

The Future of Jobs in Moldova

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With Siddhartha Raja, Veronica Midari

The World Bank Group

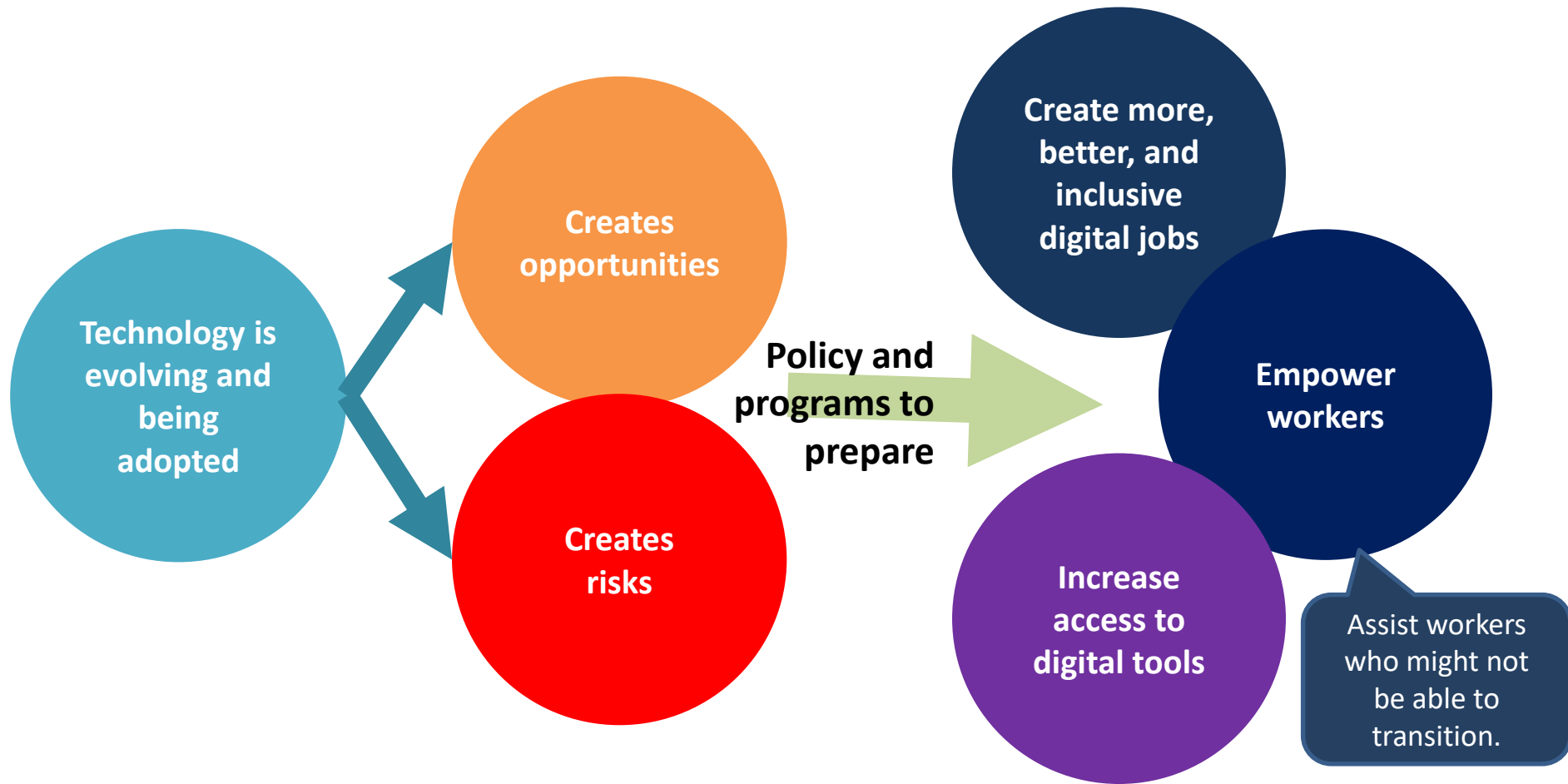
May 2019

Agenda

- Global context: How technological change could influence work
- Understanding the potential implications for Moldova's workforce
- What's next for Moldova?

Global context: How technological change could influence work

Overview



Source: World Bank

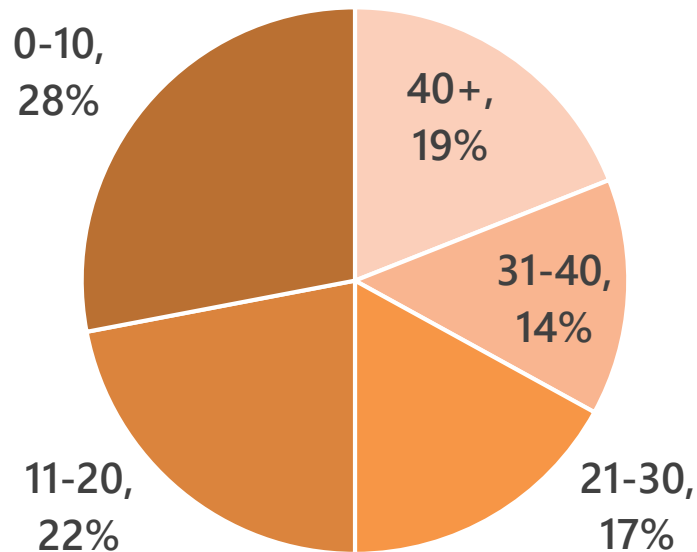
Technology's impact on jobs: Multiple dimensions

	Positive effects	Negative effects
Quantity of jobs	<p>Access to markets and resources, due to improved connectivity, helps firms grow and create jobs, or attract work to new markets that are more competitive.</p> <p>Product innovations, created and distributed using various technologies, give rise to new industries, firms, and jobs.</p>	<p>Susceptibility of today's jobs due to automation, as machines can take on more tasks, or due to innovation reshaping industries and firms.</p> <p>The nature of jobs change, as technology reshapes and alters connections among workers, work, and employers.</p>
Quality of jobs	<p>Productivity increases due to the augmentation of workers' capabilities through automation; leads to related increases in wages, improvements in working conditions.</p>	<p>Workers bear more risk, as connectivity reorganizes where work is done and by whom, diffusing the traditional formal employer-worker relationship.</p> <p>Wages stagnate or fall, as technology allows employers to automate or trade more tasks; this could lead to wage polarization and inequalities depending on task content of jobs.</p>
Distribution of jobs	<p>Inclusion of previously disconnected workers, as connectivity and automation lowers search costs and helps workers overcome physical and social barriers; firms can overcome skills constraints to grow, creating jobs.</p>	<p>Exclusion or lagging participation means that workers, employers, and economies would suffer missed opportunities and from degrading competitiveness</p>

Risks: Changing arrangements, disconnection

Workers are having to take on more risk

Average hours worked per week on freelance jobs online



Data from Elance.com, 2012

The unconnected are often vulnerable

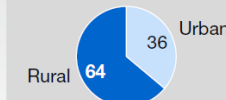
The offline population is disproportionately rural, poor, illiterate, elderly, and female

% of non-Internet users

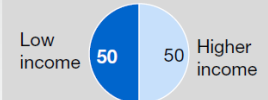
Non-Internet users in top 20 countries by size of offline population, 2013

~3.2B
(74% of the worldwide offline population)

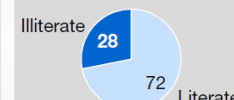
Urban-rural¹



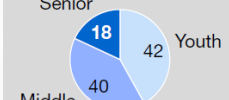
Income²



Literacy³



Age⁴



Gender

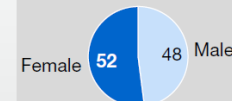


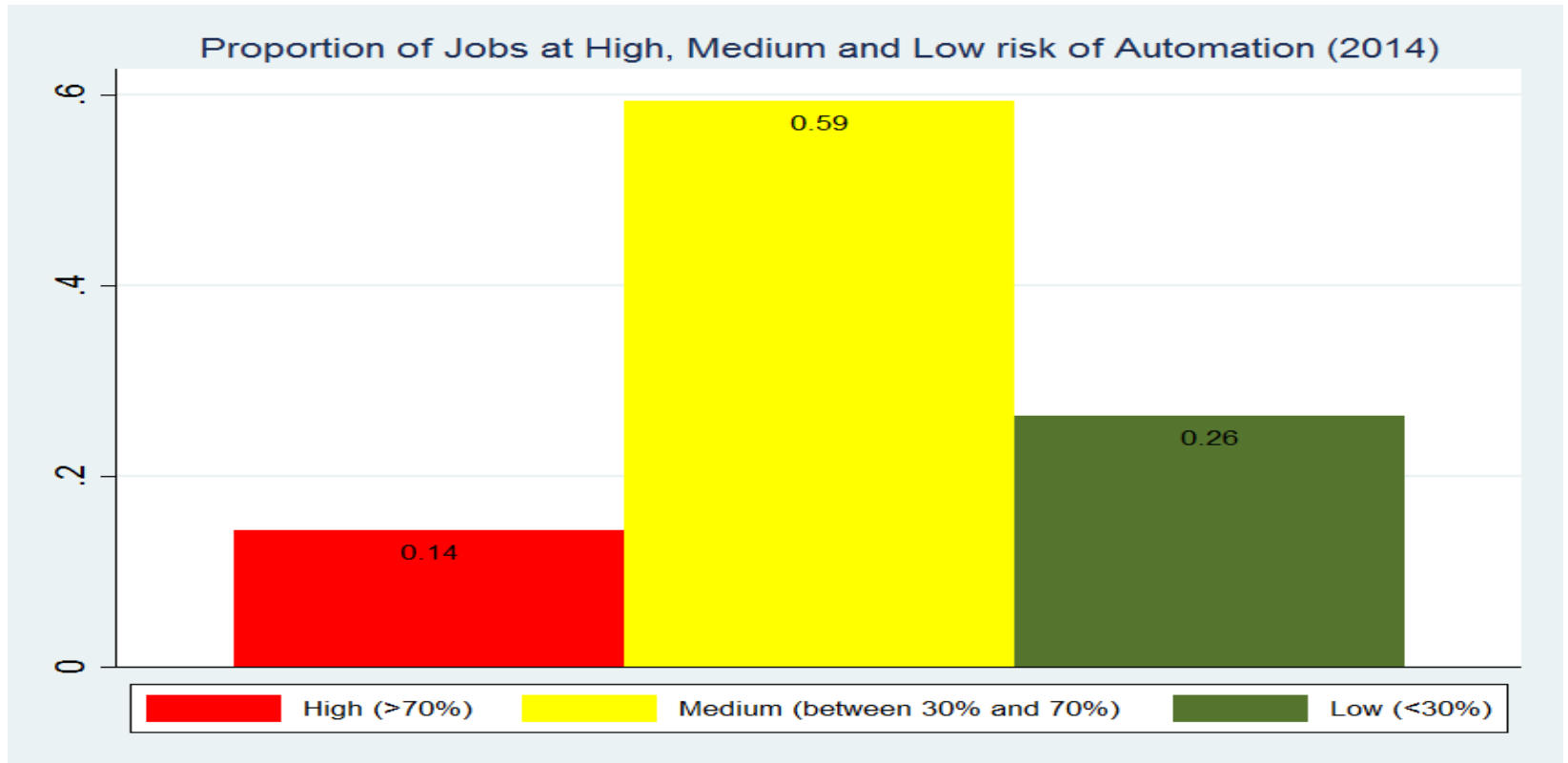
Image source: McKinsey & Company, Offline and falling behind, 2014

Understanding the implications for Moldova's workforce

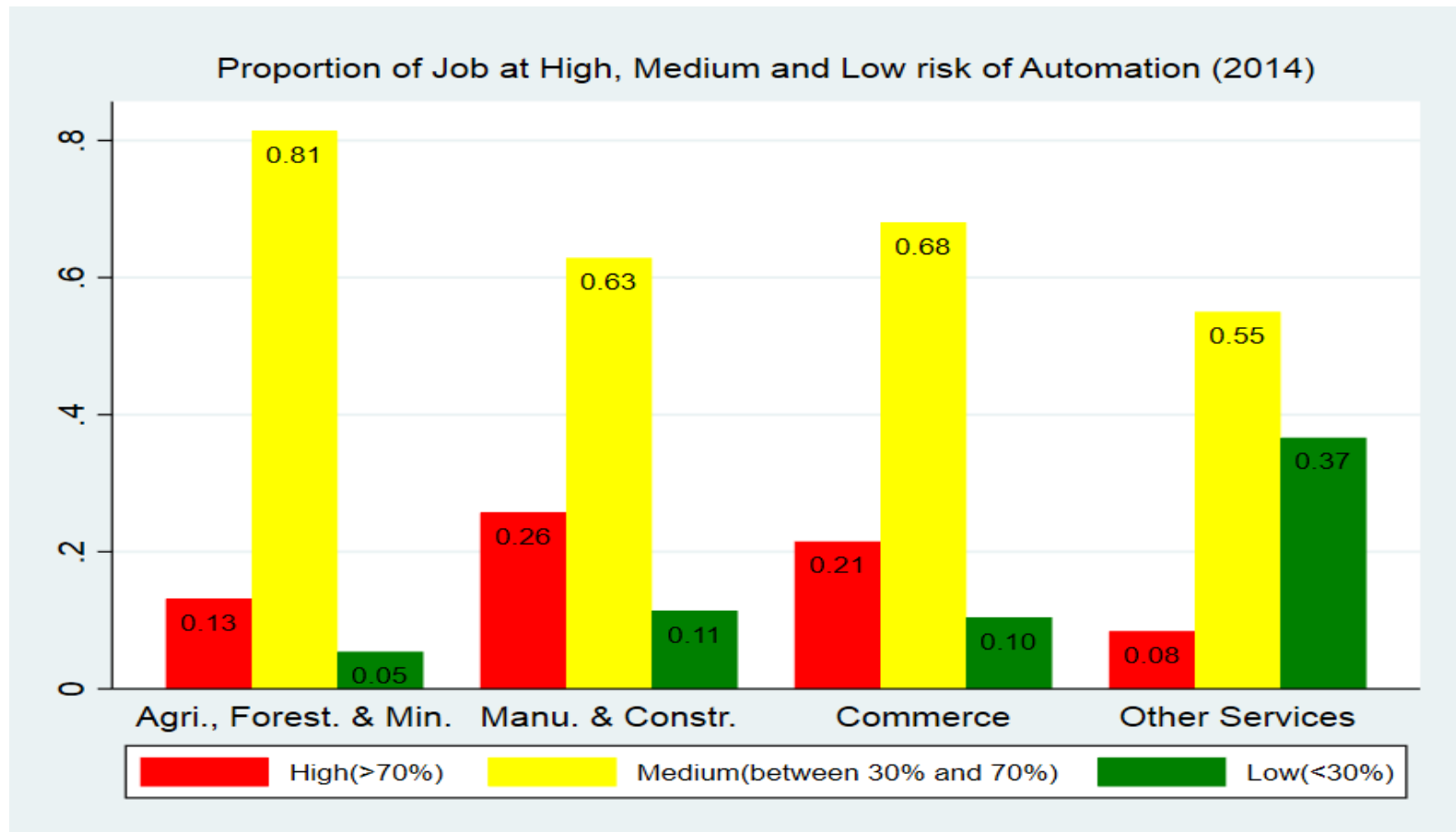
Risk of Automation to Moldovan Workforce

- Assessing the threat of automation using Job-based Approach ref. Arntz, M., Gregory, T., & Zierahn, U. (2017). Revisiting the risk of automation, Economics Letters (159); This builds on Frey & Osborne (2017)
- Primarily focused on the workers in urban areas in Moldova
- Analysis is speculative in nature

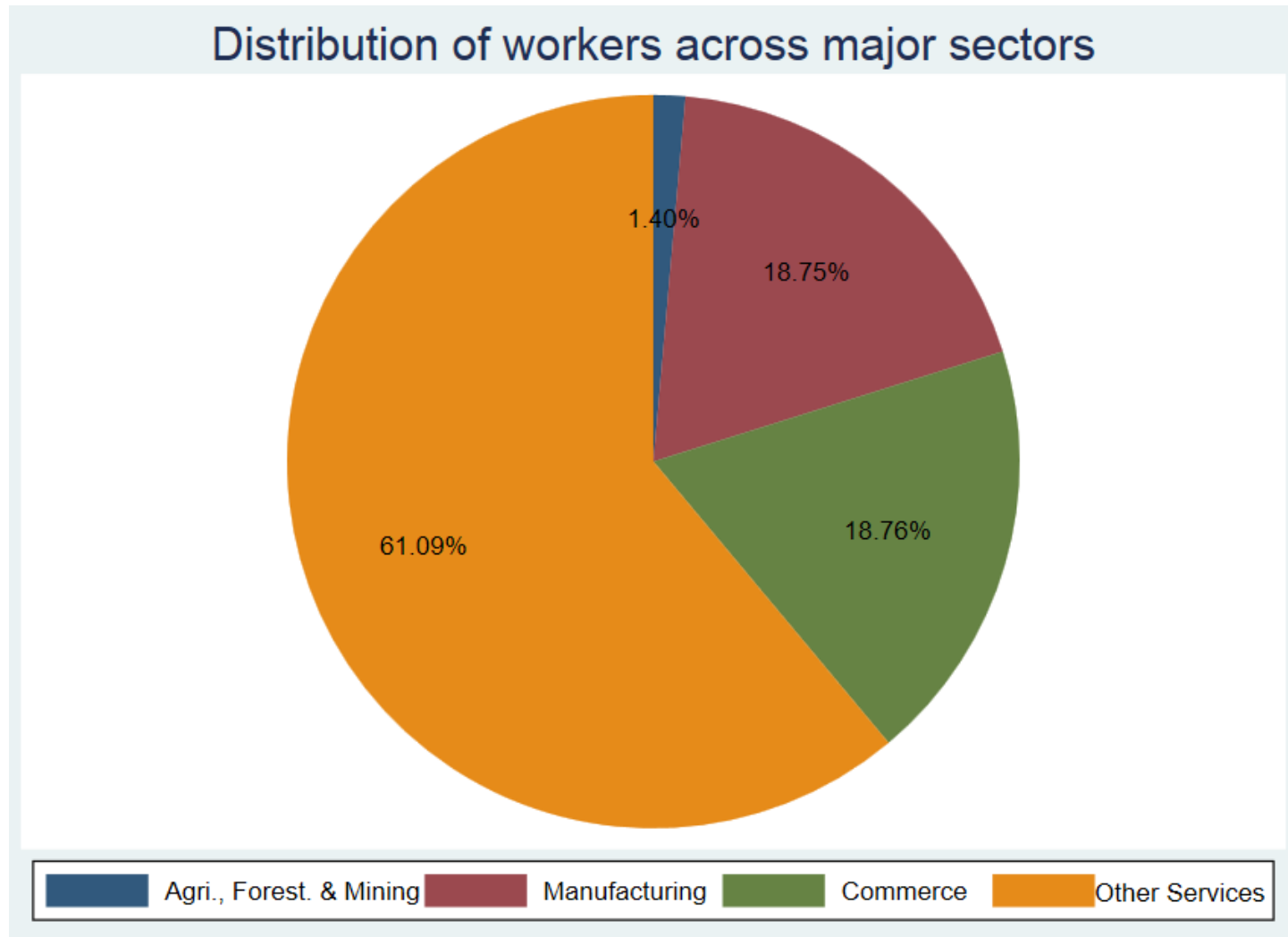
Risk of job losses and changes



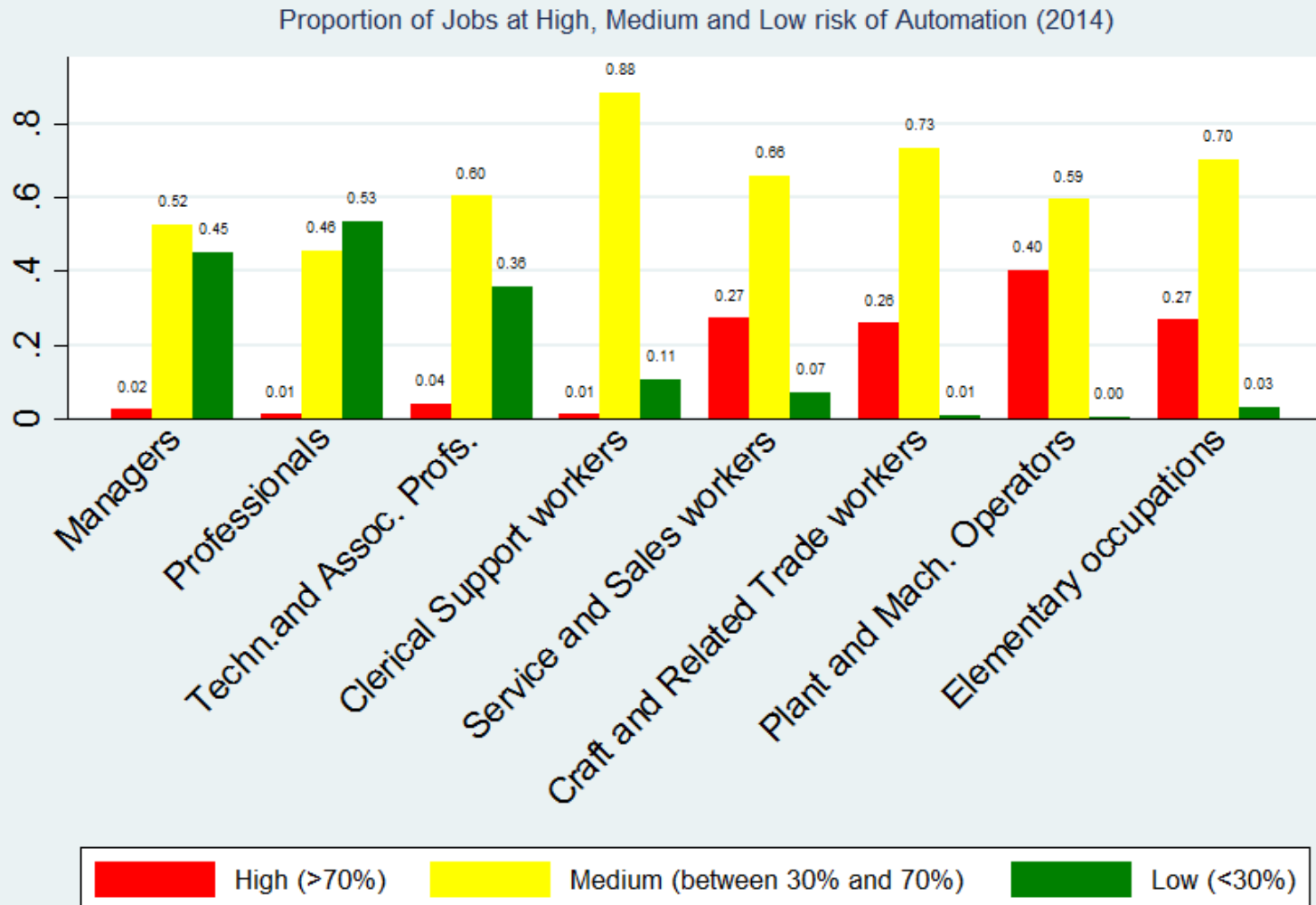
Possible changes across industries



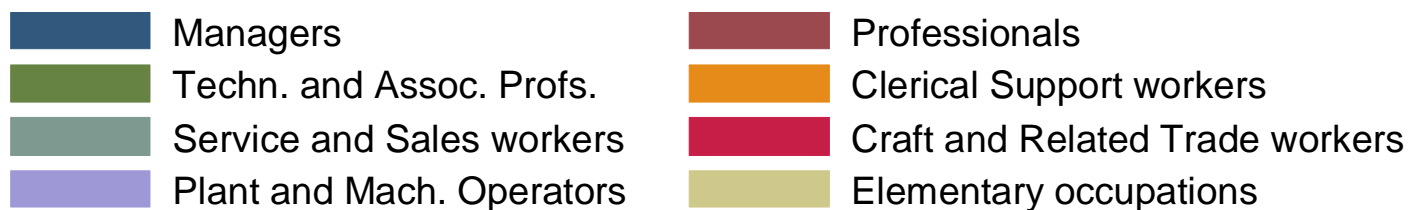
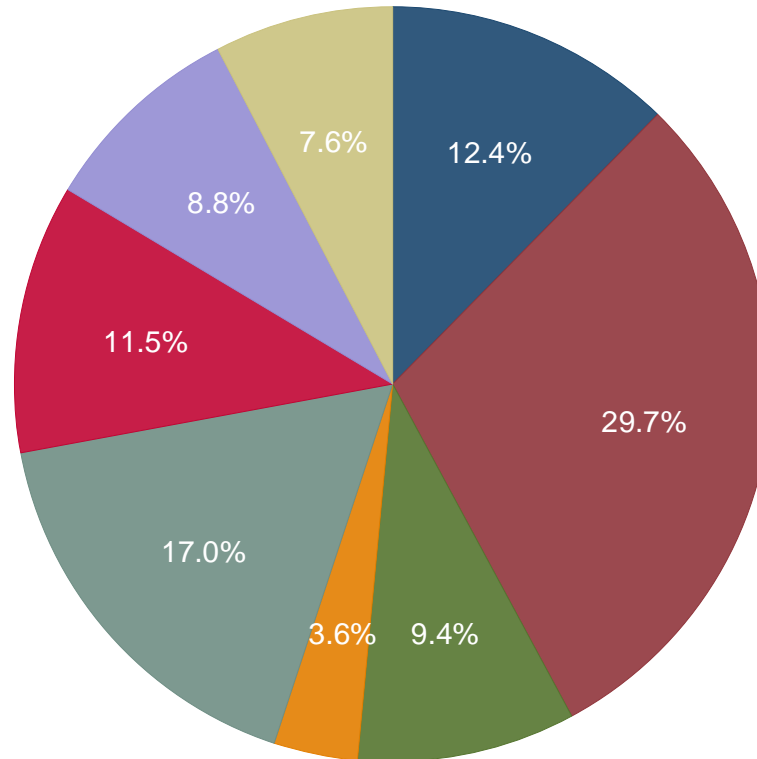
Distribution of workers across sectors



Change will differ by occupation



Distribution of workers across occupations

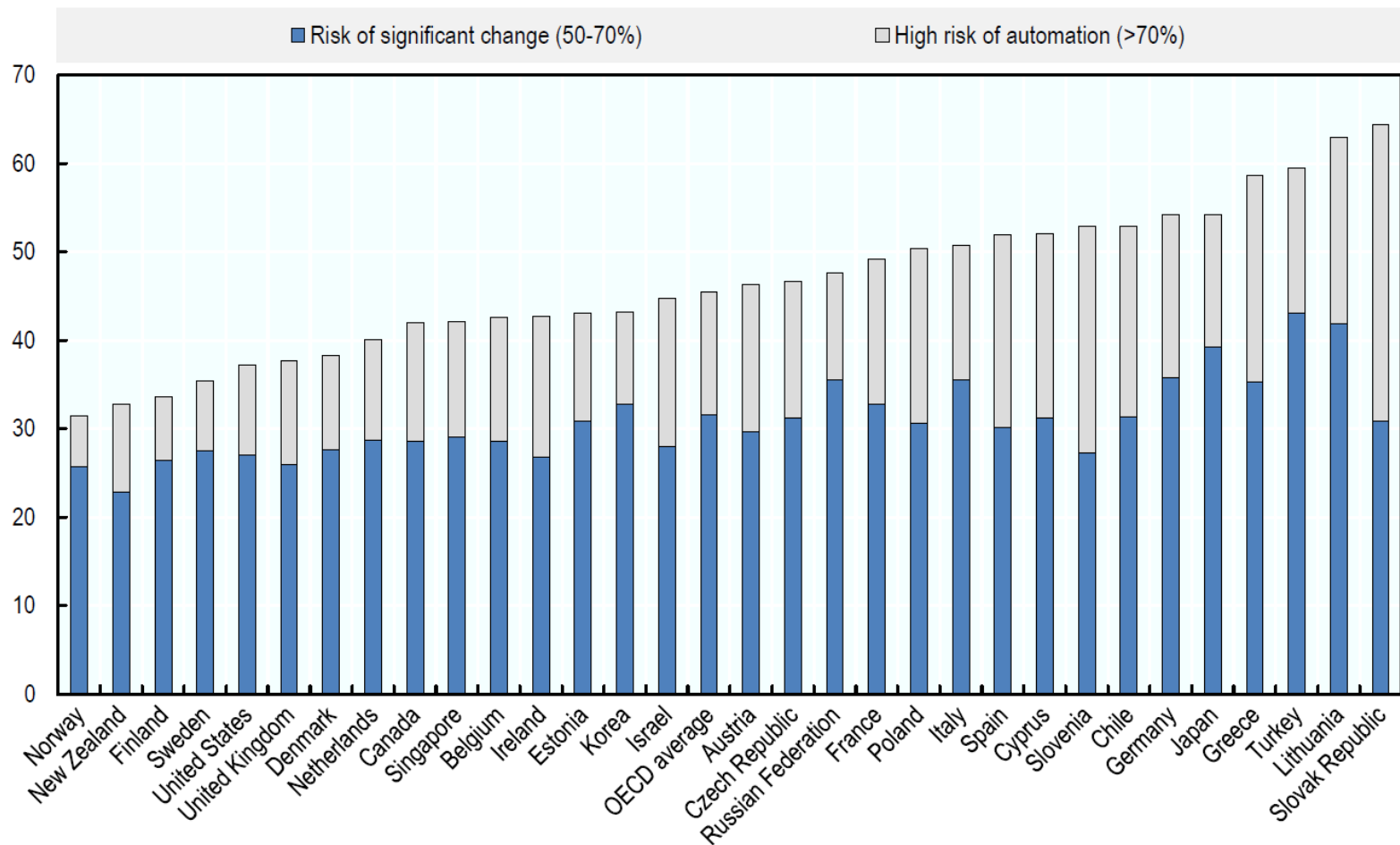


Skill Utilization across Occupations

	Main Occupation	Aggregate Usage	Managers	Professionals	Techn. and Assoc. Profs.	Clerical Support workers	Service and Sales workers	Craft and Related Trade workers	Plant and Mach. Operators	Elementary occupations
Skill/Task Type										
Communication Device Usage		1	1	1	1	1	1	1	1	1
Coordinating with Workers		2	3	2	2	2	5	2	5	2
Repetitive in Nature		3	9	6	4	5	3	4	2	3
Client Interaction		4	4	4	3	6	2	6	6	6
Basic Quant Skills		5	2	7	6	9	4	5	3	5
Advanced Writing		6	7	5	5	12	7	10	8	8
Advanced Reading		7	5	3	8	3	10	11	12	9
Cognitive		8	14	8	9	13	9	7	7	7
Physical		9	15	16	15	15	6	3	4	4
Basic Writing		10	11	13	11	11	8	12	9	13
Basic Reading Skills		11	8	10	7	10	12	14	11	10
Basic Computing		12	10	9	10	4	11	15	16	15
Internet Usage		13	12	11	14	8	14	16	17	16
Data Processing Skills		14	13	12	13	7	15	17	18	17
Supervising Skills		15	6	14	12	14	13	9	13	12
Presentation Skills		16	16	15	16	17	16	18	14	14
Advanced Quant Skills		17	17	18	17	18	17	13	15	18
Advanced Computing Skills		18	18	17	19	16	19	19	19	19
Operating Heavy Machines		19	19	19	18	19	18	8	10	11

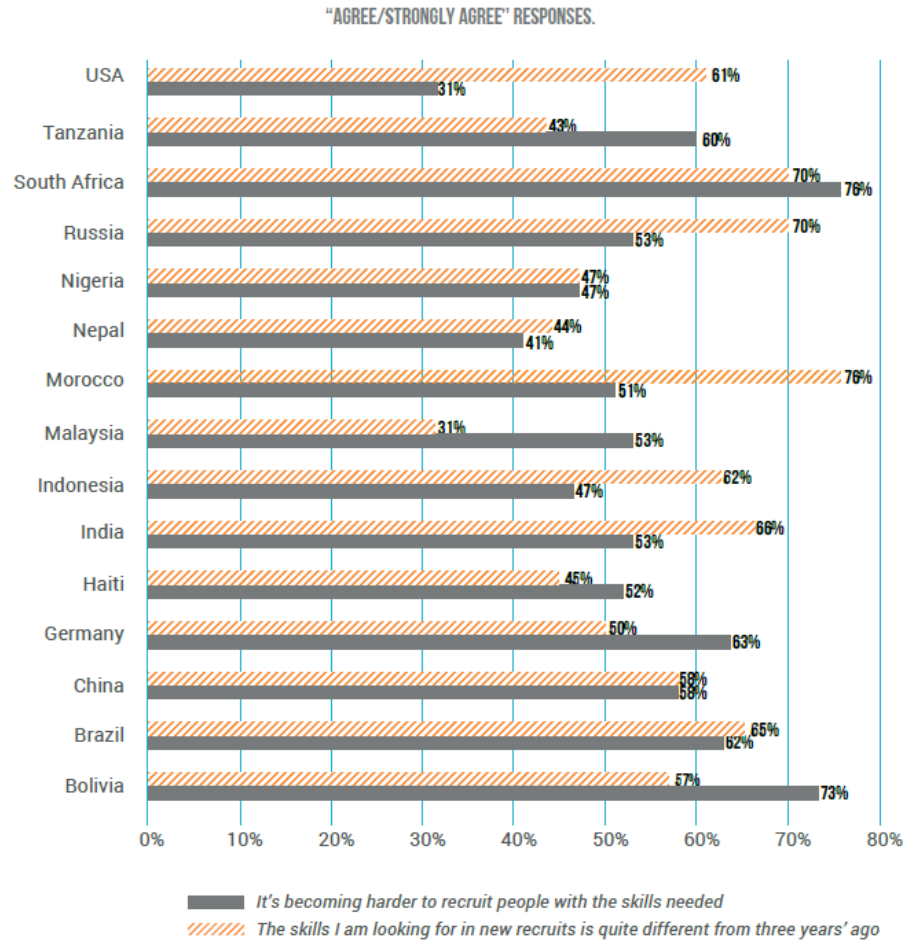
This table ranks the skills/tasks used by each major occupation. The skill/task which is used by most number of workers within the occupation is ranked first.

Recent findings from the OECD are similar



Shortage of skills across the globe

Please indicate whether your business looking for quite different skills in new recruits than three years ago.



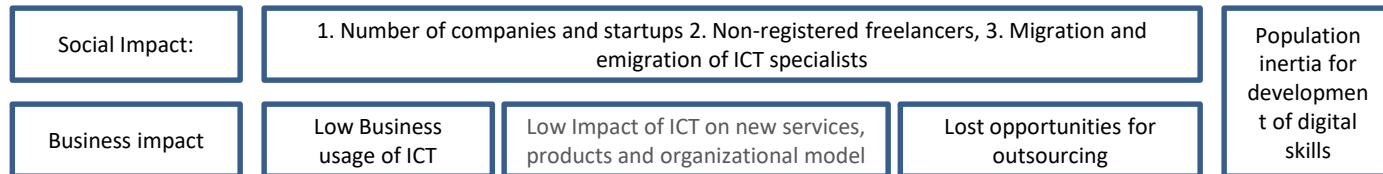
Oxford Economics, ACTEMP/ILO, IOE survey.

What's next for Moldova

Moldova's IT industry is growing, but there are limited links to the rest of the economy:

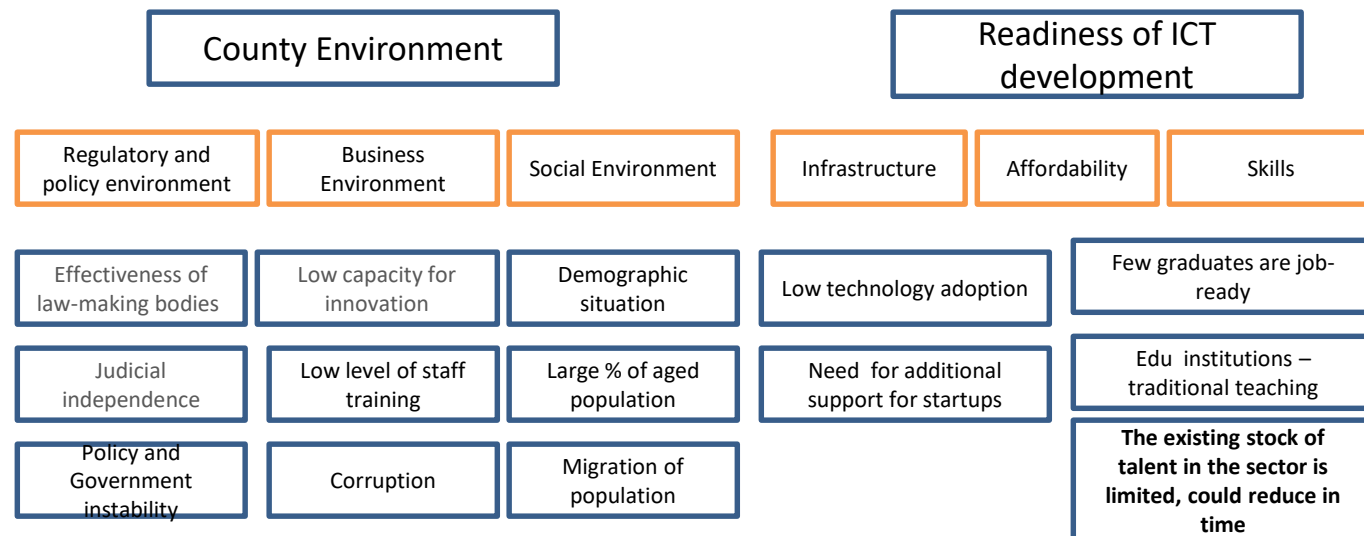
not much IT for non-IT...

5,8% GDP generated by ICT (22000 specialists), including IT (7600 specialist) generating 0,87% GDP in 2016 (NBS)



Comparatively lower level of ICT sector development (*comparing to EU and CIS countries*):

ICT Development index 2016 for Moldova 5,75 (68 position) Europe – 7,35; CIS – 5,74 (*ICT development index: ICT access, ICT use, ICT skills*)

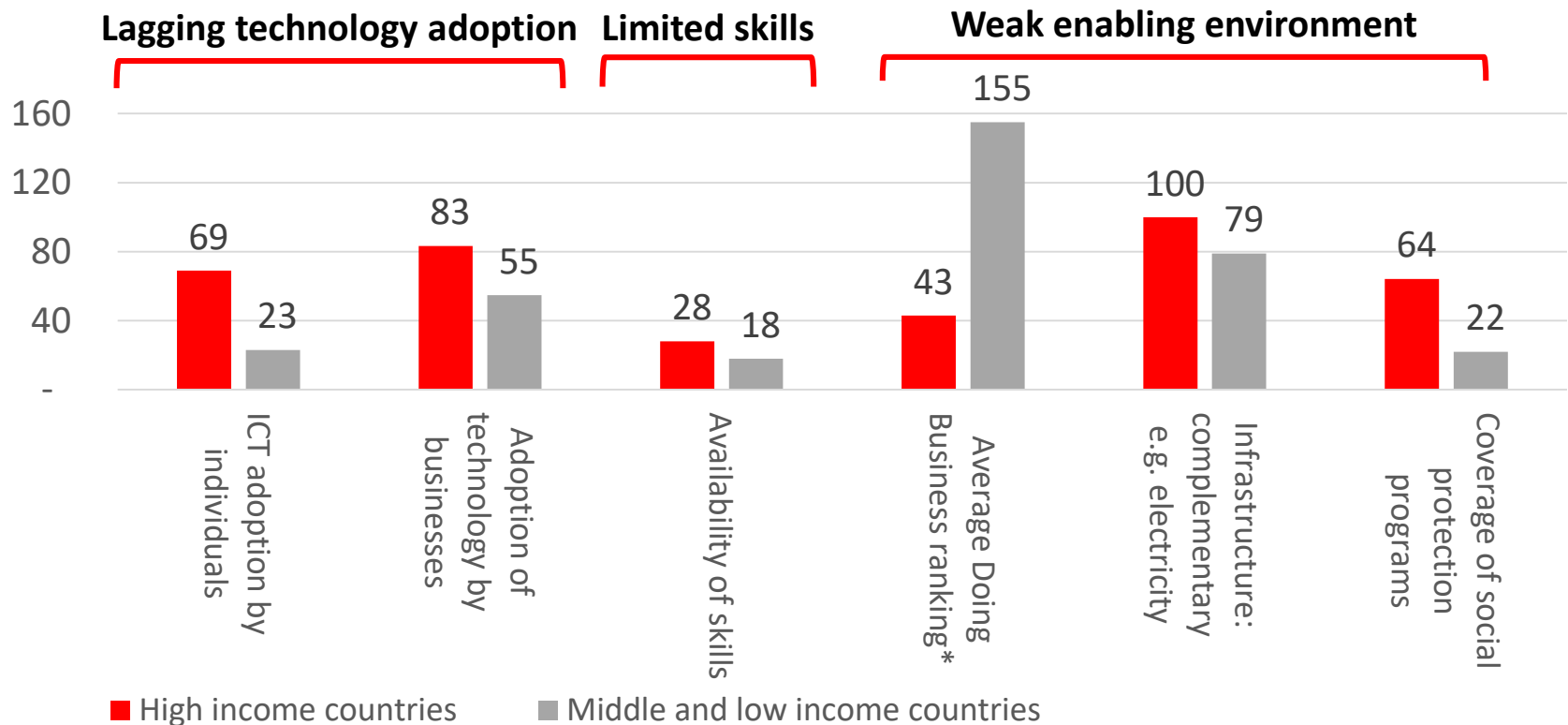


Future skills needs to go beyond “digital” skills and sectors

	Digital sectors	“Other” sectors
Digital workers	“Traditional” digital jobs – e.g. programmers, hardware designers	IT-enabled services in other sectors, e.g. BPO in health, financial services, taobao villages in china
All workers	Various traditional occupations necessary to deploy and maintain digital services – e.g. electrical, welding, customer service	Digital component in all occupations will increase over time – logistics, manufacturing, tourism, agriculture...

Source: Raja (forthcoming)

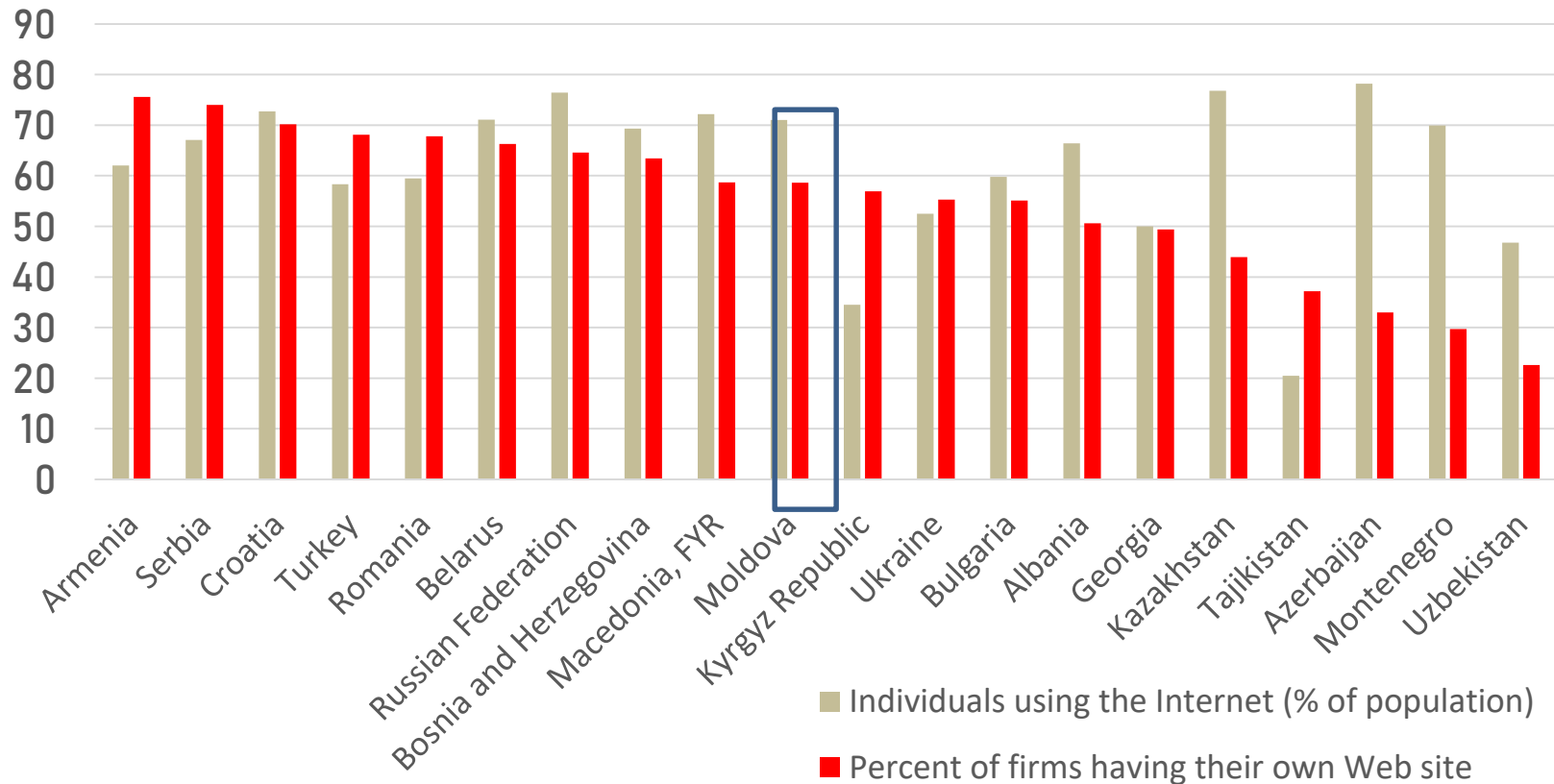
Risk is limited “resources” rather than more “machines”



* Note that this number represents the average rank of countries, hence, a lower number is better.

Notes: Availability of skills: Labor force with tertiary education (% of total); Average Doing Business ranking: Average of rankings (all high income vs all low income countries); ICT adoption by individuals: Internet users (per 100 people); Infrastructure: Access to electricity (% of population); Adoption of technology by businesses: Percent of firms having their own Web site (OECD vs ECA); Coverage of social protection programs: Percentage of unemployed receiving unemployment benefits (Western Europe vs Central & Eastern Europe)

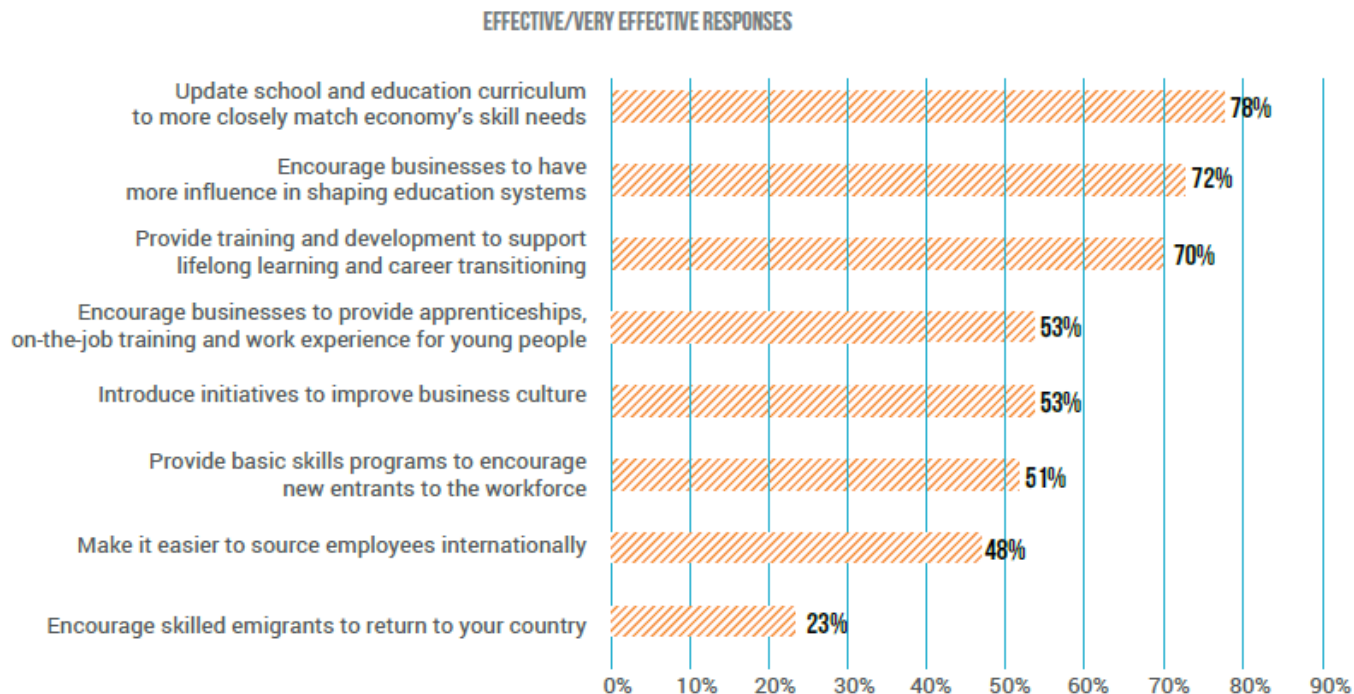
Risks: Are employers ready to “digitize” or “automate?”



Source: World Bank Enterprise Surveys (firm data, c. 2016), World Development Indicators (population data, c. 2016)

Close collaboration with businesses

Figure 6.2 Please rate how effective the following external initiatives could be in helping your business source employees with the skills you need.



Source: Oxford Economics, ACTEMP/ILO, IOE survey.

Why? Prepare now for 2030s-2070s

2019

~2040

~2060

~2080

5 year old
Starting school

25 year old
Starting a job

45 year old
Bedrock of society

63 year old
Retiring

25 year old
Starting a job

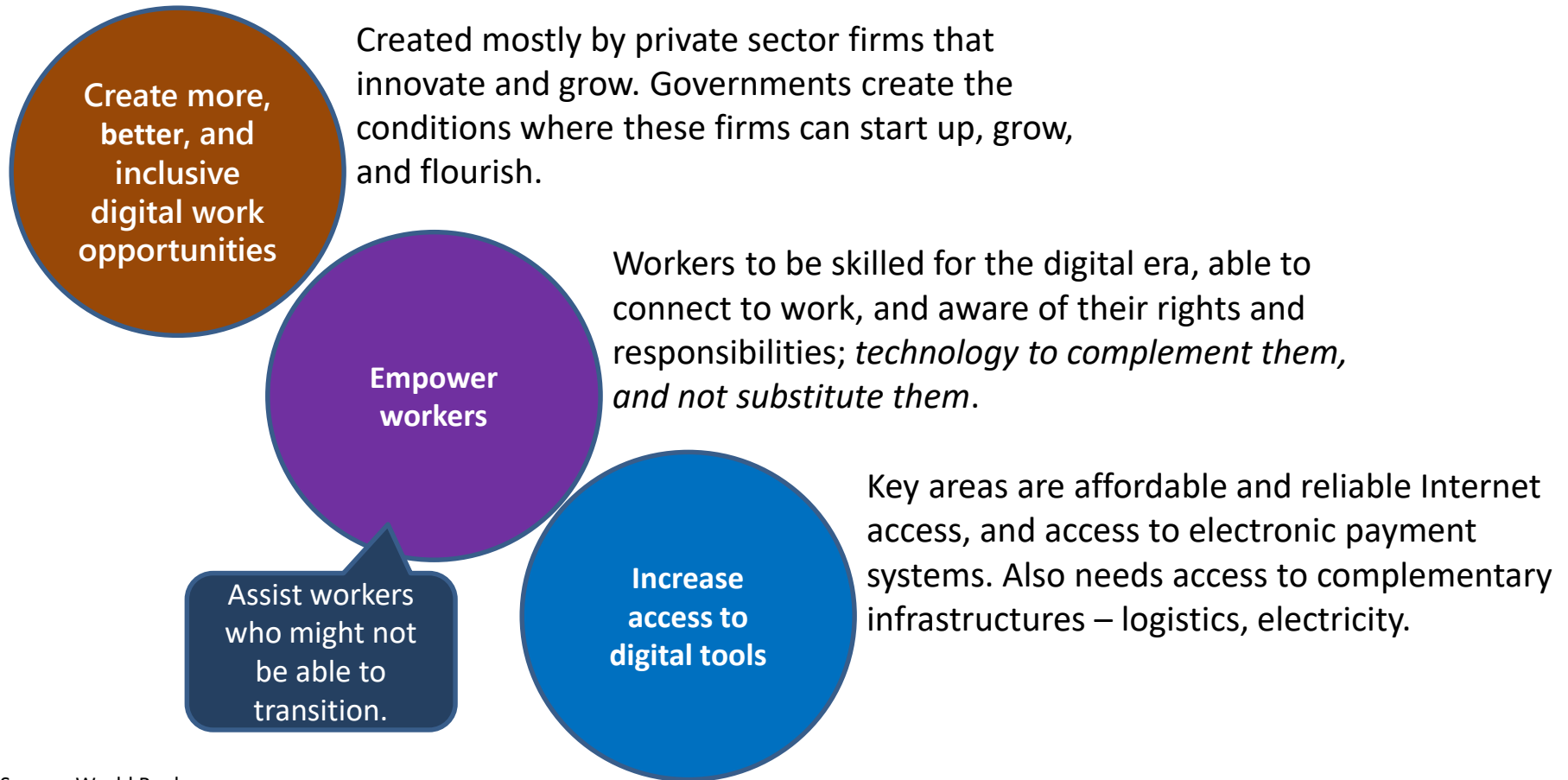
45 year old
Bedrock of society

63 year old
Retiring

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Responding: Short- and long-term measures



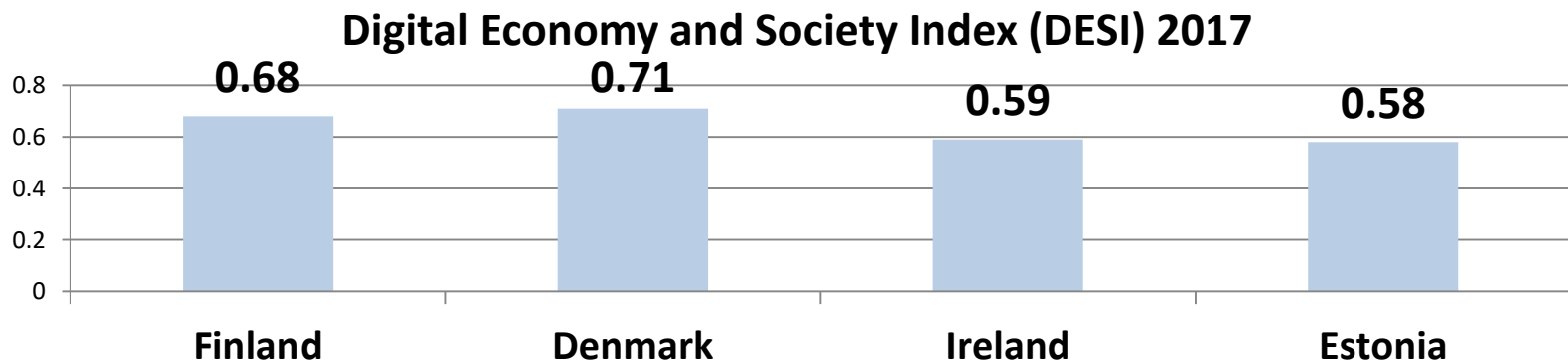
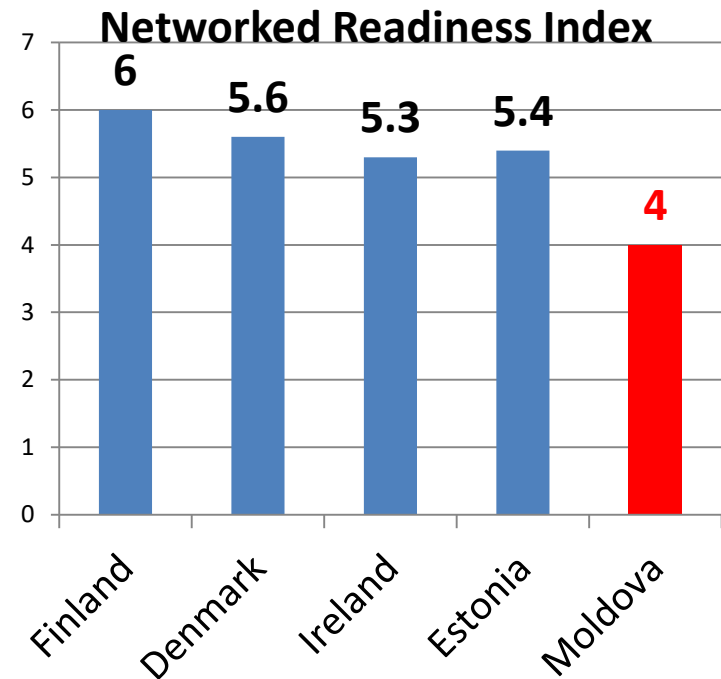
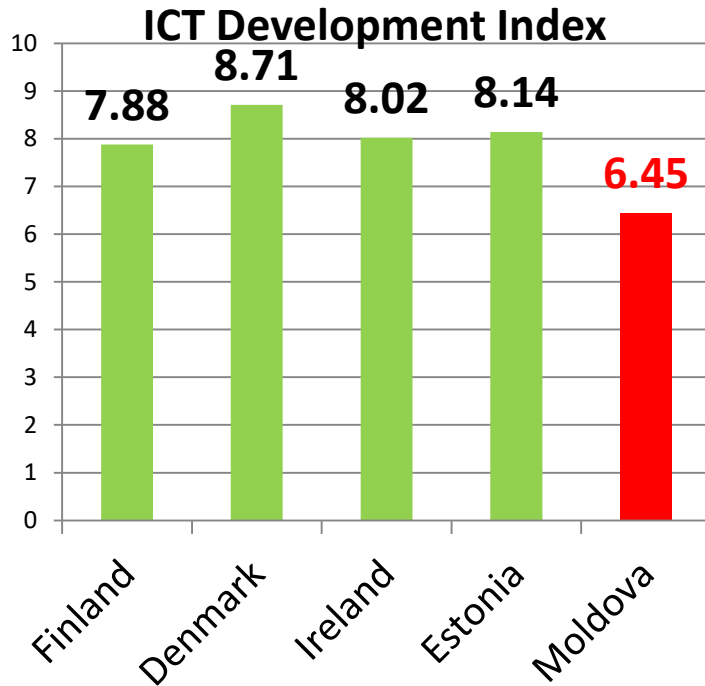
Source: World Bank

QUESTIONS?

Thank You

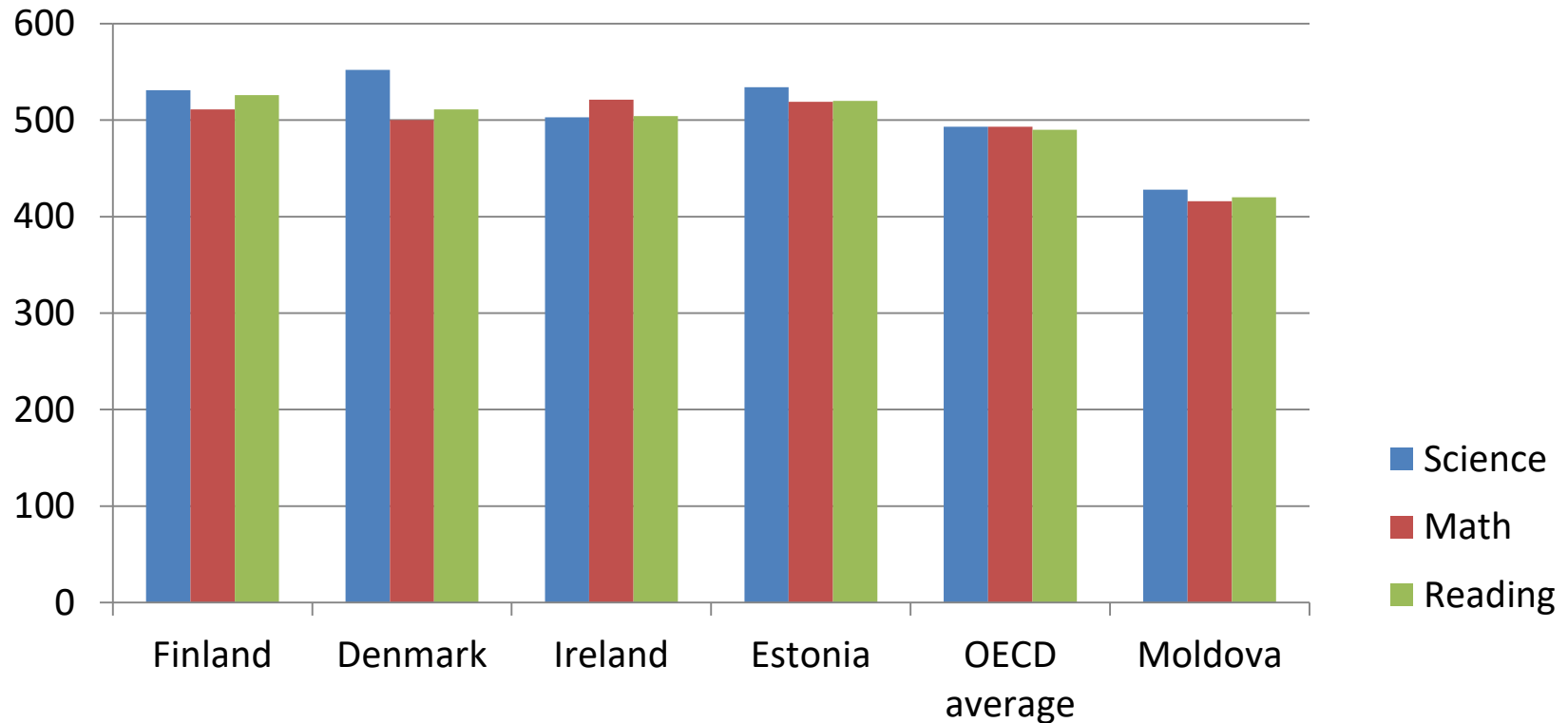
Developing key competencies for the future

Moldova has to catch up with others in creating a broad-based digital economy



Efforts are on to build the foundations of (future) worker's skills

PISA Scores 2015



BASELINE SKILLS RANKED BY CAREER AREA

SKILL	OVERALL	CAREER AREA															
		Clerical & Administrative	Customer & Client Support	Design, Media & Writing	Engineering	Finance	Healthcare	Hospitality, Food & Tourism	Human Resources	Information Technology	Management & Operations	Manufacturing & Production	Marketing & PR	Personal Care & Services	Research, Planning & Analysis	Sales	
Communication Skills	#1	#1	2	2	#1	#1	#1	#1	#1	#1	#1	#1	#1	#1	#1	#1	
Organizational Skills	2	3	3	4	3	3	2	2	2	3	2	2	2	2	2	3	
Writing	3	6	5	#1	2	4	3	4	5	2	3	3	3	4	4	4	
Customer Service	4	8	#1	15	12	7	9	3	11	9	11	14	12	5	11	2	
Microsoft Excel	5	2	9	9	8	2	12	16	3	10	6	6	5	16	3	9	
Word + Office	6	4	8	7	5	5	10	13	4	8	8	5	9	15	7	6	
Problem Solving	7	12	6	10	6	8	7	12	7	4	7	4	11	10	5	7	
Planning	8	14	18	13	7	12	5	10	10	5	4	8	4	7	8	11	
Comp Skills + Typing	9	5	4	17	10	10	4	8	12	24	14	7	17	9	16	8	
Research	10	10	12	5	9	9	6	21	8	7	12	13	6	12	6	18	
Detailed-Oriented	11	7	7	6	11	6	14	9	6	11	13	9	10	19	10	12	
Building Effective Relationship	12	15	11	19	17	11	11	6	9	15	9	18	13	3	13	5	
Project Management	13	24	24	11	4	17	19	37	14	6	5	12	8	29	9	22	
Supervisory Skills	14	18	20	25	14	14	8	5	18	26	10	11	23	8	26	14	
Multi-Tasking	15	9	10	12	19	13	15	11	13	13	18	15	16	18	14	13	
Time Management	16	16	13	14	26	15	16	19	15	21	19	20	20	14	19	10	
Leadership	17	33	23	21	15	26	18	14	24	12	15	17	22	17	17	17	
Mathematics	18	22	15	27	13	18	25	7	35	20	31	10	32	13	18	16	
Creativity	19	30	26	3	22	27	22	20	16	14	17	26	7	21	22	20	
Presentation Skills	20	35	21	16	23	22	23	32	17	16	16	27	14	31	15	15	
Team Work	21	20	19	18	21	23	21	15	21	17	24	19	15	22	21	19	
Analytical Skills	22	31	28	29	27	16	32	36	23	18	22	21	21	36	12	31	
Bilingual	23	23	14	23	34	20	17	24	22	39	29	25	31	23	36	24	
Meeting Deadlines	24	19	27	8	28	19	31	28	19	25	26	22	18	25	20	29	
Self-Starter	25	27	29	20	24	25	38	34	25	22	28	24	19	30	23	21	
Listener	26	34	16	31	37	24	20	22	32	32	34	29	33	6	33	23	
Critical Thinking	27	36	36	34	39	29	13	45	38	29	38	38	35	37	28	39	
Positive Disposition	28	28	22	24	36	32	28	17	33	37	40	28	28	11	41	25	

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Skills in demand – internationally (future?)

- Looking to advanced economies, we see the emerging importance of foundational skills in addition to fundamental building blocks of education
- Critical “baseline skills” include: communication, organizational skills, writing, basic IT tools (e.g. MS Office), and then, depending on career, planning, problem solving, and customer service

Which competencies might need more attention?

Moldova school curriculum Key Competencies (undertaken from EU countries)


1. Communication skills in Romanian;
2. Communication skills in the mother tongue;
3. Communication skills in foreign languages;
4. Competences in mathematics, science and technology;
5. Digital competencies;
6. Competence to learn to learn;
7. Social and civic competencies;
8. Entrepreneurial skills and initiative;
9. Cultural expression and awareness of cultural values.

Communicating in a mother tongue: ability to express and interpret concepts, thoughts, feelings, facts and opinions both orally and in writing.

Communicating in a foreign language: as above, but includes mediation skills (i.e. summarizing, paraphrasing, interpreting or translating) and intercultural understanding.



***Job Tasks:** Makes presentations at work / Reading Forms / Advanced reading / Filling Forms / Writing articles / Client Inter. Intensity*




Methods of developing these competences: using ICT devices for communication and learning, peer learning, group learning, learning café, phenomenon based learning.

Digital competence: confident and critical usage of information and communications technology for work, leisure and communication.



Job Tasks: Using Computer / Internet / Data Processing / Advanced computation skills / Communication devices / Using programming languages



Methods of developing these competences: using ICT devices at all the lessons from primary school at all disciplines, coding from the primary school, gaming as a way of learning, robotics as extracurricular activity, communication with students online, assessment and exam on line.

Development of digital skills: Informatics

- The Ministry of Education, with the support of development partners, launched in 2014 a broad initiative to modernize the Curriculum for Informatics (7-12 grade)
- The Ministry of Education issued an order ordering the piloting of the updated Curriculum in Computer Science and in the study year 2015-2016
- The competence related to digital literacy is developed within Informatics discipline starting with 7th grade at school
 - 7th grade – use of Word and PowerPoint,
 - 8th grade – Excell,
 - 9th grade – some coding like Scratch.
 - The program is more focused on development of users digital skills and less for the development of coding skills.
- Current Curriculum at Informatics compared to the previous curriculum is simpler, more attractive and accessible for students.

High School Curricula for Informatics

Grades	Topics studied at Informatics	No of hours
X	<ol style="list-style-type: none"> 1. Types of Structured Data 2. information 3. Arithmetic basis of computing 4. Boolean algebra 5. Logic of circuits 6. Computer Structure and Computer Networks 	<p>20</p> <p>10</p> <p>12</p> <p>9</p> <p>7</p> <p>10</p> <p>Total - 68</p>
XI	<ol style="list-style-type: none"> 1. Sub-programs 2. Dynamic Structures of Data 3. Programming Techniques 	<p>18</p> <p>24</p> <p>26</p> <p>Total - 68</p>
XII	<ol style="list-style-type: none"> 1. Modeling elements 2. Numerical calculation 3. Database 4. Web design elements 	<p>10</p> <p>24</p> <p>20</p> <p>14</p> <p>Total - 68</p>

Learning to learn: ability to effectively manage one's own learning, either individually or in groups.



***Job Tasks:** Learning new things*

Freedom to think

Cognitively Challenging



Methods of developing these competences :

Problem based learning, collaborative learning, and bridge21 method of teaching, project based learning.

Using the infrastructure enablers: schools without walls, FabLabs, Digital and Innovation Hubs, Living labs.


Mathematical, scientific and technological competence:
sound mastery of numeracy, an understanding of the natural world and an ability to apply knowledge and technology to perceived human needs (such as medicine, transport or communication)..



***Job Tasks:** Basic Maths Skills*

Advanced Maths Skills

Operate heavy machinery



Methods of developing these competences :
implementation STEM education, FabLab
facilities for implementation of technical
knowledge in real life

Social and civic

competences: ability to participate effectively and constructively in one's social and working life and engage in active and democratic participation, especially in increasingly diverse societies.

Sense of initiative and entrepreneurship: ability to turn ideas into action through creativity, innovation and risk taking as well as ability to plan and manage projects

Cultural awareness and expression: ability to appreciate the creative importance of ideas, experiences and emotions in a range of media such as music, literature and visual and performing arts

*Job Tasks: Learning new things
Freedom to think
Cognitively Challenging*

Job Tasks: Requires Supervision of others work / Coordinating with Other Workers / Coordinating with non-coworkers

*Job Tasks: Learning new things
Freedom to think
Cognitively Challenging*

Methods of developing these competences :

- ✓ problem based learning, collaborative learning,
- ✓ bridge21 method of teaching, project based learning.

Using the infrastructure enablers: I Hub, Living labs, Innovation Centers, Startups.

Development of Digital Competences in most advanced countries based on ICT Development Index: Finland, Denmark, Ireland, Estonia

Country ICT POLICY

- *Research based*
- *Finance recourses*
- *Awareness*

TEACHING APPROACHES:

- STEM based on real world problems
- Coding, gaming, robotics , elements of programming – primary /lower secondary school
- ICT devices use – disciplines cross cutting
- Programming – high secondary school

TEACHERS:

- Role of facilitator
- Training/support
- E-resources, Websites

INFRASTRUCTURE ENABLES:

- School without walls
- FabLab, Digital Hubs, Living Lab
- Startups Centers

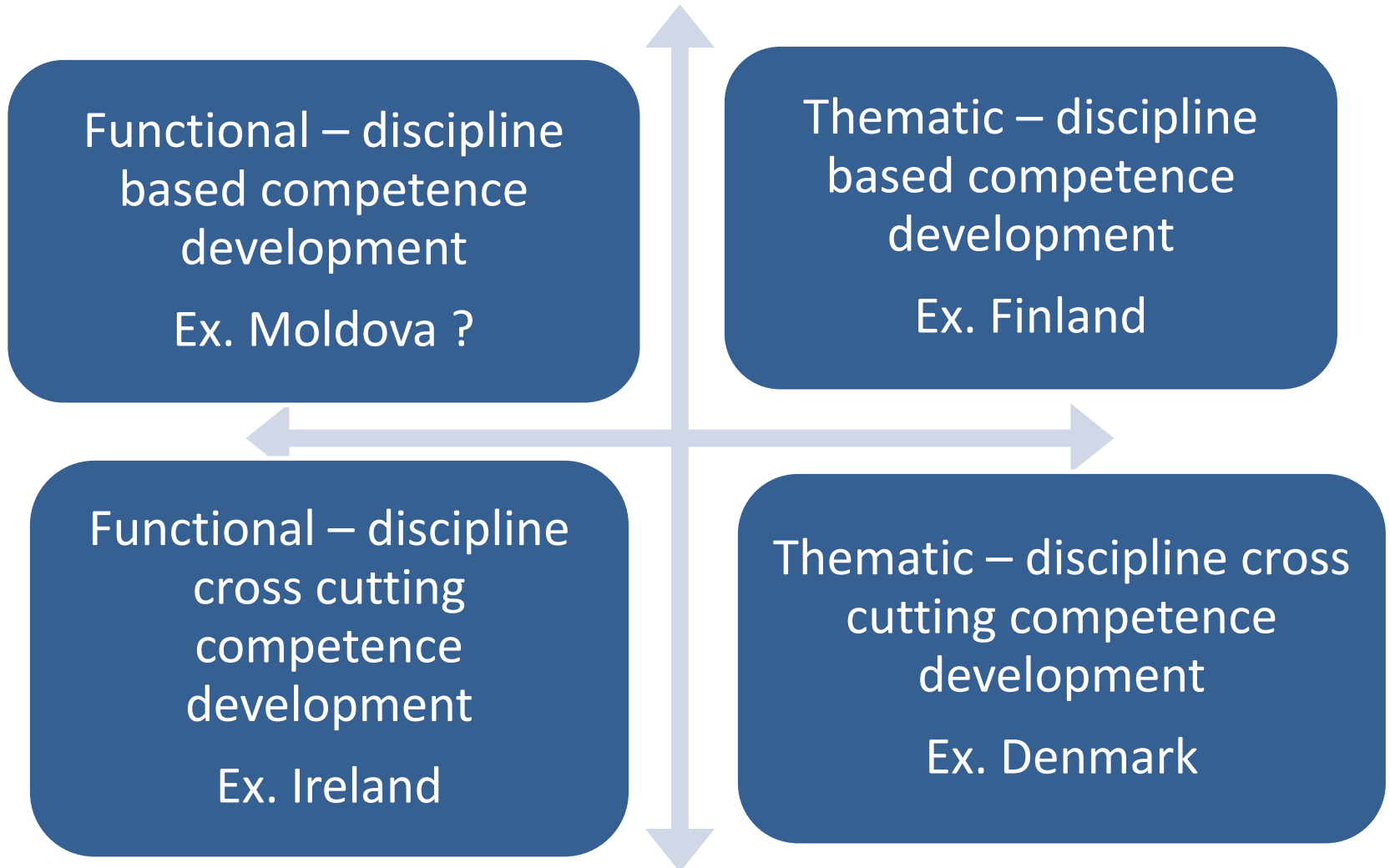
ICT HELPERS:

E-manuals, Digital learning resources
On line assessment tools
ICT administration of education
Digital matriculation for HE, exams online

POPULATION DIGITAL LITERACY:

- E-services
- Export of IT products
- Education of population

The European practice of transposing key competences into curricula



Estonia – mix approach, Moldova is trying the same

Approaches for adults digital skills development:

1. Direct approach: providing ICT training to adult population

2. Indirect approach: via teaching staff using ICT tools and integrating ICT in all the training subjects

Finland, Denmark, Ireland, Estonia library networks are connected to internet and are free of charge.

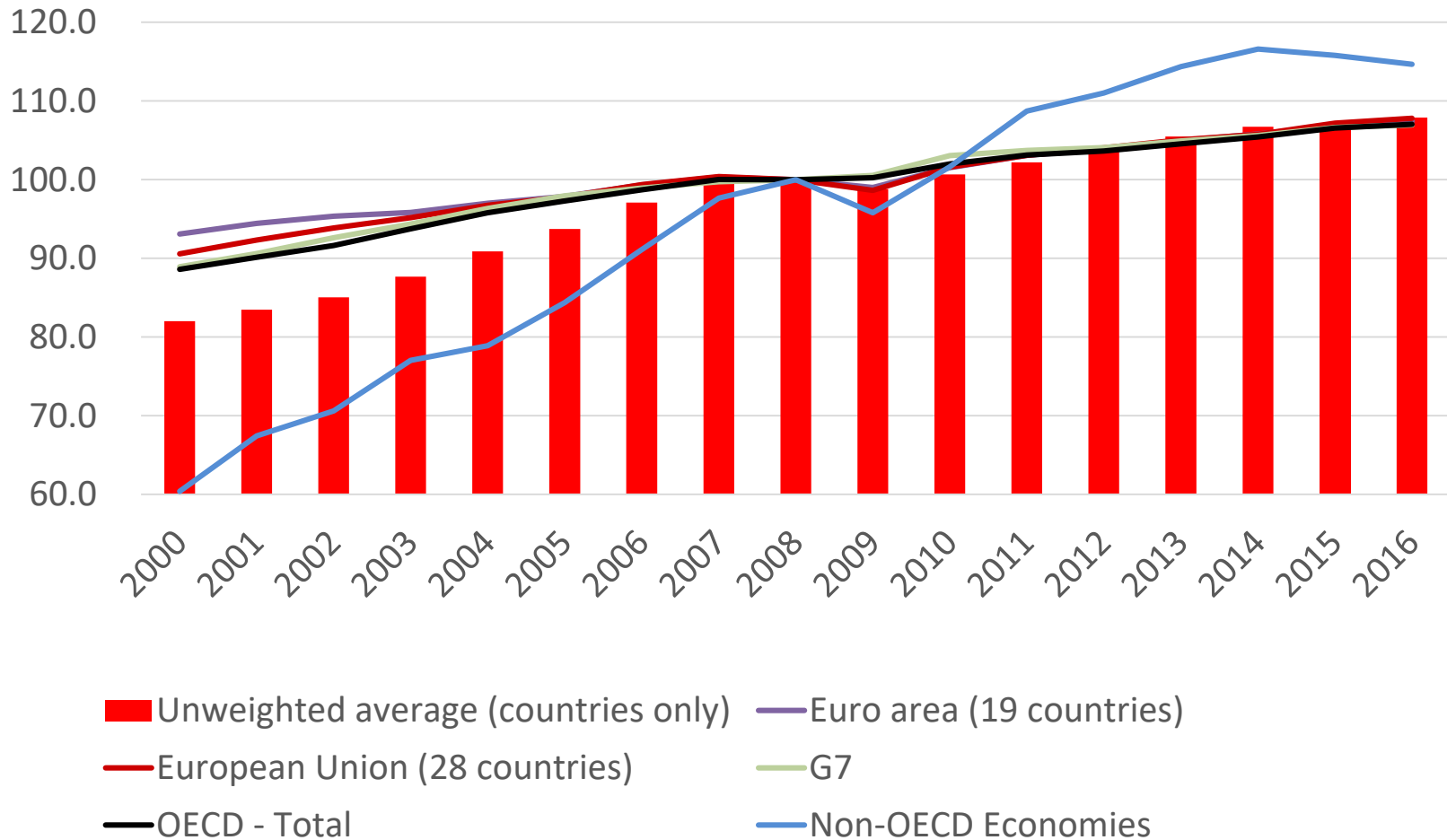
- **Ireland 1. Targeted training of Family Carers Ireland** - training on digital skills; 2. **'Getting Citizens Online Grant Scheme'** - a number of organisations were awarded grants to help community around the country to deliver basic IT Training, aimed at getting citizens online. 3. **Ireland - NALA Distance Learning Service:** To address barriers to participation in adult learning and help to provide learning opportunities for those people not currently engaged in lifelong learning.
- **Estonia - "Come Along!"** providing basic and advanced computer training to 100,000 people and connecting 50,000 more families to the Internet over period of three years

Basic ICT skills development for adults is part of unemployment agency training program.

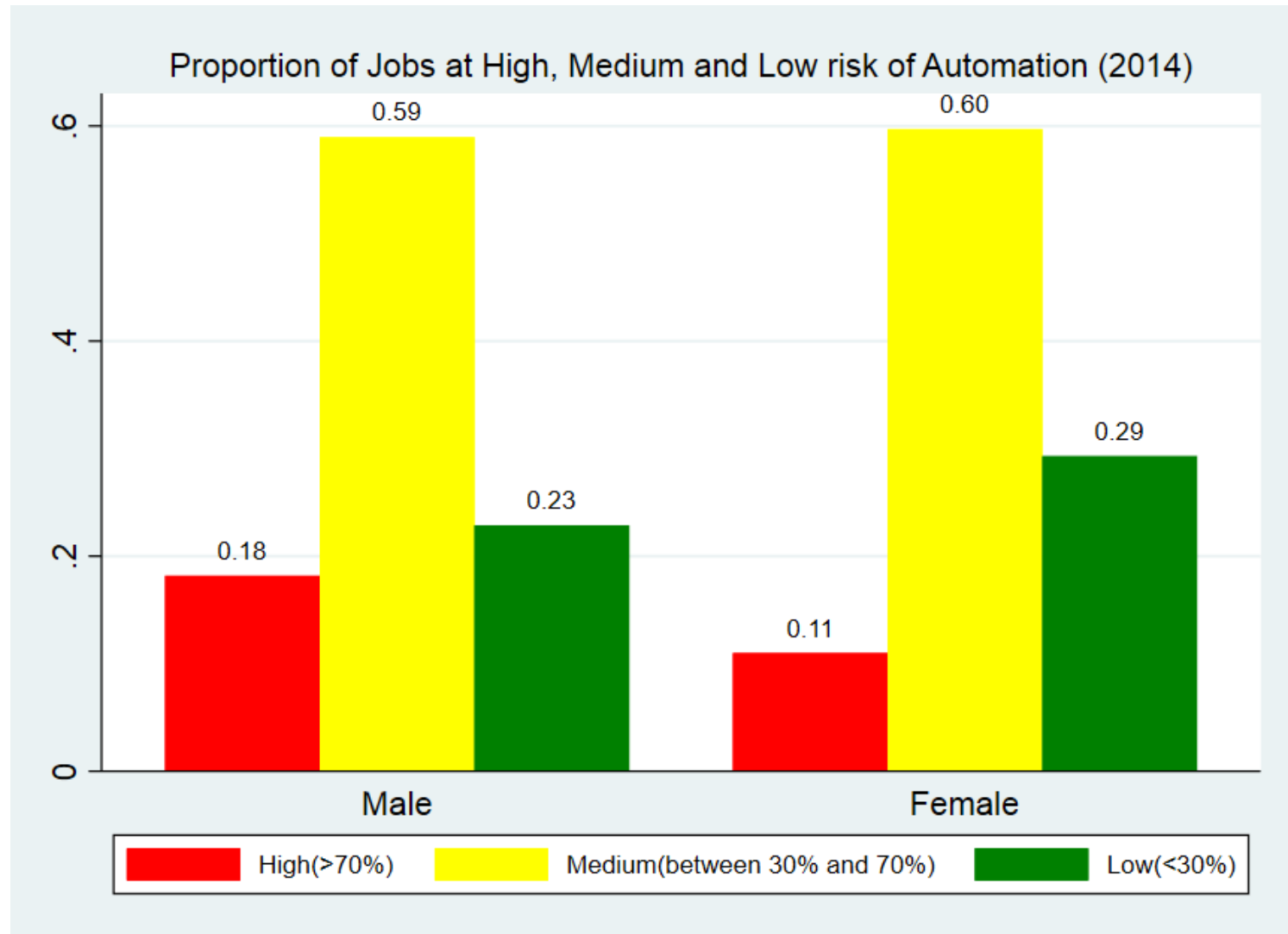
- **Digi4Adults project for teaching staff and trainers (Finland, Denmark, Spain, Sweden, Austria).** The Project developed Content and digital competence integrated learning (CDCIL). The CDCIL training model aims at increasing the digital competence of adult education trainers. Trainers are producing the so called Caselets. **Caselet Track** is an Open Educational Resource, which includes different kind of caselets, as well as experiences and feedback of using the caselets. Anyone can download the caselets from Digi4Adults website and try them out with the purpose of learning.
- **Denmark – EMU educational portal:** The portal is a unique constellation of virtual entries targeted at specific user groups such as teachers and students in basic school, upper secondary school, vocational education, and teacher training colleges
- **Estonia – Programme VANKER:** The development of modern and high quality e-learning study materials and making them available to all VET teachers and students.

The world is more digital, but productivity is stagnating?

GDP per hour worked USD, constant prices, 2010 PPPs; Index: 2008 = 100



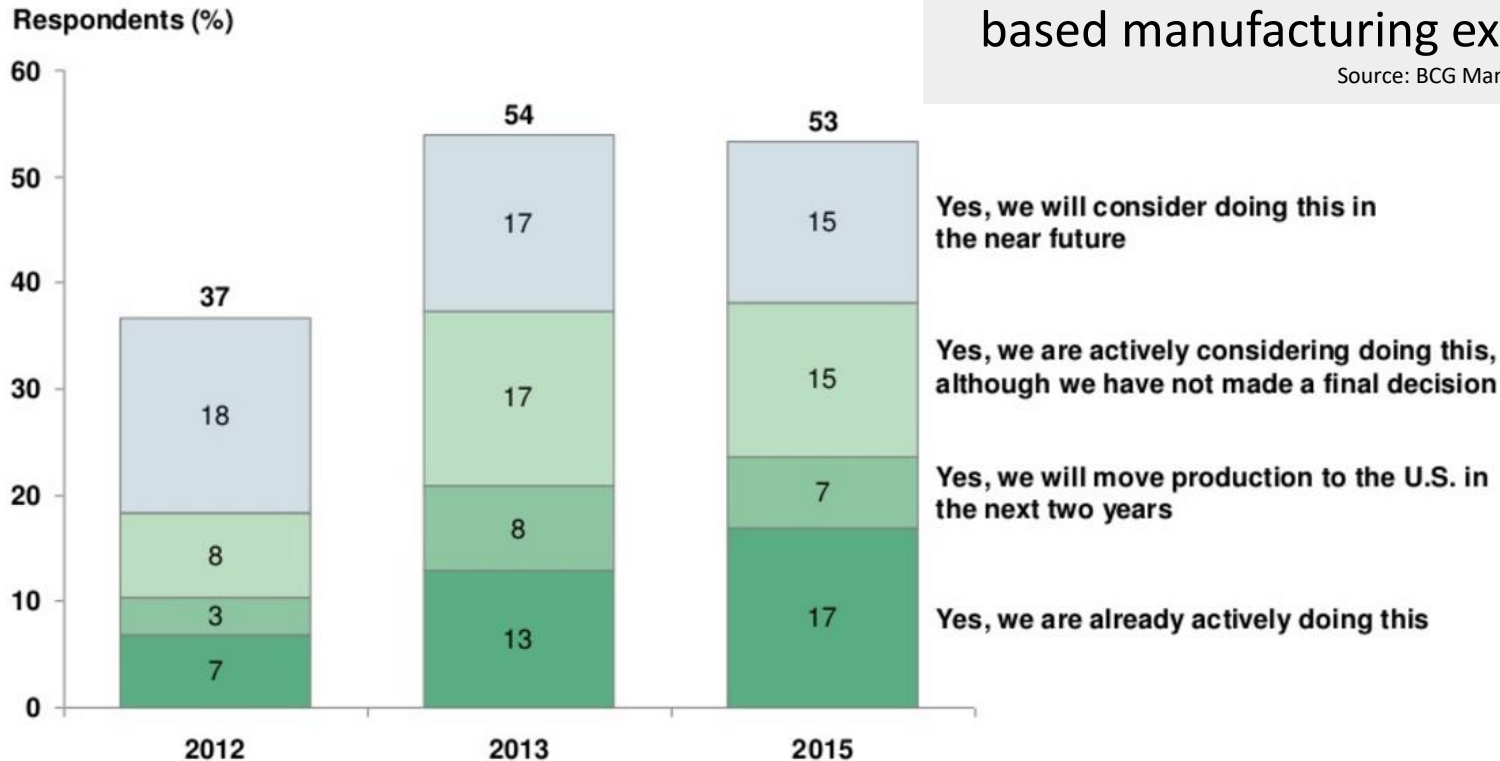
Changes would differ by gender



Global trends mean that all countries could be affected...

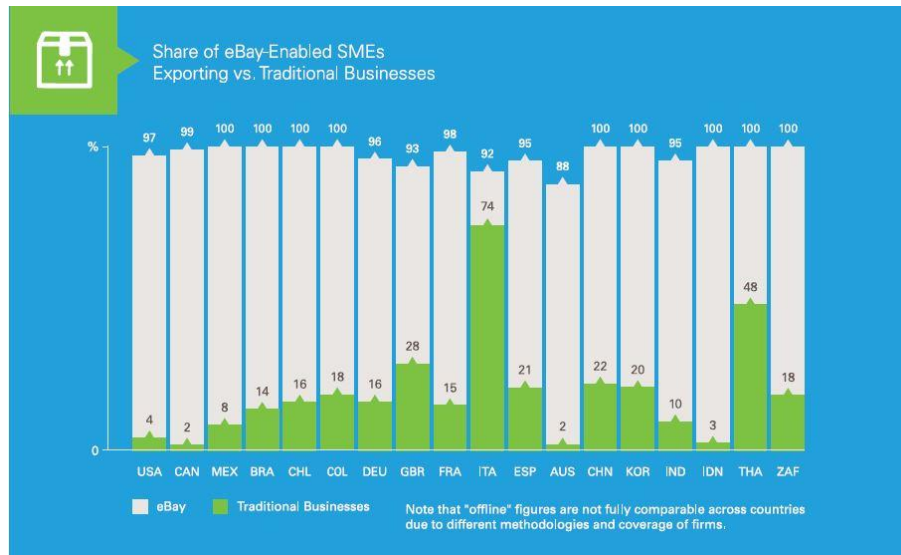
Interest in reshoring among U.S.-based manufacturing executives

Source: BCG Manufacturing Survey



Opportunity of complementarity: Possibility of job creation and innovation everywhere

ICT enables market entry, even for small businesses



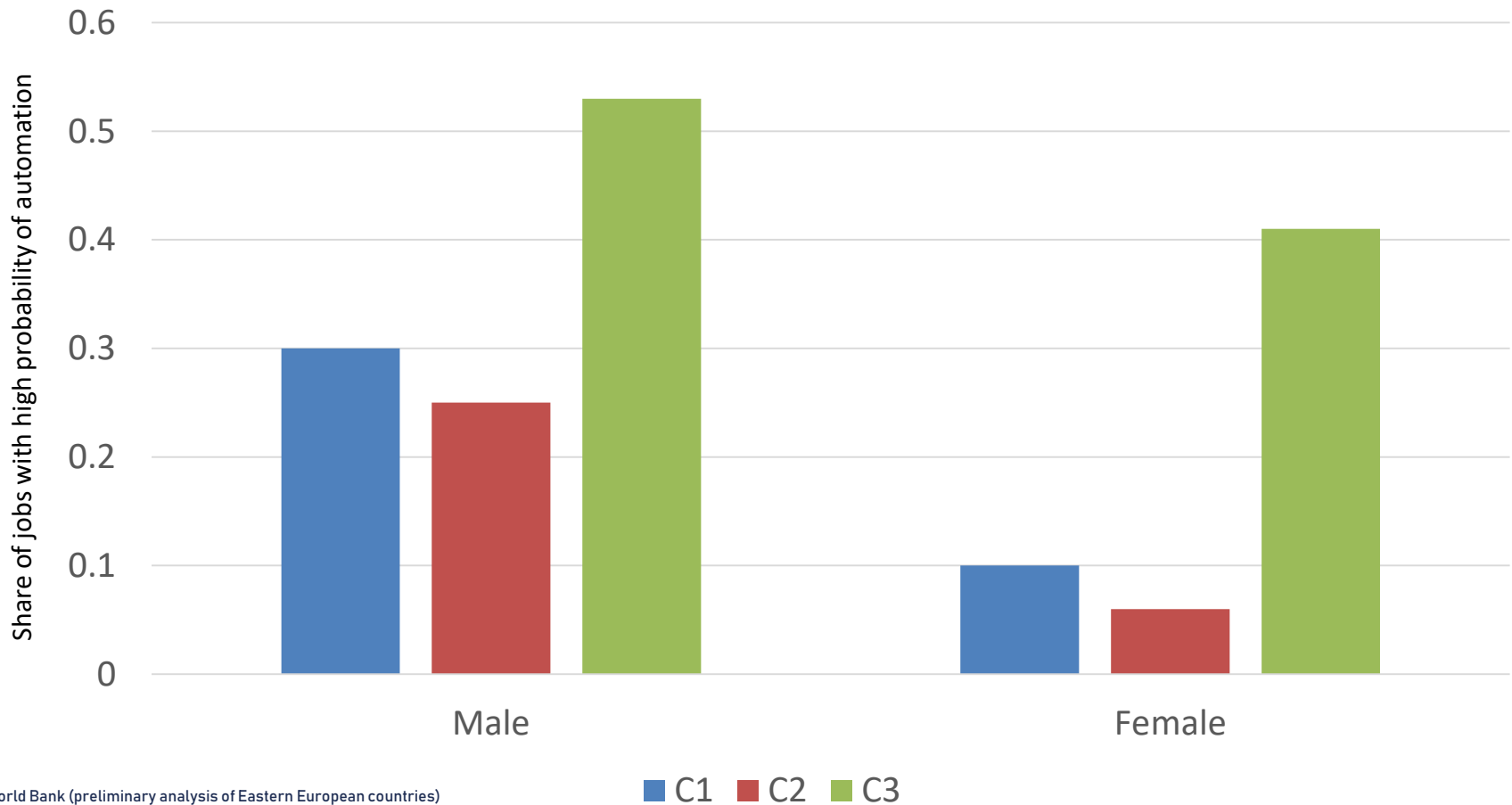
Source: eBay, Small Online Business Growth Report: Towards An Inclusive Global Economy, 2016

Technology enables innovation



Source: CNN, 2016

Effects for men and women will differ: And the 'causes' might be gendered as well...



Job-based Approach

- Focus on the tasks performed by the worker
- Every occupation consists of a variety of tasks
- The tasks performed depends on the nature of the job (e.g. type of industry, country etc.)
- Some very simple tasks can be very difficult to automate whereas very complex task can be easy to automate (haircut vs generating financial reports)
- Workers within same occupation code but performing different tasks face different level of automation

Variation in Task-structure within same Occupation

Bank Accountant [*SOC code: 13-2011*]

- Analyzes the financial statements and conformance to procedural standards
- Application of detailed knowledge of BASEL-III
- Using Advanced accounting /database software
- Interpersonal and Communication skills
- Bachelors degree or higher

Restaurant Accountant [*SOC code: 13-2011*]

- Manages the books for the restaurant
- Using Intuit QuickBooks
- Basic Arithmetic skills
- Knowledge about restaurant business
- More clerical in nature
- High school or above
- May not require extensive interpersonal or communication skills

Data & Methodology (Job-based Approach)

- Moldova Labor Force Survey for 2014, 2015 and 2016
- Workers on Urban areas
- Matched the LFS dataset with the STEP survey to collect information about tasks and Frey-Osborne dataset to assign probabilities
- Estimate the impact of each task on the probability of automation
- Predict the probability of automation using the task-related information for each worker
- Speculative Analysis, projecting over the *next two decades*

Tasks affecting Automation

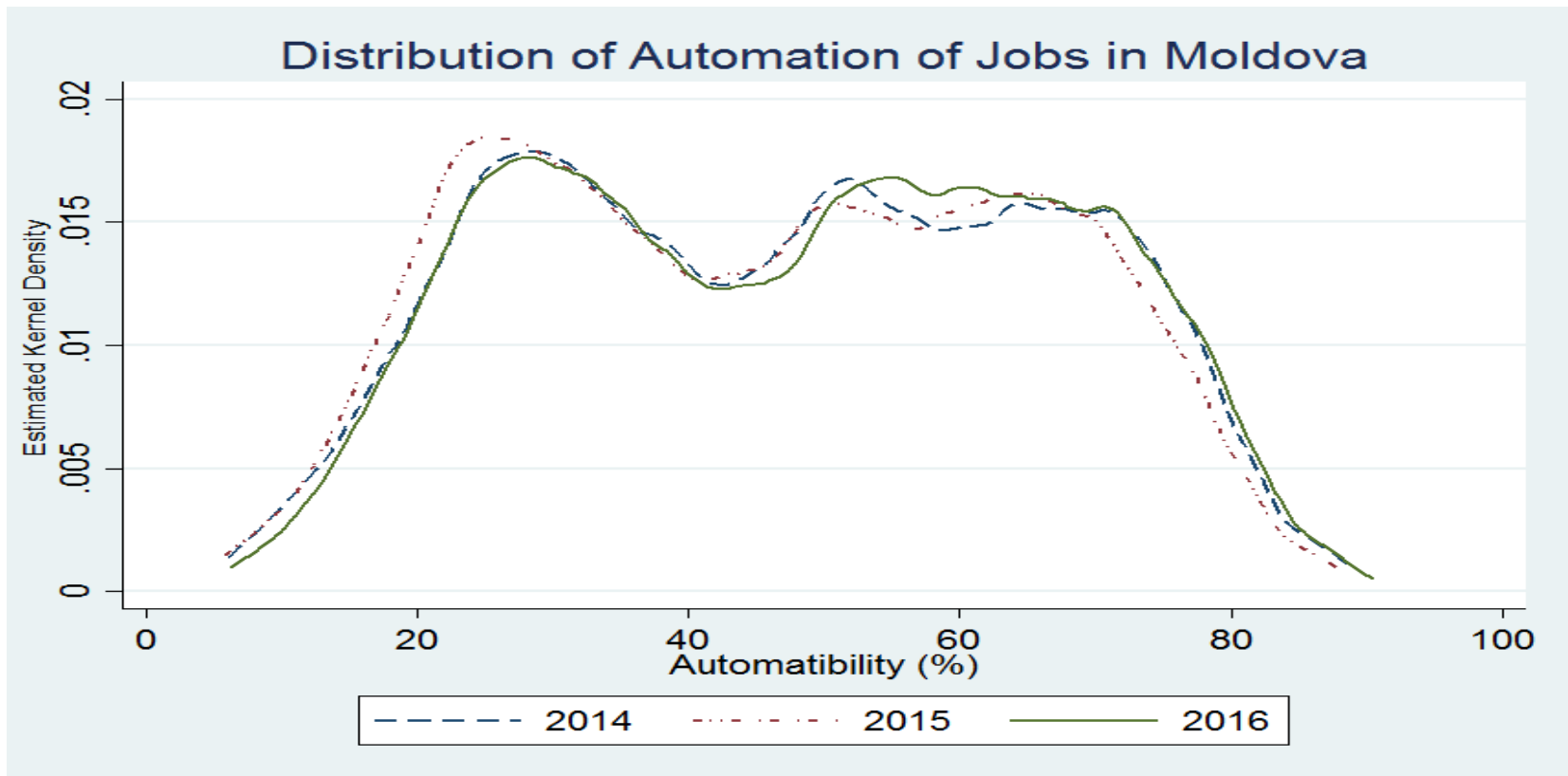
Determinants of Probability of Automation

VARIABLES	(1) Coefficient	(2) Standard Error	(3) P-value
Cognitively Challenging	-0.0628***	0.00717	0
Physically Demanding	0.0147***	0.00534	0.00599
Operate heavy machinery	0.338***	0.0262	0
Level of Repetitiveness	0.136***	0.0164	0
Requires Experience	-0.320***	0.0127	0
Requires Supervision of others work	-0.216***	0.0140	0
Coordinating with Other Workers	-0.0585***	0.00605	0
Client Inter. Intensity	-0.133***	0.0152	0
Makes presentations at work	-0.0973***	0.0161	1.34e-09
Using Computer	0.0726**	0.0331	0.0284
Reading Forms	-0.128***	0.0166	0
Advanced Reading	-0.505***	0.0167	0
Filling Forms	0.367***	0.0151	0
Writing Articles	-0.393***	0.0144	0
Basic Maths Skills	0.346***	0.0146	0
Advanced Maths Skills	-0.189***	0.0196	0
Internet	-0.168***	0.0302	2.88e-08
Data Processing	0.367***	0.0273	0
Advanced Computation Skills	-0.137***	0.0217	2.75e-10
Communication Devices	0.0278	0.0612	0.650
Constant	0.378***	0.0656	8.42e-09
Year-Fixed Effects	Yes		
Observations	29,845		

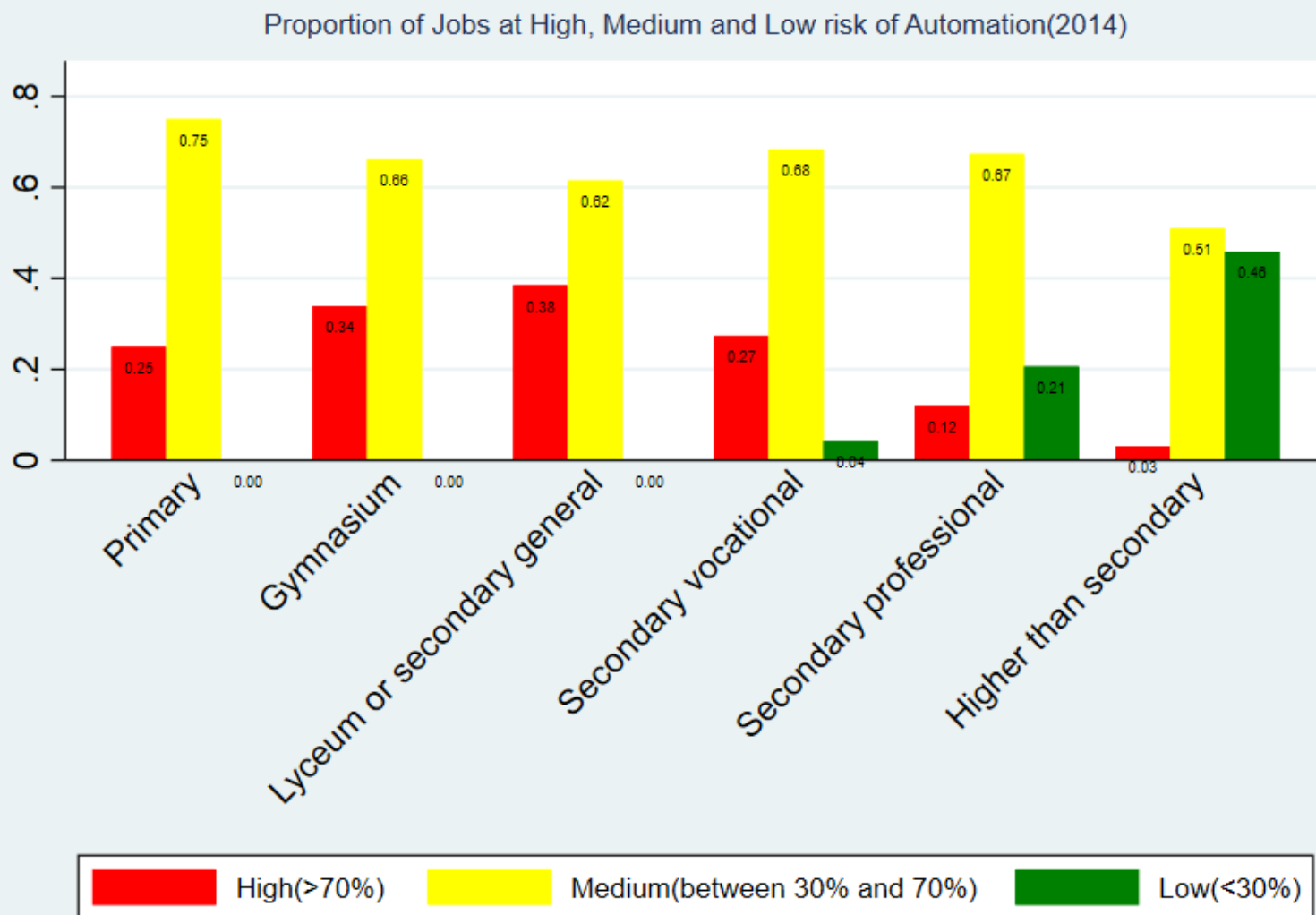
*** p<0.01, ** p<0.05, * p<0.1

Sources: Author own calculations using the Pseudo-STEP survey data for Moldova

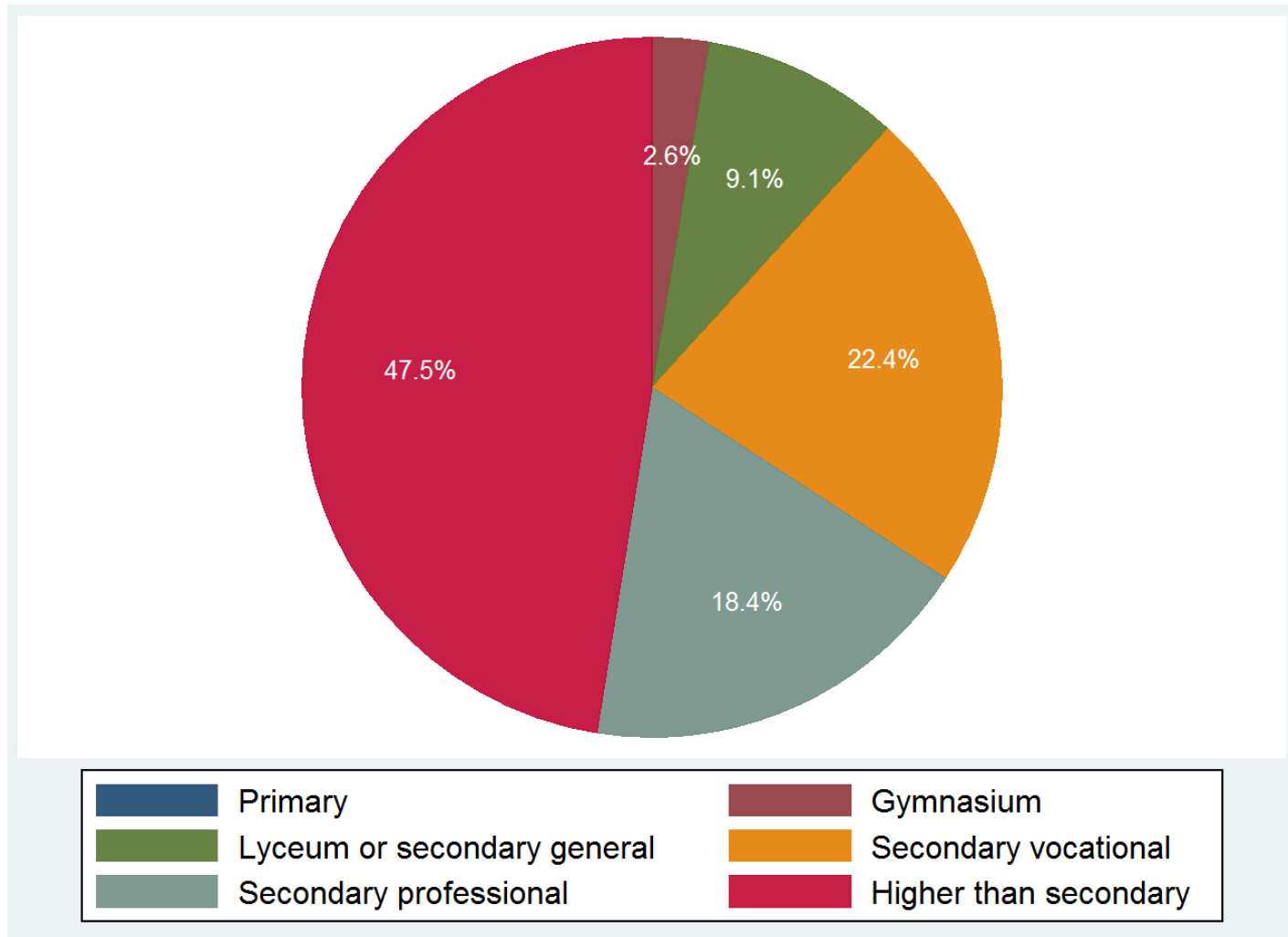
Distribution of Automation across workers



Change will differ by level of education



Education level across Workers



Risks: Jobs lost, and labor market polarization

