestic producers (which are inconsistent with the market integration goals of a trade agreement). Studies have found that participation in deeper and more comprehensive trade agreements is related to a country's ability to attract FDI. Each provision added to an agreement between a pair of countries (particularly in the areas of competition policies, investment, movement of capital, and intellectual property rights) is associated with an average 3 percent increase in FDI flows between the agreement partners.

ECA countries have, on average, made considerable progress in reducing barriers to trade and investment:

- Tariff levels applying to countries outside of preferential agreements have fallen steadily in ECA countries—from an average of 7 percent in 1988–96 to 5 percent in 2006–15. ECA's average tariff in the latter period was lower than that in all other regions except North America (Canada and the United States).

**FIGURE 21** ECA ranks among the top regions in regard to the number of trade agreements and investment treaties



Note: ECA = Europe and Central Asia.

Although tariff rates were reduced in all ECA subregions over this period, they were particularly low in high-income countries.

- ECA countries are among the least restrictive globally toward inward FDI, according to the OECD's FDI Regulatory Restrictiveness Index (although data are not available for the Western Balkans and the South Caucasus subregions). EU countries are the least restrictive, but all ECA subregions achieved some reduction in restrictions from 1997 to 2015.
- ECA's average score on an index of the intensity of use of PTAs dwarfs those of all other regions, driven by regional integration among EU member states and—to a lesser extent—an expansion of PTAs by Turkey and Russia.
- The average ECA country has entered into more BITs—almost 50 from 2000 to 2016—than the average country in other global regions. Almost 60 percent of all BITs signed by the average ECA country involve a partner in the ECA region.

ECA countries have also made progress in reducing product market restrictions that hamper international connectivity, but the advances have slowed in recent years. A measurement of product market restrictions that includes barriers to entrepreneurship, trade, and investment, as well as the impact of the scope and nature of state control of the economy, shows that the restrictiveness of the average European country has declined since 1998—but progress has stalled since 2008. Similarly, an index of the degree of policy restrictiveness in the ECA region implied by domestic regulatory regimes for energy, transport, and communications has improved since the mid-1980s (though the country coverage of this index is limited)—but progress has been negligible over the past 10 years. According to both indicators, the ECA region has more restrictive policies, on average, than Canada and the United States.

The transition countries (mostly not covered in the two regulation indicators discussed in the previous paragraph) have made significant progress in improving market-friendly regulations, as measured by the Transition Indicator Database developed and managed by the European Bank for Reconstruction and Development. The market openness indicators in formerly centrally planned economies in the Baltic countries and Central Europe improved markedly from 1989 to 2000, although the pace of reform slowed in the subsequent decade. Other subregions also made significant progress, but scores on these indicators of open markets vary considerably. For example, the gap between scores for the average country in Central Asia and the OECD benchmark is four times larger than the gap between the average country in the Baltics and Central Europe and the OECD standard.

Barriers to cross-border movement of people in high-income ECA countries—as measured by visa requirements, visa-issuing practices, and consular services—declined moderately from 2006 to 2012, and they remain substantially less than those imposed by the United States. However, obtaining a formal sector job is more difficult for immigrants in high-income ECA countries than in the United States. The decline in visa restrictions in both the ECA and the United States has applied mostly to nationals of high- and upper-middle-income countries, while nationals from poorer countries have seen little decline in restrictions on moving to high-income countries.

In many of the region's countries, limited integration of immigrants has impaired their contributions to host economies. For example, unemployment rates in the region tend to be higher among the foreign-born than the native-born population. Support for integration is even more important for refugees, who tend to take longer after entry to participate in the labor force. Although scores vary within the region, the ECA fares poorly on average when compared with other regions regarding policies supporting migrant integration (as measured by the Migrant Integration Policy Index). The average ECA country has had less success in integrating migrants than three of the four comparator countries selected for this exercise: Canada, the Republic of Korea, and New Zealand. (The ECA region has had more success than the fourth comparator country, Japan). The Central Europe subregion and Turkey have the worst performance, and while average scores in Western, Southern, and Northern Europe are closer to those of the best performers outside ECA, no ECA subregion has a score above the best-performing regions.

In summary, ECA countries have been global leaders in cooperation through PTAs and BITs and are comparable to high-income countries in terms of policies toward immigration. However, the average ECA country is more restrictive than countries in non-ECA regions regarding domestic regulations and migrant integration policies. The trend toward more open policies has slowed significantly, however, particularly since the first decade of this century. Little progress has been made in tariff liberalization (as of the beginning of the 2000s), the use of BITs (as of the end of the 2000s), or reductions in FDI regulatory restrictions and product market liberalization (as of 2010).



Barriers to cross-border movement of people in high-income ECA countries—as measured by visa requirements, visa-issuing practices, and consular services—declined moderately from 2006 to 2012.

## Considerable Scope Remains for Improving Policies to Increase Connectivity in Europe and Central Asia

Over the past few decades, steps toward increasing connectivity have brought economic growth and greater productivity to most countries in the ECA region. It would be beneficial to develop these connections more broadly and deeply to support broad-based growth. This conclusion rests firmly on *Critical Connections*' primary innovation: a multidimensional approach that examines the depth and breadth of ECA countries' connections, both within the region and globally. It explicitly recognizes the complementarity of the individual channels of connectivity: trade, FDI, migration, ICT, portfolio flows, and transport. The principal message is that diversity in country connections and balance in all channels of international connectivity are critical for achieving the highest impact on growth and economic resilience. It is not enough to focus on a few countries for connectivity or on one or two channels. The deepening of one channel can boost the impact of the other channels on growth.

In addition to recognizing that channels are mutually supportive, multidimensional connectivity provides the following lessons:

- ECA policies that build regional and *global* connectivity will stimulate robust growth. Being well connected in the global network of countries is important for long-run inclusive economic growth.
- Multidimensional connectivity puts a spotlight on cross-border transfers of knowledge and ideas as the wellspring of sustained growth. An ongoing improvement in the stock of knowledge leads to increases in TFP that allow countries to get more output from the same amount of inputs. Knowledge flows that occur through connectivity are mostly "tacit"—that is, "learning by doing"—and not transmitted via books or blueprints.
- As a result of the complementarity of the channels that link countries together, a balanced connectivity profile may be more important for knowledge spillovers and growth than being well connected in a single connectivity dimension. Deep and comprehensive FTAs are a way to achieve this.
- The number of connections a country's economic partner has might be just as important as the type of connections. Not all partner countries are the same in this regard. Some partner countries have more connections than others, which makes them potentially better conduits for knowledge transfers.
- In some cases, a country will be better off completing all channels of connectivity to a poorly connected partner than building a single channel of connectivity to a well-connected country.
- Connectivity's being multidimensional implies that shocks in one dimension (say, migration) can have adverse effects in other dimensions (say, FDI and trade) as well. However, countries with the greatest connectivity are among those with the most resilience to shocks.

The ECA region is a great laboratory for observing the role of multidimensional connectivity in action. Regional supply chains are strong, and links between countries across the various forms of connectivity allow observation of how connectivity

opens doors for the knowledge transfers that support sustained growth. The variation in connectivity between countries can be exploited empirically to explore which forms of connectivity matter the most.

Although the ECA region as a whole has moved toward greater connectivity, progress has been uneven across countries. Lower trade barriers have not always been associated with fewer restrictions on immigration or product markets, and some countries still rely heavily on other ECA partners for global connectivity. Most higher-income countries have pursued complementary policies in most areas of connectivity, but complementary policies have been less prevalent in lower-middle-income countries (e.g., lower tariffs are not uniform across partner countries and lose effectiveness because of more restrictive domestic regulatory regimes). Moreover, infrastructure linkages remain quite poor in some parts of ECA, particularly Central Asia.

ECA is a diverse region, and the appropriate policy mix to promote multidimensional connectivity will vary from one country to the next. This study supports some general observations about the direction of policy, however. Most obviously, countries can maximize their exposure to international knowledge flows and their ability to exploit their comparative advantages by maintaining low barriers to international transactions, including low tariff rates, minimal constraints on inward or outward FDI, and efficient procedures for border transactions. Multidimensional connectivity suggests countries should not try to rely on one or two types of connections; rather, they should develop a wide variety of mutually supportive outside links, including migration. In addition, participation in deep multilateral trade agreements that support integration of services markets and the reduction of differences in rules governing product markets would increase the impact of low barriers to international transactions on connectivity.

Broad improvements to the domestic business climate can make opening up an economy to the outside world more beneficial. A host of policies, desirable in themselves because they increase domestic economic efficiency, offer improved connectivity as a bonus: strengthening institutions, boosting financial sector development, and ensuring flexible labor markets. Adopting international best practice for standards governing product markets, worker protections, and the environment also tends to encourage international connectivity, particularly by making it easier to participate in global and regional supply chains.

Infrastructure investments that focus on improving the efficiency of logistics services are critical for most forms of international connectivity. Recognizing how some connections are more meaningful can give countries a framework to help evaluate the costs and benefits of infrastructure projects. In most economies, trade in final goods relative to trade in services is not as dominant as it once was. So improvements in telecommunications, including reducing the cost and increasing the efficiency of internet connections, would support international commercial transactions and improve contacts with diasporas and other foreign sources of knowledge.

Greater connectivity has two sides: the sending and the receiving countries. A lack of pertinent market information could keep the two from building business connections. Countries seeking to improve connectivity—in particular,



ECA is a diverse region, and the appropriate policy mix to promote multidimensional connectivity will vary from one country to the next.

those without a history of involvement with trade and FDI—may benefit from proactive policies that can help increase foreign investment and contacts with foreign firms. Investment promotion activities may be useful to encourage investors who lack sufficient information on domestic business opportunities or the policy regime and to reduce unnecessary or burdensome procedures for investment approvals.

Policies should aim to boost the positive effects of connectivity at the firm level, which are associated with better performance. Encouraging skilled immigration may facilitate the introduction of the foreign management practices that increase productivity. Promoting linkages with foreign affiliates, both within ECA and outside it, increases the kind of learning that improves the operation of local firms. Policies to help local firms acquire and absorb efficient global best practices could include increasing access to finance, management training, and supporting labor force mobility.

Migration is a key element of multidimensional connectivity. Improving its benefits within the ECA will require policy reforms to better integrate migrants into the labor force and increased investment in education for all workers to cope with the ongoing transformation of work driven by technological change. From 2000 to 2010, the share of temporary migration rose in more than two-thirds of high-income ECA host countries. Temporary work has also been a more prevalent feature of the labor market, reflecting greater connectivity and faster technological change. Helping all workers benefit from a rapidly changing global economy involves moving away from social safety nets tied to long-term employment toward general safety nets, allowing for more flexible contracts, investments in education, and the removal of constraints on workers' ability to move to find employment.

Improvements in various types of connectivity are perhaps most critical for the lower-middle-income countries, particularly those in the South Caucasus and Central Asia. Because of both their geographic position and limited infrastructure, many of these countries are only weakly connected to other ECA countries and the global economy. The vast distances between Central Asia and Europe will remain an obstacle to connectivity. However, infrastructure investments and policies to improve integration through freer trade, infrastructure, and investment policies are likely to provide large growth benefits in Central Asia.

The more diversified upper-middle-income countries, on the other hand, have a broader set of opportunities to improve connectivity. Participation in supply chains is strong in most of these countries, but balancing the currently uneven supply chain linkages, particularly low levels of imports of intermediate goods, versus already-high levels of exports of these goods, would support greater benefits from connectivity. A large set of policies—from removing barriers to trade and FDI to strengthening intellectual property protection and competitiveness reforms—are needed to improve participation in value chains and make the most of cross-border production opportunities.

The high-income countries that recently entered the EU have established relatively open economies and strong domestic business climates in the context of deep integration within the EU. Nevertheless, further efforts are required to bring their domestic business climates to the level of the most advanced European countries. Most of the transition EU economies would benefit from

reducing the excessive economy-wide restrictiveness in product markets that are relevant from a connectivity dimension. This calls for a review of the state's role in the economy and the extent to which regulatory regimes impede new firms' entry into sectors. If a country has relatively closed markets internally, its external connectivity will be affected by the reduction in its attractiveness for inward FDI and participation in global supply chains.

The ECA region's once-confident march toward greater connectivity has for the most part stalled in the past decade. Voices are currently casting doubt on the wisdom of opening to the outside world. The economic benefits of deeper and more diverse connectivity, however, are strong—most notably, the knowledge transfers from trade, FDI, and migration that deepen participation in multinational supply chains and lead to faster growth. By exploring multidimensional connectivity and its impact, *Critical Connections* provides a framework for understanding the benefits of and concerns about globalization and helps provide information for policy discussions and actions that recognize how the various aspects of connectivity might work together to deliver resilient and faster growth.

## Annex A. Selected Indicators

**TABLE A.1 Multidimensional Connectivity Indexes (on an Absolute Basis)**

*Global ranking, from best to worst, in combined connectivity (lower rankings indicate better connectivity)*

Country	Multidimensional connectivity	Trade	FDI	Migration	ICT	Airlines	Portfolio flows
<b>ECA</b>							
Germany	2	1	5	3	4	3	3
United Kingdom	4	6	2	4	2	1	4
Netherlands	5	10	3	14	12	8	14
France	6	5	6	5	5	4	5
Belgium	7	7	7	18	9	13	18
Italy	8	8	13	7	6	7	6
Spain	10	12	12	10	7	6	9
Switzerland	13	15	10	17	8	10	17
Ireland	14	16	11	29	14	14	31
Sweden	15	17	14	19	13	12	19
Poland	17	28	25	20	27	28	23
Austria	18	18	22	21	18	15	20
Russian Federation	22	19	37	13	23	30	13
Czech Republic	23	21	28	39	35	25	38
Hungary	25	25	26	43	37	33	42
Denmark	28	26	23	25	20	11	24
Luxembourg	29	38	4	61	39	37	57
Finland	30	22	24	31	30	21	30
Turkey	31	32	39	16	33	27	16
Portugal	32	31	29	28	25	20	29
Norway	33	33	21	22	22	16	21
Slovak Republic	35	34	41	52	53	68	51
Ukraine	40	42	64	48	67	66	47
Greece	42	39	40	26	26	22	27
Bulgaria	48	47	59	62	58	62	62
Lithuania	50	49	58	68	80	49	65
Croatia	51	53	54	56	49	57	54
Estonia	52	50	57	84	59	61	78
Belarus	54	65	101	67	100	100	63
Latvia	58	55	63	79	73	54	76
Cyprus	60	71	52	74	45	51	70
Malta	62	64	60	94	70	63	95
Kazakhstan	63	62	83	53	95	88	53
Bosnia and Herzegovina	68	68	76	65	64	80	82
Macedonia, FYR	77	69	74	95	79	79	96
Albania	78	80	87	76	72	75	90
Moldova	86	89	100	102	89	92	102
Georgia	97	103	102	99	102	104	97
Armenia	98	105	103	103	103	103	101
Kyrgyz Republic	99	96	95	106	101	101	104
Tajikistan	100	106	106	107	105	106	105
Azerbaijan	101	102	107	87	104	102	84
<b>Other countries</b>							
United States	1	2	1	1	1	2	1
China	3	3	8	6	15	19	7
Canada	9	9	9	9	3	5	8
Mexico	11	11	20	8	10	9	11
Japan	12	4	17	2	19	18	2
Singapore	16	14	19	42	29	29	40
Brazil	19	29	18	11	24	32	10
Malaysia	20	13	31	36	31	38	37

*continued*

**TABLE A.1** *continued*

Country	Multidimensional connectivity	Trade	FDI	Migration	ICT	Airlines	Portfolio flows
India	21	24	38	12	17	24	12
Indonesia	26	23	35	24	48	36	25
Thailand	27	20	34	32	43	31	32
Hong Kong SAR, China	34	27	16	33	16	26	33
South Africa	36	35	30	27	38	50	26
Argentina	37	37	27	30	42	48	28
Chile	38	41	33	40	50	59	39
Israel	39	36	46	37	28	56	35
New Zealand	41	45	32	41	21	35	41
Morocco	43	46	51	45	46	40	52
Peru	44	52	45	49	52	60	48
United Arab Emirates	45	43	53	34	47	42	34
Saudi Arabia	46	40	43	23	36	53	22
Egypt, Arab Rep.	47	57	49	47	55	52	46
Colombia	49	58	44	35	41	45	36
Nigeria	53	67	48	46	32	73	45
Tunisia	55	44	71	59	51	44	60
Trinidad and Tobago	56	59	61	70	62	69	77
Costa Rica	57	54	65	72	63	43	68
Pakistan	59	48	66	44	66	76	43
Dominican Republic	61	51	67	54	40	34	58
Algeria	64	56	81	38	56	55	44
El Salvador	65	60	73	57	34	46	72
Panama	66	77	50	75	77	64	74
Guatemala	67	61	77	58	44	58	64
Qatar	69	70	56	60	57	47	56
Bangladesh	70	63	92	51	97	94	50
Uruguay	71	73	55	77	71	77	71
Bahamas, The	72	84	42	92	65	17	89
Jordan	73	66	68	82	61	67	80
Mauritius	74	74	47	93	83	83	94
Ecuador	75	85	70	55	60	65	55
Ghana	76	78	82	83	78	85	83
Jamaica	79	87	62	63	68	39	79
Sri Lanka	80	76	91	69	93	93	66
Oman	81	72	84	64	54	41	59
Kenya	82	93	72	71	84	71	69
Bahrain	83	91	85	80	99	82	75
Lebanon	84	79	78	73	76	78	67
Cameroon	85	90	79	78	92	87	73
Mozambique	87	97	69	89	90	98	91
Kuwait	88	81	89	50	69	95	49
Gabon	89	94	75	88	88	97	86
Barbados	90	99	36	97	75	70	100
Syrian Arab Republic	91	75	88	66	74	81	61
Namibia	92	86	90	96	86	89	92
Paraguay	93	95	80	86	85	86	88
Guyana	94	92	86	85	81	84	108
Botswana	95	83	94	90	91	96	85
Swaziland	96	82	93	104	94	99	103
Ethiopia	102	100	99	81	98	90	81
Brunei Darussalam	103	88	96	91	96	91	87
Benin	104	98	104	101	107	105	99
Belize	105	101	97	105	87	74	106
Antigua and Barbuda	106	104	98	108	82	72	107
Burkina Faso	107	108	108	100	108	108	98
Afghanistan	108	107	105	98	106	107	93

Note: ECA = Europe and Central Asia; FDI = foreign direct investment; ICT = information and communication technology.

**TABLE A.2 Multidimensional Connectivity Indexes (on a Per Capita Basis)**

Global ranking, from best to worst, in combined connectivity (lower rankings indicate better connectivity)

Country	Multidimensional connectivity	Trade	FDI	Migration	ICT	Airlines	Portfolio flows
<b>ECA</b>							
Luxembourg	1	2	1	1	1	3	32
Ireland	2	3	6	4	3	5	28
Netherlands	3	6	5	21	15	13	9
Belgium	4	4	4	6	7	19	79
Switzerland	6	5	8	2	2	7	7
Malta	7	23	7	35	23	6	53
Sweden	9	8	13	8	10	12	84
Norway	11	13	12	10	13	8	15
Cyprus	12	37	3	16	6	11	14
United Kingdom	13	19	15	11	9	17	5
Denmark	14	11	17	15	12	4	11
Finland	15	9	16	31	25	16	16
Austria	16	7	19	9	17	14	70
Germany	18	10	20	12	19	26	19
France	19	17	18	13	22	30	18
Czech Republic	21	12	28	29	34	34	30
Hungary	22	18	25	51	37	36	26
Spain	23	25	24	17	29	23	48
Estonia	24	20	30	23	27	22	1
Portugal	26	27	29	24	30	24	21
Slovak Republic	27	14	32	41	43	56	66
Italy	31	22	31	32	32	33	12
Lithuania	35	28	40	45	77	35	2
Latvia	37	32	41	20	55	21	60
Poland	38	34	36	47	45	49	34
Croatia	41	44	37	59	38	39	56
Greece	42	45	42	26	31	31	20
Bulgaria	45	43	45	71	51	50	62
Turkey	56	55	57	39	76	62	85
Belarus	58	48	73	30	83	100	98
Bosnia and Herzegovina	60	60	63	88	49	63	82
Macedonia, FYR	61	52	58	83	65	58	69
Russian Federation	63	49	67	43	73	80	40
Ukraine	71	62	76	27	87	81	104
Albania	75	79	75	37	60	48	75
Kazakhstan	76	68	83	25	99	90	99
Georgia	84	102	65	63	98	99	90
Moldova	86	81	94	48	62	68	80
Armenia	87	90	70	77	89	79	81
Kyrgyz Republic	95	99	97	50	100	95	94
Tajikistan	102	109	101	67	107	98	103
Azerbaijan	106	106	107	87	103	93	106
<b>Other countries</b>							
Singapore	5	1	11	14	11	20	10
Hong Kong SAR China	8	15	10	22	5	29	4
Bahamas, The	10	41	9	36	14	1	8
Canada	17	16	22	7	4	18	22
Barbados	20	85	2	49	28	10	63
Australia	25	35	23	3	21	44	17
Qatar	28	33	21	42	18	9	23
New Zealand	29	39	26	5	8	27	13
United States	30	30	27	18	26	46	64
Mauritius	32	57	14	52	66	52	6
Trinidad and Tobago	33	31	33	66	33	28	72

continued

**TABLE A.2** *continued*

Country	Multidimensional connectivity	Trade	FDI	Migration	ICT	Airlines	Portfolio flows
United Arab Emirates	34	29	34	55	39	37	77
Malaysia	36	21	43	54	40	60	65
Israel	39	24	46	19	24	51	61
Chile	40	46	35	58	63	66	29
Japan	43	26	50	75	57	71	24
Panama	44	59	38	53	52	40	73
Bahrain	46	42	49	72	70	42	37
Uruguay	47	73	39	40	56	59	3
Mexico	48	40	51	56	42	53	107
Thailand	49	38	55	78	82	69	36
Costa Rica	50	36	60	70	54	38	83
Argentina	51	66	44	34	61	74	27
Saudi Arabia	52	51	54	44	41	65	42
Oman	53	56	56	61	35	32	41
South Africa	54	53	53	64	68	82	39
Brazil	55	69	48	69	85	87	49
Gabon	57	80	47	46	81	75	33
Brunei Darussalam	59	50	71	60	67	43	78
China	62	54	62	113	88	96	89
Peru	64	74	59	85	72	77	71
El Salvador	65	63	61	80	16	45	86
Jamaica	66	83	52	68	46	25	88
Morocco	67	75	66	106	79	61	44
Dominican Republic	68	61	64	62	36	41	91
Tunisia	69	47	79	90	59	55	25
Jordan	70	65	68	33	44	54	51
Indonesia	72	71	77	99	97	89	43
Guyana	73	64	80	81	53	47	76
Philippines	74	58	84	79	80	86	45
Colombia	77	84	72	86	74	78	50
Swaziland	78	67	89	82	91	83	93
Antigua and Barbuda	79	92	69	28	20	2	58
Lebanon	80	77	74	103	64	57	31
Namibia	81	70	93	74	75	67	92
Kuwait	82	76	86	104	48	73	55
Botswana	83	72	92	109	92	76	87
Egypt, Arab Rep.	85	86	78	97	95	85	67
Guatemala	88	78	88	84	58	64	96
Belize	89	93	87	38	47	15	74
Ecuador	90	96	85	65	69	70	101
Algeria	91	82	98	107	93	72	52
Ghana	92	87	95	100	50	94	105
Paraguay	93	100	96	57	94	84	46
Nigeria	94	101	90	101	71	104	68
Cameroon	96	105	91	91	102	97	35
India	97	88	99	95	84	101	47
Zimbabwe	98	89	100	76	90	91	54
Sri Lanka	99	91	102	92	105	102	59
Mozambique	100	107	82	73	104	103	108
Kenya	101	103	81	94	86	88	95
Pakistan	103	97	103	111	78	106	57
Sudan	104	98	105	105	112	113	113
Syrian Arab Republic	105	94	104	108	96	92	102
Bangladesh	107	95	108	96	101	109	38
Benin	108	108	109	89	111	111	100
Togo	109	104	113	93	108	105	97
Ethiopia	110	111	110	112	109	107	112
Afghanistan	111	113	106	110	106	110	110
Niger	112	112	111	98	113	112	111

## Notes

1. Transmission of shocks is not new. The bubonic plague of 542 CE, which decimated the Byzantine Empire, is thought to have arrived in Constantinople (today's Istanbul) by way of the Silk Road. The spice trade was also accompanied by struggles for economic dominance as wars were fought, lands were colonized, and fortunes were made and lost.
2. The full study is available at <http://www.worldbank.org/en/region/eca/publication/critical-connections>.
3. Note that the OECD average includes the European Union countries.
4. In a seminal contribution, Coe, Helpman, and Hoffmaister (1997) identify that by trading with industrial countries with a large "stock of knowledge" accumulated through R&D activities, developing countries boosted their productivity by importing intermediates and capital goods that embodied knowledge and information. Van Pottelsberghe de la Potterie and Lichtenberg (2001) identify that FDI, and in particular outward FDI, has also been a conduit for R&D spillovers for 13 industrial countries (including 11 EU member countries).

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The countries of the Europe and Central Asia region, along with much of the rest of the world, find themselves engaged in a revival of one of the fundamental questions of economic policy: how much to open to the rest of the world. This question now dominates the political economy of the region, not just within the advanced economies of the European Union but also among the region's emerging market economies. In *Critical Connections*, the World Bank offers new research on the process of economic integration, showing its potential benefits without ignoring the downsides.

The report examines how trade, investment, migration, and other linkages among countries drive economic growth in the Europe and Central Asia region. It breaks new ground by using a multidimensional approach that recognizes how each connectivity channel is likely to be affected by the strength of other channels. The multidimensional view offered by this approach makes it clear that diversity in country connections and balance in all channels of connectivity are critical for achieving the greatest impact on growth and economic resilience.

Europe and Central Asia provides a great laboratory for observing the role of multidimensional connectivity in action. The region's 47 countries vary widely in the degree of openness of their economies. Its collective experience shows how the various elements of cross-border connectivity work together to accelerate progrowth knowledge transfers, which in turn boost productivity through participation in today's global value chains. Which countries a country has as its economic partners might be just as important as the type of connection it has with them, because being well connected to highly connected countries can provide benefits beyond being well connected to comparatively isolated countries.

Although greater connectivity can expose countries to external shocks, the report presents a fact-based argument for policies that seek to build deeper and more diverse connections within the Europe and Central Asia region and globally. The message is timely. Europe's once-confident march toward economic integration has slowed over the past decade, with voices in many countries questioning the wisdom of opening to the global economy. *Critical Connections* serves as a reminder to citizens and policy makers that greater regional and global connectivity has been a tremendous "convergence machine," raising living standards in lower-income countries toward those of wealthier middle- to high-income countries. By exploring multidimensional connectivity and its impact, the report provides a framework for understanding the many benefits and challenges of globalization and helps provide information for policy discussions and actions that recognize how the various aspects of connectivity might work together to deliver resilient and faster growth.

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