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Europe 2020

The Employment, Skills and Innovation Agenda
A World Bank Technical Note

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Abbreviations

BSMEPA	Bulgarian Small and Medium Enterprise Promotion Agency
CEE	Central and Eastern Europe
EC	European Commission
ECD	early childhood development
EU	European Union
FDI	foreign direct investment
GDP	gross domestic product
HEIs	higher education institutions
MEYS	Ministry of Education, Youth and Science (Poland)
MoEET	Ministry of Economy, Energy and Tourism (Poland)
NCF	National Capital Fund
NGP	nongovernmental organization
OECD	Organisation for Economic Co-operation and Development
PAS	Polish Academies of Science, <i>Polska Akademia Nauk</i>
PISA	Programme for International Student Assessment
RDI	research and development institutes
R&D	research and development
STEP	Skills Toward Employment and Productivity
TFP	total factor productivity
TIMSS	<i>Trends in International Mathematics and Science Study</i>

Introduction

This Technical Note highlights some of the work the World Bank has recently conducted in support of the growth agenda outlined in the Europe 2020 Strategy.¹ The World Bank is actively supporting the New Member States, as well as accession and neighborhood countries, in achieving the Europe 2020 targets of smart, sustainable, and inclusive growth. The engagement consists of policy and program lending in these areas as well as analytical work. This note focuses on highlighting some of the Bank's analytical Europe 2020 work pertaining to raising employment rates and skills levels as well as to spur innovation and technology absorption.² The Technical Note is structured as follows:

Section 1 provides the macroeconomic background, and highlights how the economies of the EU-10 countries were steadily catching up with those of the EU-15 countries, but then the catching-up was interrupted by the onset of the global financial and economic crisis. Re-accelerating the pace of convergence after the crisis and reaching the Europe 2020 targets will require raising employment levels, raising skill levels, and increasing technology absorption and fostering innovation.

Section 2 focuses on low employment rates in EU-10 countries, particularly among older and less-educated workers, women, and minority groups, in particular Roma, and highlights some key issues in the organization of labor markets and labor market related institutions that have been the focus of recent World Bank research: (1) enhancing the productivity and employability of older workers; (2) evaluating the age of retirement and worker disincentives resulting from pre-retirement benefits; (3) evaluating the eligibility conditions for the receipt of disability pensions; (4) evaluating the employee-employer tax wedge; (5) evaluating whether pro-natalist policies that are in place, promote rather than discourage female labor force participation; (6) promoting labor market opportunities of poor and vulnerable groups, especially Roma; and, (7) evaluating whether labor market opportunities can be enhanced through active labor market programs.

Section 3 focuses more specifically on skills development across the life cycle, with a brief discussion on selected policy areas: (1) expansion of early childhood development programs to universal coverage; (2) adopting ambitious, comprehensive approaches to schooling to support higher levels of generic skills for all; (3) strengthening access to and efficiency of tertiary education through higher education financing reform and data collection as a basis for system steering; and (4) establishing and strengthening lifelong learning systems. Section 3 also highlights some policy insights from the Polish and Lithuanian reforms.

Section 4 focuses on innovation and technology absorption, highlighting how more and more efficient R&D spending will boost economic growth in EU10 countries. This section explores four policy directions: (1) redesigning public R&D funding systems to emphasize applied research and collaboration with industry; (2) reforming state-owned research institutes, including through commercialization and employee-led privatization, to better align their outputs with the needs of industry; (3) strengthening the public institutional framework for R&D and innovation; and (4) increasing financing for start-up and innovative companies.

¹ The note was drafted by Nina Arnhold, Marcin Piatkowski and Joost de Laat, under the guidance of Jesko Hentschel, based on recently completed and ongoing World Bank work in support of the region's growth agenda. The authors would like to thank Jan Rutkowski, Natasha Kapil, Itzhak Goldberg and Borko Handjiski for their contributions and Mamta Murthi, Dirk Reinermann, Lars Sondergaard, Juan Manuel Moreno and John Gabriel Goddard for their suggestions and comments. The note was edited by Diane Stamm and Nadezhda Lepeshko.

² A separate technical note will highlight World Bank work on inclusive growth which is not covered here.

Section 1: The Macroeconomic Environment in EU-10 Countries

Key issue:

The fallout from the global financial and economic crisis and volatile financial markets may weaken future growth potential of the EU-10 countries, also relative to other high and upper middle-income countries.

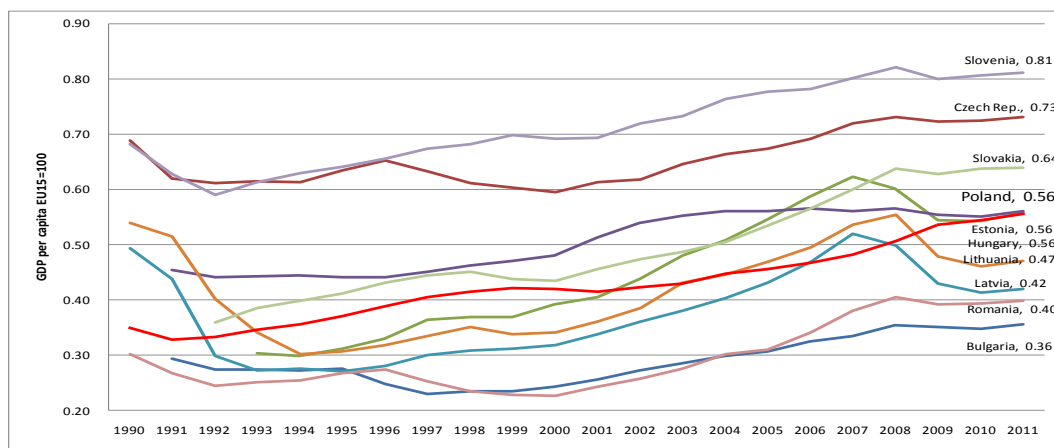
To reach the Europe 2020 targets of smart, sustainable, and inclusive growth, the largest economic payoff would likely come from:

- Raising employment rates;
- Raising skill levels; and,
- Increasing technology absorption and fostering innovation.

Key issue: The fallout from the global financial and economic crisis and volatile financial markets may weaken future growth potential of the EU-10 countries, also relative to other high and upper middle-income countries.

The economies of the EU-10 countries were steadily catching up with those of the EU-15 countries until the onset of the global financial and economic crisis.³ Gross domestic product (GDP) growth in the 10 countries averaged nearly 6 percent during 2000–08. By 2008, relative to EU-15, GDP per capita in the EU-10 region had reached the highest levels since the beginning of transition in 1989 (figure 1.1) and one of the highest income levels relative to EU-15 in its economic history (Piatkowski 2009). Slovenia and the Czech Republic had the highest GDP per capita in 2008 in the region, outperforming Portugal. The overall level of well-being, as measured by, for instance, the Human Development Index, has also risen and reached the highest levels on record, above what would be predicted by income alone (UNDP 2009). Nevertheless, a large income gap remains between the EU-10 and EU-15 countries.

Figure 1.1 GDP per Capita in EU-10 (EU-15 = 1), 1990–2011 (Purchasing Power Standard)



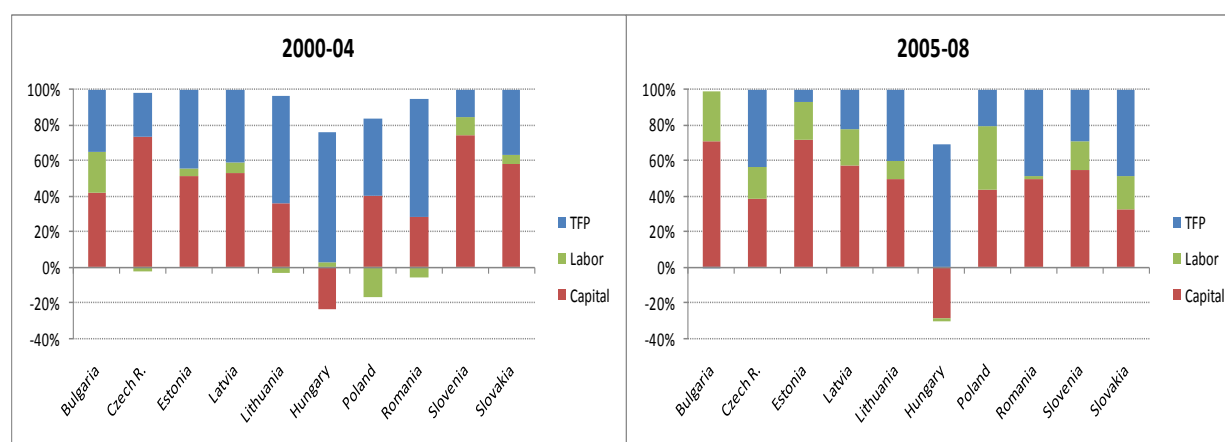
Source: Authors' own estimates based on the Eurostat Ameco database.

Note: Projections for 2010–11.

³ The EU-10 includes Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, and Slovenia.

Fast growth was largely driven by improvements in TFP and rising investment. TFP growth has been high since 2000, reflecting growing openness to trade, rising quality of education and ongoing absorption of technology from abroad through imports and foreign direct investment (FDI). The contribution of capital was also high, mainly owing to enhanced macroeconomic stability, high inflows of FDI and improvements in infrastructure, increasingly funded by EU funds. However, the contribution of employment to growth has been relatively weak, reflecting on average low employment rates across the region, although the contribution of labor to growth during 2005-08 increased owing to improved labor market conditions and structural reforms enhancing labor supply (figure 1.2).

Figure 1.2 Contribution of TFP, Labor, and Capital to GDP Growth in EU-10 countries



Source: Eurostat, World Bank staff calculations.

The fast catching-up was, however, interrupted by the global crisis, which hit the region hard. In 2009, against expectations that the EU-10 region could largely decouple from the global crisis (EC 2008a; IMF 2008), GDP of the EU-10 fell by 3.6 percent, slightly less than the EU-15 but much more than the rest of the world's economy (figure 1.3). Such a strong impact of the crisis on the region is widely attributed to the unprecedented current account imbalances experienced before the crisis in a number of EU-10 countries, rapid expansion in credit, asset bubbles in non tradable sectors, fast real exchange rate appreciation, lack of flexibility in countries with fixed exchange rates, large reliance of external inflows of capital, and often loose fiscal policy.⁴

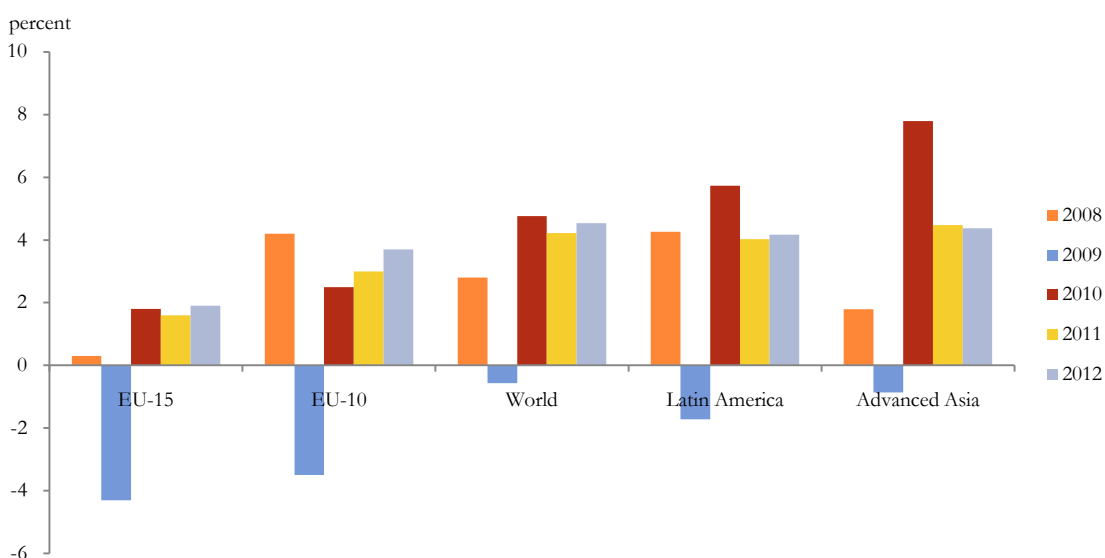
However, there was a large differentiation in the region. Bulgaria, Estonia, Latvia, Lithuania, and Romania experienced the largest macroeconomic imbalance before the crisis, and GDP decreased much more (in Latvia, for instance, it declined by 18 percent in 2009 alone) than in countries like the Czech Republic, Poland, or the Slovak Republic, where the macroeconomic imbalances were much smaller. Poland was the only country in the EU to avoid the recession altogether, growing by 1.8 percent in 2009.

The recovery started in early 2010, but is fragile and uneven. The EU-10 region began to grow in 2010 for the first time since the start of the crisis in late 2008. Year-on-year growth in the EU-10 region improved from -4.0 percent in the third quarter of 2009 to 2.5 percent in the third quarter of 2010. However, the pace of economic recovery is slower than in other parts of the world economy, especially relative to other high and upper middle-income countries such as Korea, Brazil, Chile or Malaysia (figure 1.3).

⁴ See, for instance, Berglöf et al.2009; Cihak and Fonteyne 2009; Mitra, Selowsky, and Zalduendo 2009; and Darvas 2010.

Moreover, volatile financial markets, fiscal pressures, and high unemployment cast a shadow on future prospects. The strength of the recovery in the EU-10 region is also uneven, reflecting varying degrees of reliance on external demand, initial imbalances, and country-specific factors. Countries that had the largest macroeconomic imbalances before the crisis are rebounding much more slowly than countries like the Slovak Republic or Poland, which have kept macroeconomic imbalances under control.

Figure 1.3 GDP Growth Rates in EU-10 and the World, 2008-2011



Sources: IMF World Economic Outlook Database, October 2010; Eurostat; World Bank staff calculations.

Note: Projections for 2010-12. Advanced Asia: Korea, Hong Kong, Taiwan, and Singapore. Latin America refers to Latin America and the Caribbean.

A new set of reforms can enable the EU-10 to enhance growth prospects and achieve targets under the Europe 2020 Strategy. The reform agenda is extensive and includes strengthening fiscal sustainability, increasing labor force participation, improving education and skills, and enhancing technology absorption and innovation. There also remains an important agenda to cut red tape and reduce regulatory costs for doing business, which according to the most recent World Bank Doing Business 2011 (World Bank 2010g) report are, despite the ongoing improvements, still higher than in advanced economies or in a number of high achieving countries such as Korea or Chile. The crisis has reemphasized the importance of these reforms. In the environment of higher credit spreads, lower capital inflows, low capacity utilization and large uncertainty as to future macroeconomic developments, all negatively affecting private investment, to reach the Europe 2020 targets the largest and most immediate economic payoff would likely come from (a) increasing employment rates in the EU-10 region to the 75 percent EU target, (b) enhancing human skills, and (c) increasing technology absorption and fostering innovation.

Section 2: Raising Employment Rates

Key issue:

- Low employment rates in EU-10 countries, particularly among older and less-educated workers, women, and minority groups such as Roma

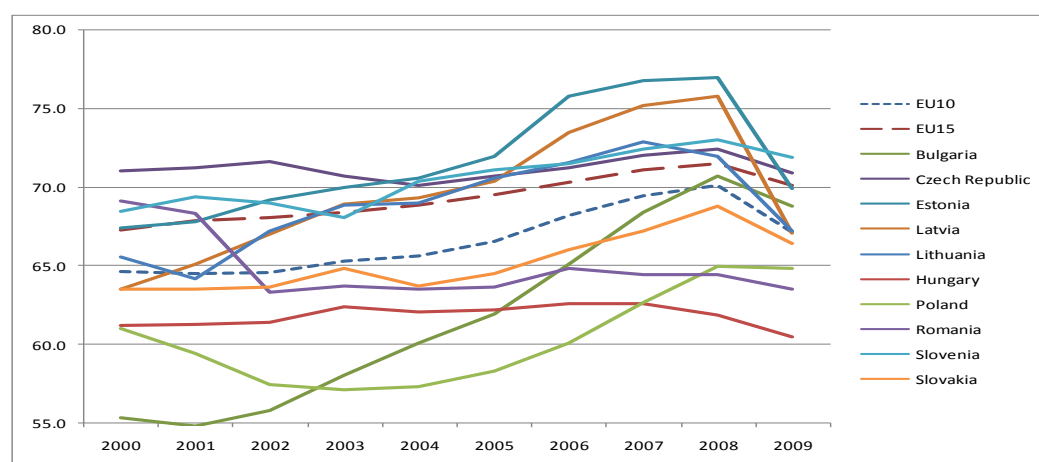
Selected Policy Directions:

- Enhance the productivity and employability of older workers
- Evaluate the age of retirement and worker disincentives resulting from pre-retirement benefits
- Evaluate the eligibility conditions for the receipt of disability pensions
- Evaluate the Employee-Employer Tax Wedge
- Encourage higher female labor force participation and evaluate pro-natalist and others policies in this context
- Promote labor market opportunities of poor and vulnerable groups, including Roma, Europe's largest minority group
- Evaluate whether labor market opportunities can be enhanced through active labor market programs

Key issue: Low employment rates in EU-10 countries, particularly among older and less-educated workers, women, and minority groups such as Roma.

EU-10 countries have low employment rates. Despite substantial improvements in the last two years driven by economic expansion and structural reforms, the average employment rate for the region stood at 67 percent in 2009, lagging behind the EU-15 average at 70 percent and below the 75 percent target of the EU 2020 Strategy (figure 2.1). Employment rates in Hungary and Romania, which only slightly exceeded 60 percent, were one of the lowest in the EU-27. Employment rates exceeded the EU-15 average only in the Czech Republic and Slovenia.

Figure 2.1 Average Employment Rates in EU-10 and EU-15 Countries, 2000–09



Source: Authors' calculations based on Ameco database.

Note: EU-10 unweighted average.

Raising employment could substantially boost growth. Model-based estimates suggest that raising employment to the Lisbon target of 70 percent employment rate for 15-64 year olds, roughly comparable with the current EU2020 target of 75 percent for 20-64 year olds, could increase the level of GDP in 2025 in selected EU-10 countries by 15.6 percent, 11.0 percent and 5.5 percent respectively for Poland, Romania and the Czech Republic (Table 1.1).⁵ In the case of Poland, this would translate into additional growth of around 0.9 percentage points a year until 2025; for the Czech Republic a higher employment rate could boost growth by around 0.4 percentage points a year. A World Bank report (Richter and Krzak 2011), based on a large-scale general equilibrium model of the Polish economy developed by the Institute of Structural Research (IBS), provides similar estimates for Poland, where reaching the Lisbon Agenda’s 70 percent employment target could increase growth by 0.8 percentage points on average during 2010-15.⁶ These estimates suggest that raising employment could significantly raise GDP growth rates and help make up for a large part of the projected post-crisis decline in the growth rate in the EU-10 countries.

Table 1.1 Overall Effects on GDP Levels of Achieving Lisbon Targets in Selected EU-27 Countries by 2025

	Employment (1)	Human capital (2)	Services (3)	Administrative burden (4)	R&D (5)	Total (6)
GDP						
Poland	15.6	0.4	0.4	2.0	5.4	25.2
Czech Republic	5.5	0.1	1.5	1.7	4.9	14.3
Romania	11.0	0.7	0.3	1.7	11.7	27.2
EU-27	6.3	0.4	0.1	1.5	4.5	13.3

Source: Lejour, Verweij, and ter Weel 2008.

Note: The numbers in columns (2)–(5) are relative changes from the policy simulations in the previous column in 2025. The number in columns (1) and (6) are relative changes from the baseline.

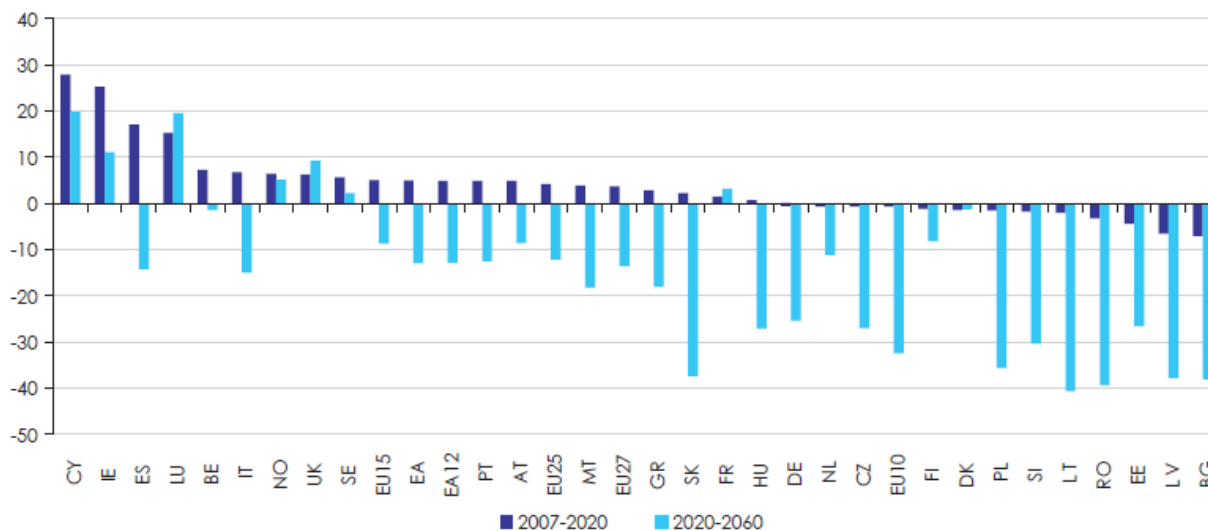
Aging population trends further underscore the need to raise employment rates among the working age population. The labor force in EU-10 countries is declining, a process which, according to the projections of the European Commission, is likely to accelerate after 2020, with EU-10 countries projected to be at the forefront of the decline (figure 2.2). The demographic decline is projected to result from low fertility rates, not exceeding 1.5 in the whole region, rapid aging, and net emigration. These projections, however, do not fully factor in the potential for growing migration into EU-10 countries in the medium term, driven by rising absolute and relative incomes. The Czech Republic, for instance, has recently seen a significant inflow of immigrants; between 2004 and 2008 the stock of foreign-based population increased from 2.5 percent to 4.2 percent. In 2007 alone, immigration inflows reached 1 percent of total population (OECD 2010c). Other EU-10 countries, especially those with higher incomes, may experience similar waves of immigration in the future, partly mitigating the negative demographic trends.⁷

⁵ Estimates based on a *WorldScan* general equilibrium model of the world economy, which simulates the effects on income, consumption, exports, and real wages of reaching five selected targets by 2015 under the old EU Lisbon strategy (Lejour, Verweij, and ter Weel 2008).

⁶ Although the ultimate contribution of higher employment to growth will depend on the exact composition of the projected increase in the employment rate with regard to high and low-skilled workers.

⁷ In Poland, the stock of foreign population amounted to only 0.2 percent of the total population in 2008.

Figure 2.2 Labor Force Projections, 2007–60 (percentage change of people aged 15–64)

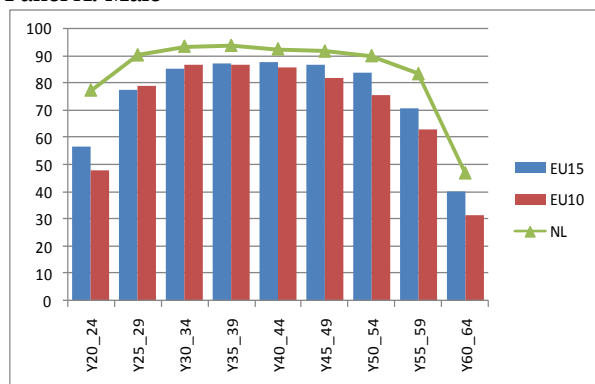


Source: EC 2009b.

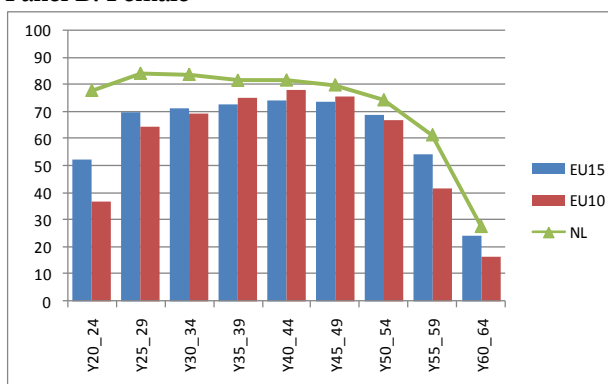
Labor inactivity among older workers largely explains low overall employment rates. EU-10 countries lag behind EU-15 and the Netherlands, the best overall EU performer in 2009, in most age groups in terms of employment among both men and—to a lesser extent—among women (figure 2.3). However, the largest difference in employment rates relates to the youngest and oldest age cohorts. Among 55–64-year-olds, the employment rate among men and women in EU-10 is, respectively, 6.7 and 9.8 percentage points lower than the EU-15 average compared to only a 1.3 and 0.1 percentage point difference among 25–49-year-olds.

Figure 2.3 Employment Rates by Age in EU-10, EU-15, and the Netherlands, 2009 (percent)

Panel A: Male



Panel B: Female

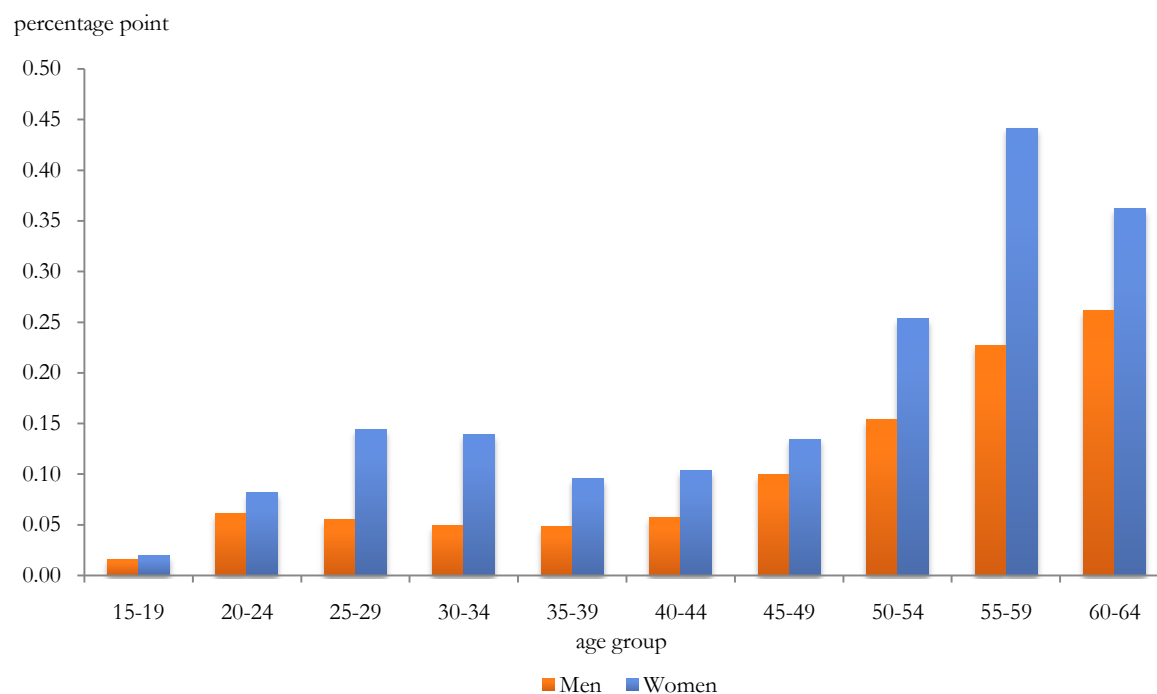


Source: Eurostat; World Bank staff.

Reducing inactivity among older workers, especially women, would have the biggest impact on the employment rate. This is because older workers have the highest inactivity rate and represent a large share in the total labor force. Taking Poland as an example, if the proportion of inactive women aged 55–59 fell by 10 percent, the employment/population ratio would increase by more than 0.4 percentage points. However, if inactivity among younger women aged 30–34 fell by the same 10 percent, the total employment rate would

increase by less than 0.15 of percentage point (figure 2.4). All other EU-10 countries exhibit a similar pattern, with reductions in inactivity among older workers bringing the largest benefits among all age groups. While the current age cohort is likely to have lower skills levels than future generations, countries are advised to follow a two-pronged approach by raising the skills levels of the current cohort through further learning and providing future generations upfront with a stronger skills basis through the formal education system.

Figure 2.4 Poland: Effect of 10% Fall in Inactivity on Total Employment Rate (by Age and Gender), 2008



Source: World Bank forthcoming.

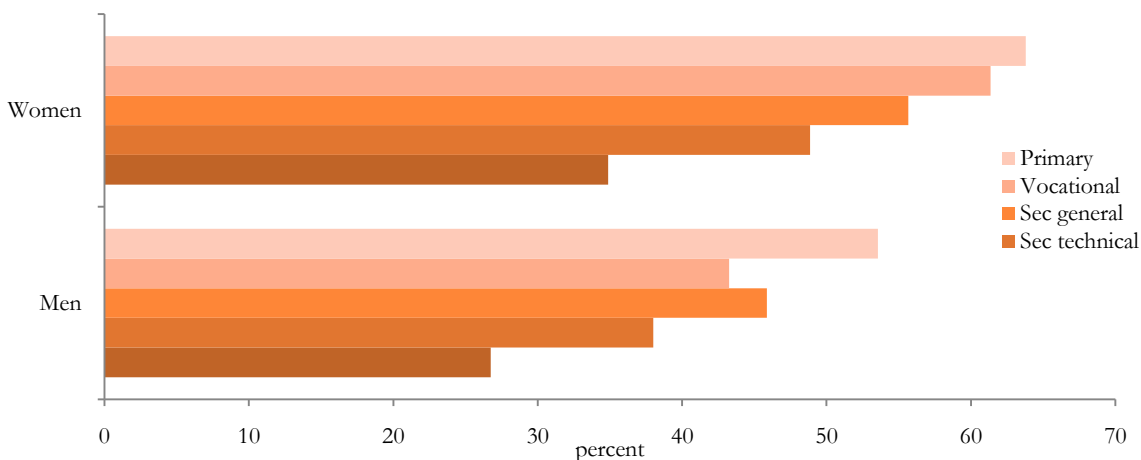
Youth unemployment remains a severe problem for many EU member states; therefore, school-to-work transition will continue to deserve attention by policy makers. The World Bank (2007) has developed a global inventory of interventions to support young workers.

Selected Policy Directions to Raise Employment

1. Enhance the productivity and employability of older workers

Enhancing the productivity and employability of older workers includes the development of a system of lifelong learning, and of active labor market policies such as job search assistance, job counseling, training, and incentives for employers to hire older workers. Low educational attainment and low skills also contribute to inactivity. There is ample empirical evidence that low quality of human capital (lack of skills) represents a key barrier to increasing employment and reducing inactivity (OECD 2010b; World Bank 2010a). This is also the case for older workers in EU-10 countries, where inactivity is closely correlated with educational attainment. Poland provides a suitable example (figure 2.5). Raising skills levels is discussed in more detail in the next section.

Figure 2.5 Poland: Better Education Is Associated with Lower Likelihood of Inactivity in Older Age



Source: World Bank forthcoming based on Labor Force Survey 2008 (2nd quarter).

2. Evaluate the age of retirement and worker disincentives resulting from pre-retirement benefits

Retirement ages for both men and women especially have generally not kept up with the rising life expectancy. Given the demographic trends, raising the retirement age and equalizing it for men and women is becoming increasingly critical. Important lessons can be learnt from Germany, one of the countries in Europe hit hardest by the demographic decline. Germany will gradually increase the retirement age to 67. While there is still public debate on the fine print, the recently published sixth German aging survey has confirmed that the employment situation for the 60+ generation has already changed significantly since 2002 and that Germany is moving toward longer working lives. The retirement age already increased from 62 to 63 between 2002 and 2008, and the percentage of those who are still employed beyond their 60th birthday has increased to 33 percent. The federal government, states, social partners, and enterprises cooperate in the Initiative New Quality of Work (INQA). According to INQA, employment of the 55–65 age group has increased from 37 percent in 1998 to 52 percent currently; the next target will be 55 percent. The focus is now increasingly shifting from the “if” to the “how” of longer working lives.

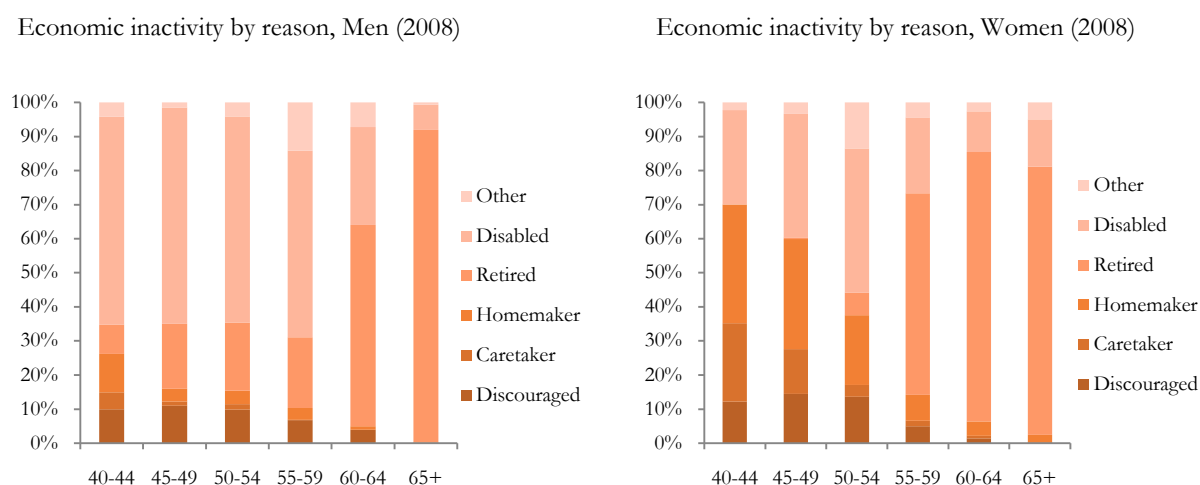
Similarly, preretirement benefits can also strengthen disincentives for workers. In Poland, for example, after a cut in the eligibility for the so-called preretirement benefit granted to unemployed men over 55 years of age and women over 50 years of age introduced in 2004, labor participation rates among these two age cohorts increased sharply, while the labor participation rate of other older age cohorts increased much less or continued to stagnate (World Bank forthcoming).

3. Evaluate the eligibility conditions for the receipt of disability pensions

In some countries, the stock of disability pensioners is unusually large. In Poland, for example, a forthcoming World Bank study which includes an analysis of labor force surveys finds that disability and early retirement are the main reasons for inactivity among older workers. Results from these surveys suggest that inactivity among workers in Poland is mostly driven by the availability of preretirement and disability benefits, followed by caretaking and homemaking activities for women (figure 2.6, panel B, below). Disability

is the main reason for inactivity for men aged 45–59 and for women aged 45–55 (panels A and B), that is, until they reach the early retirement age. Consequently, retirement is the dominant reason for inactivity among workers who reach the early retirement age. Caretaking and homemaking activities are the prevailing reason for inactivity only among women under age 50. Women over age 50 are inactive mainly due to disability and later on due to early retirement.

Figure 2.6 The Two Main Reasons for Inactivity Among Older Workers Are Disability and Early Retirement



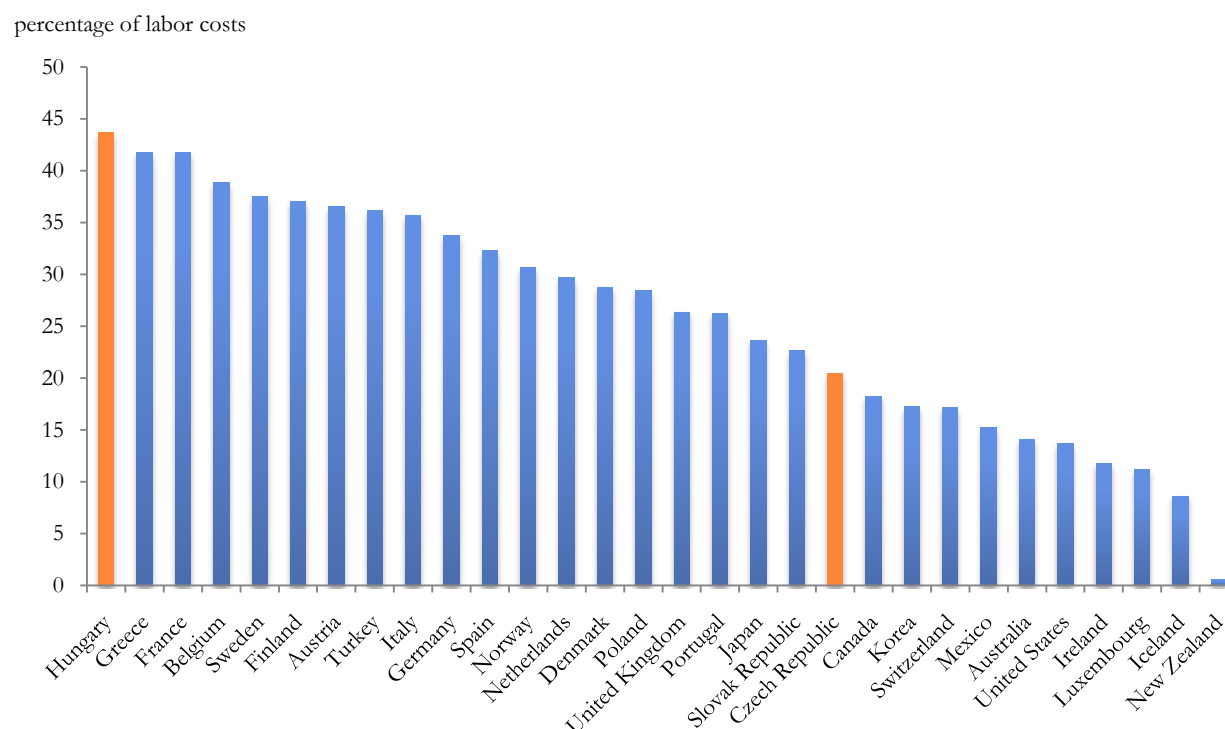
Source: World Bank forthcoming based on Labor Force Survey 2008 (2nd quarter).

4. Evaluate the Employee-Employer Tax Wedge

There is a broad consensus in the literature that a high tax wedge reduces reported employment, especially of the low-skilled workers, and increases unreported employment (OECD 2010b). For example, in 2009, Hungary had the lowest employment rate in the EU region, barely exceeding 60 percent, while the Czech Republic’s employment rate was the second highest in the region, exceeding the EU-27 average (figure 2.1). The difference in tax wedge is likely an important contributor to this difference in employment rates. Figure 2.7 shows the tax wedge. Note that Hungary’s tax wedge is the highest among OECD countries (although it was recently slightly lowered), while that of the Czech Republic is below the OECD average. An in-depth analytical work in Turkey (World Bank 2009b) estimated through micro-economic demand functions the employment impact of a 5 percent reduction in the social security contributions for employers – which was found to be relatively modest if compared to the impact of a targeted subsidy reduction for specific groups or those earning around the minimum wage. Reform measures to lighten the tax burden, especially on labor, as well as incentives to operate in the formal sector are further proposed by a World Bank (2008b) report on reducing undeclared employment in Hungary.⁸

⁸ For an overview of the recommendations, see World Bank 2008b.

Figure 2.7 Total Tax Wedge in OECD countries, 2009



Source: OECD 2009a.

5. Encourage higher female labor force participation and evaluate pro-natalist and others policies in this context

Greater female labor market participation is needed in order to raise employment levels, as previous sections have shown. It is therefore important to evaluate if pro-natalist and other policies in place support rather than discourage greater female labor market participation.

In response to below replacement fertility rates, many European countries have increased spending on policies aimed at encouraging greater family sizes. Common pro-natalist policies include child benefits, birth grants, tax credits, maternity leave, child care, and flexible work arrangements. International evidence on fertility dynamics has demonstrated that a discussion of pro-natalist policies requires an analysis of labor market dynamics, especially the participation of women. The combination of very low fertility with low participation in the labor market by women may reflect an incompatibility between raising children and working that is observed in several *lowest-low* fertility countries. Croatia, for example, like other European countries, is faced with the double challenge of having an aging population that relies on a relatively small economically active working-age population, and has among the lowest female labor force participation rates; 56.5% in 2007, a *reduction* from 63% in 1980 (World Bank 2008a). A recent Public Finance Review by the World Bank (2008a) demonstrates that Croatia spends approximately 2% of GDP on family benefits, and around half of this is spent on (regressive) child tax allowances, which are unlikely to encourage larger families or greater female labor force participation. A shift away from such expenditures toward policies that

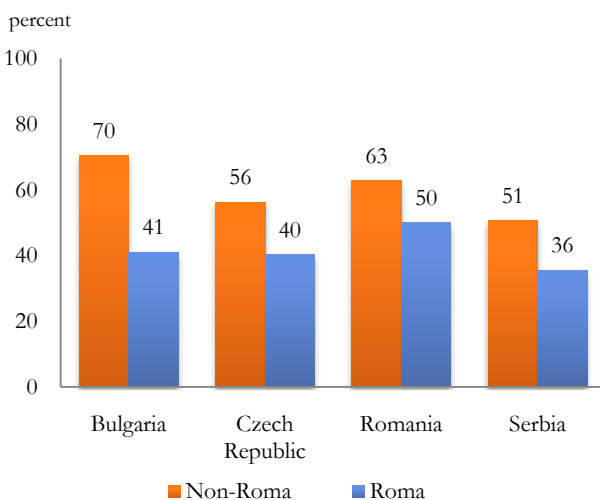
address the work-child raising compatibility such as flexible work arrangements and child care are much more likely to meet the fertility objective while raising female labor force participation.

6. Promote labor market opportunities of poor and vulnerable groups, including Roma, Europe’s largest minority group

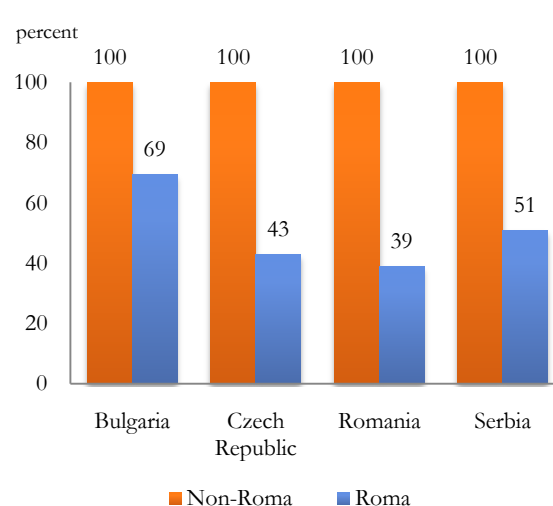
Roma employment rates continue to fall far behind those of the majority populations, especially among women. This is shown by a recent World Bank study “Roma Inclusion: An economic opportunity for Bulgaria, Czech Republic, Romania, and Serbia” (World Bank 2010c) which analyzes labor force and household budget surveys for Bulgaria, Czech Republic, Romania, and Serbia. In Bulgaria, for example, only a third of Roma men work compared to almost two-thirds of men from the majority populations. Roma women are even less likely to have jobs. A mere 31% of Roma women in Romania are employed, 24 percentage points below the employment rate of women from the majority population. In the Czech Republic and Bulgaria less than a quarter are working compared to 47% of Czech and 58% of Bulgarian women from the majority populations. Similarly, among those working, the average wage gap with majority populations is almost 50 percent. Figure 2.8 summarizes these findings. The report also finds that differences in skill levels account for approximately 2/3rds of the wage gap.⁹ Finally, the report finds that for the four countries the potential economic benefits of successfully integrating the Roma into the labor market are large, increasing GDPs by more than 3 percent and government budgets by more than 4 percent annually.¹⁰

Figure 2.8 Roma and non-Roma employment conditions

Panel A: Percent employed



Panel B: Roma earnings relative to non-Roma



Source: World Bank 2010c.

⁹ Using the Oaxaca Blinder wage decomposition technique that is commonly used for this type of calculation.

¹⁰ Micro credit may provide one avenue to raising (self-) employment rates among working age Roma. An ongoing World Bank/UNDP assessment of a new EU pilot project by Polgar Foundation in Hungary, which provides micro credits to Roma, will provide further insights into this the approach (see also box 3.3).

7. Evaluate whether labor market opportunities can be enhanced through active labor market programs

Many EU countries are putting considerable resources into improving labor market outcomes through a variety of active labor market programs, but little is known about their effectiveness. For example, programs that improve matching of workers and jobs through job search assistance, improve quality of labor supply through training, and programs that provide direct labor incentives through job creation schemes such as public works. Recent reviews of the literature assessing the effectiveness of these programs have shown a considerable heterogeneity with some programs having considerable success in one country or context but not in another (e.g. Card et al. (2009) and Kluve (2006)). This underscores the importance of evaluating the effectiveness of these programs in improving labor market outcomes. In Europe, the World Bank is currently working with the governments of Latvia, Serbia, and Turkey to carry out impact evaluations of a public works program, a self-employment subsidy program, and a skills training program, respectively. In each of these countries, the World Bank is collaborating with the national employment agencies and collecting data through tailor-made surveys to evaluate the employment impact using different counterfactual econometric methods such as matching (Latvia), regression discontinuity (Serbia), and randomized control trial (Turkey). In collaboration with EC DG Regional Policy and UNDP, it is also carrying out an evaluation of a novel microfinance program called Kiut in Hungary aimed at promoting self-employment among the poor, Roma in particular.

Section 3: Raising Skill Levels

Key issues:

- Low skill levels hamper growth, innovation, and social inclusion.

Selected Policy Directions

- Expand early childhood development programs to universal coverage
- Build a strong skills foundation for all through ambitious approaches to schooling
- Strengthen access to and efficiency of tertiary education through higher education financing reform and data collection as a basis for system steering
- Establish and strengthen lifelong learning systems

Key Issue: Low skill levels hamper growth, innovation, and social inclusion.

Education contains a promise of upward mobility and equality of opportunity in democratic societies. However, the Europe 2020 Strategy (EC 2010a) summarizes the status quo in the EU: “A quarter of all pupils have poor reading competences...one in seven young people leave education and training too early. Around 50 percent reach the medium qualifications level but this often fails to match labor market needs. Less than one person in three aged 25–34 has a university degree compared to 40 percent in the U.S. and over 50 percent in Japan. According to the Shanghai index that ranks international universities, only two European universities are in the world’s top 20.”

Box 3.1 “Skills, Not Just Diplomas: the Path of Education Reforms in Europe and Central Asia”

A forthcoming World Bank (Sondergaard and Murthi, forthcoming) report “*Skills, Not Just Diplomas*” uses a range of different data sources to argue that the skills problem in the Eastern European and Central Asian (ECA) region relates more to the quality and relevance of the education provided in ECA countries than to problems of access.

Figure 3.1 Not Reading Well Enough to Learn? Share of Students Scoring “Level 1 or below” (indicating very poor quality) on PISA 2006 - Reading



Sources: OECD 2007 database; Murthi and Sondergaard (2010).

For instance, the report uses results from OECD's Programme for International Student Assessment (PISA) 2006 (shown in figure 3.1) to illustrate that a large proportion of 15-years in ECA have not acquired even the most rudimentary reading proficiencies. It argues that education systems in the region are not devoting attention and resources to measure and analyze what competencies their students are acquiring. School systems still focus on sorting and streaming students, breeding excellence for a few at the top while worrying less why many fail. Few school systems in the region measure success in terms of increasing the proportion of students who meet key competencies by the end of basic or secondary education.

Source: World Bank staff.

Skills will continue to be an important driver of individual success, social cohesion and economic growth.¹¹ While education systems used to focus on knowledge as a commodity to be acquired through repetition and rote learning, with an emphasis on early tracking and dead ends of the education systems, the technological revolutions of the past decades have shown that this approach to the transmission of knowledge is not going to prepare students and societies for future challenges. Students will need to be highly proficient in accessing, assessing, organizing, consolidating, and communicating knowledge, and this demands a different skills set than previously.

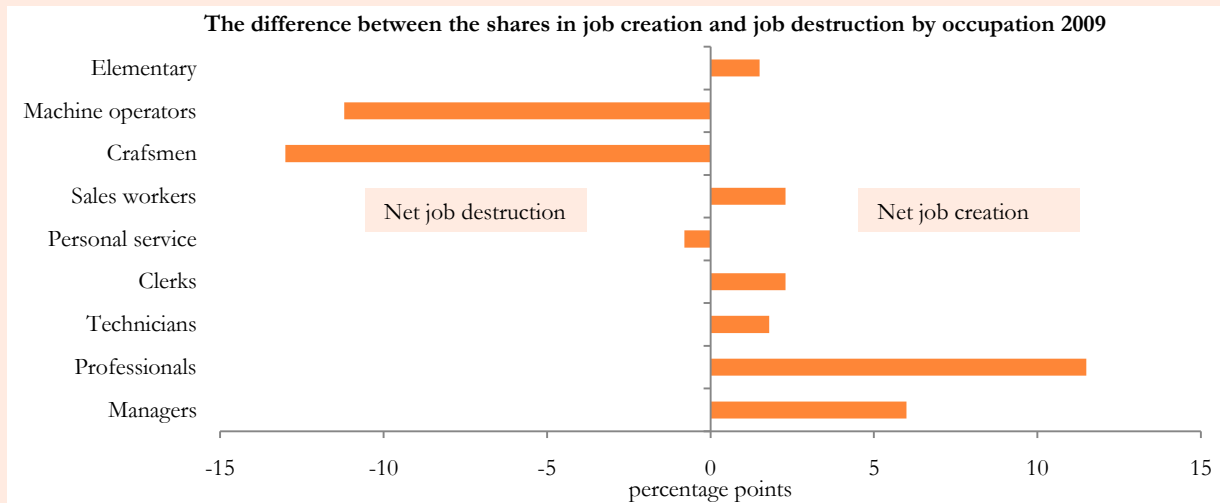
The labor market sends a strong message on the types of skills needed and on those that are becoming obsolete. A recent EC Expert Group report (EC 2010c) identifies four priorities for action: (a) investing in skills requires the right incentives for individuals and employers; (b) the worlds of education, training, and work need to be brought together; (c) the right mix of skills needs to be developed (job-related as well as transferable); and (d) future skills needs have to be better anticipated.

¹¹ For a detailed discussion on social and individual rates of return on education, see Psacharopoulos 2009 and World Bank forthcoming.

Box 3.2 Analyzing the Skills Mismatch

A World Bank forthcoming study analyzes the case of Poland using data from the Narodowy Bank Polski-World Bank Firm Survey of Demand for Skills 2009. The study shows that the same developments being observed internationally (e.g. see Levy and Murnane (2004) for an example of the United States)—that there is less and less demand for routine manual and routine cognitive tasks and an increasing demand for nonroutine, analytical, and interactive tasks and the associated skills—also are taking place in EU Member States like Poland (see figure 3.2). The study also highlights that employers not only seek increasingly higher skill levels, but also a broader set of competences and attitudes.

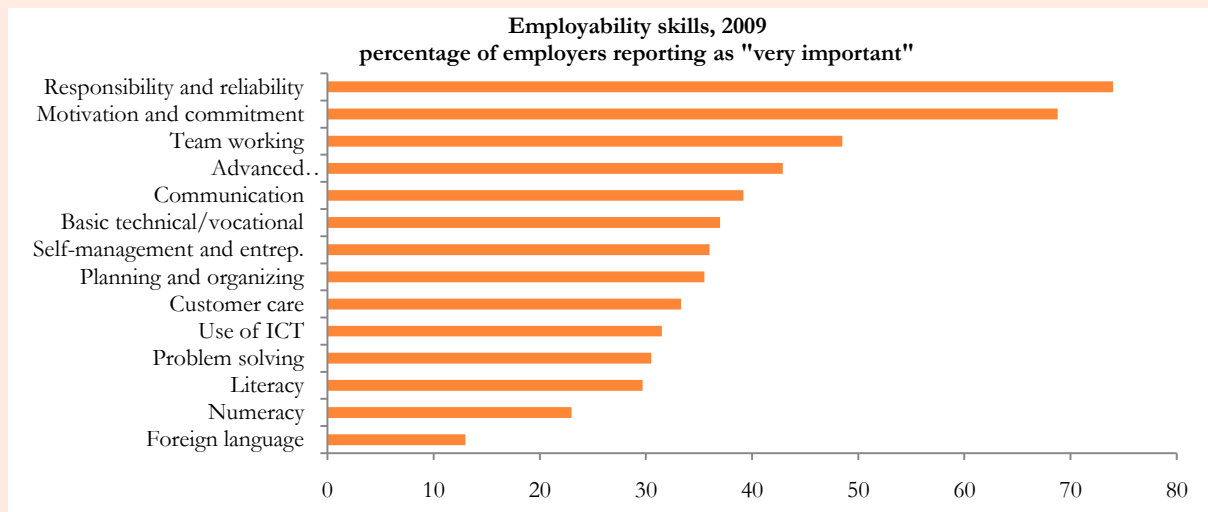
Figure 3.2 Newly Created Jobs in Poland Require Different Skills from Old Jobs, Giving Rise to the Skills Mismatch



Source: World Bank (forthcoming).

Further, Polish Employers value certain attitudes, such as responsibility and motivation, over other factors, as figure 3.3 illustrates.

Figure 3.3 Polish Employers Value Attitudes, such as Responsibility and Motivation, Over Other Factors



Source: World Bank (forthcoming).

Selected Policy Directions to Raise Skill Levels

1. Expand early childhood development programs to universal coverage

While schools play an important role in providing the skills needed for a dynamic labor market and inclusive societies, by the time formal schooling starts in most European countries, there are already significant developmental differences among children. This is an issue in Central and Eastern European countries, but it is also an issue in many old EU Member States.

Early childhood development (ECD) programs need political commitment and are resource intensive. Especially in Central and Eastern European economies, ECD provisions appeared as an easy gain for cost-cutting measures. However, as emphasized by the “Stepping Up Skills For More Jobs and Higher Productivity” report and elsewhere, getting children off to the right start is very important for further learning (World Bank, 2010c); research shows that the handicaps built early in life are difficult if not impossible to remedy later in life and that effective ECD programs can have a very high payoff. This can be done by developing technical, cognitive, and behavioral skills which ensure readiness for schooling and provide the basis for further learning. A new World Bank (2010f) study “Investing in Young Children: An Early Childhood Development Guide for Policy Dialogue and Project Preparation” provides a general overview of benefits of ECD programs by type of intervention.

EU-10 and other countries have profited from investment in ECD, and the benefits extend far beyond childhood. In Turkey, for example, children who benefited from a mother-child education program that provided cognitive enrichment to children and training and support for mothers were more likely to be in school during their teenage years than those in the control group (86 percent compared with 67 percent (Kagıtcıbası, Sunar, and Bekman 2001)). Using this example, a Bank report (World Bank 2010e) estimated through a micro-simulation approach the impacts of ECD on the generation of 20-39 year-olds today. Significant impacts resulted with incomes 8 percent higher, the poverty rate 11 percent lower and the female labor force participation rate more than 9 percent higher. Language acquisition plays a particular role in further learning, including acquisition of the language of instruction where this is not the mother tongue of the child.

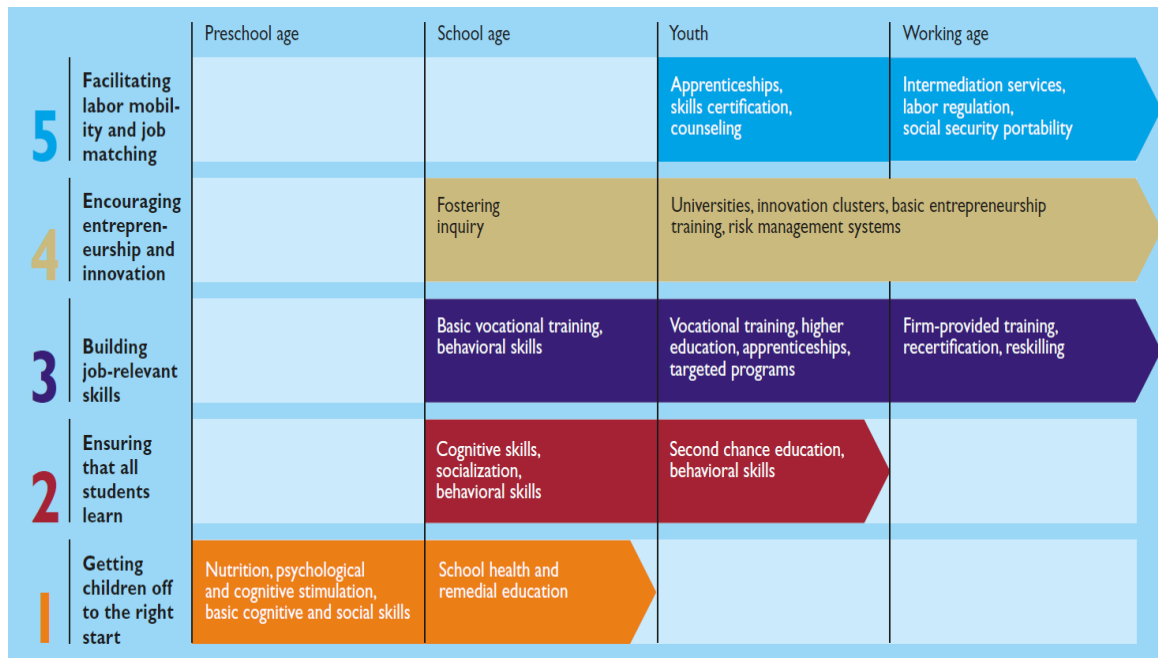
Box 3.3 ECD also provides leverage for the inclusion of Europe’s most impoverished minority, the Roma

An estimated 10 to 12 million Roma live in Europe. Their primary school completion rates in some EU-10 countries are comparable to school completion rates in Sub-Saharan Africa. This is not only a human rights issue but also an economic one. A 2010 World Bank (2010c) study “Roma Inclusion: An Economic Opportunity for Bulgaria, Czech Republic, Romania, and Serbia” estimates the combined economic benefits of Roma inclusion for Central and Eastern Europe and the Balkan countries to be 3.4 billion euro to 9.9 billion euro annually. Besides policies that can help labor market integration, the study discusses supply-side and demand-side interventions supporting school attendance and completion of Roma students as well as measures to support school readiness. The fiscal benefits alone far outweigh the investments of closing the education gap between Roma and non-Roma. Upon the request of the EC’s DG Regional Policy, the World Bank, in collaboration with UNDP, is currently providing technical support on monitoring and evaluation for an EU Parliament funded EC Roma Pilot on Early Childhood Education and Care being implemented by the Roma Education Fund in Slovakia, Hungary, Romania, and FYR of Macedonia.

Source: World Bank staff.

ECD programs and an integrative approach to learning based on learning outcomes are important elements of an inclusive lifelong learning system, but should not be established in isolation. Rather, they need to be part of a set of interventions geared toward individual and economic growth. These interventions do not concern education alone. The World Bank’s 2010 publication, “Stepping Up Skills,” (World Bank 2010b), thus proposes an integrative approach that combines education, health, labor market, and other interventions (figure 3.4).

Figure 3.4 Implementing STEP (Skills Toward Employment and Productivity) as an Integrated Set of Programs Across the Life Cycle



Source: World Bank 2010b.

While some interventions are designed for specific stages of the life cycle, efforts would need to be made so that knowledge, skills, and competences can be acquired at all stages, and to avoid dead ends for learners and closed “windows of opportunity” for the acquisition of skills. That is what the European Qualification Framework for Lifelong Learning and various National Qualifications Frameworks across Europe try to support. Ideally, they are learning-outcomes based, duration neutral, provide the basis for recognition of prior learning, allow for permeability, and have been developed involving key stakeholders, including employers.

2. Build a strong skills foundation for all through ambitious approaches to schooling

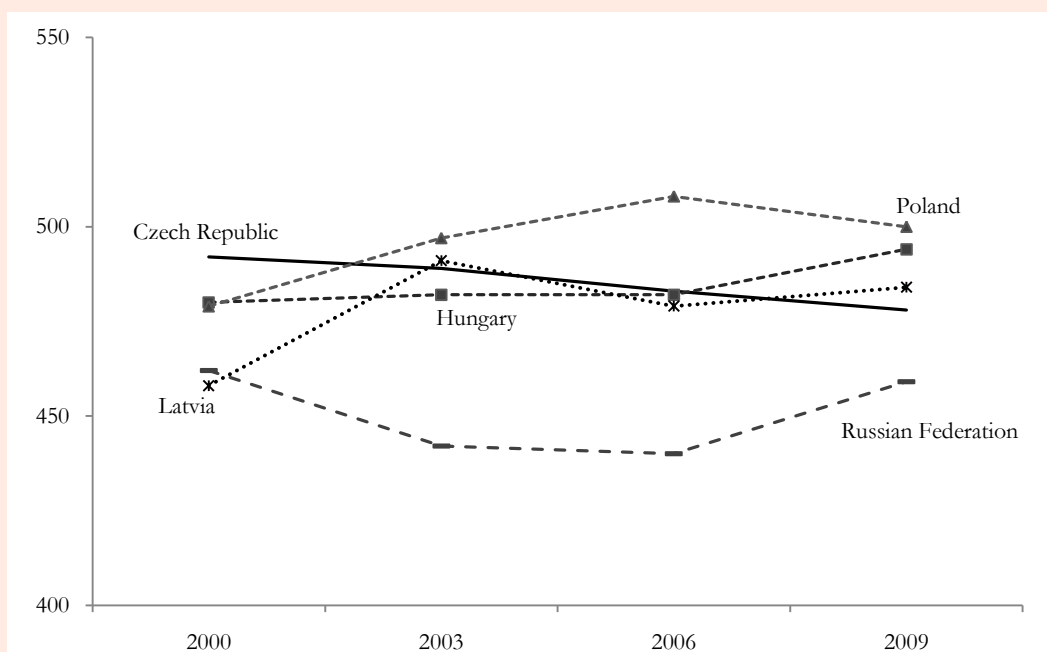
Striving for stronger skills, some European countries have had remarkable success with their education reforms, as box 3.4 shows for Lithuania and Poland. Poland, in fact, has become the highest performer in the EU-10 after deciding to postpone for one year the division of students into a vocational and a general track. A recent World Bank report (Jakubowski et al. 2010) clearly attributes the remarkable

improvement to “more” general education. It is an example of a country which postponed the division of students in secondary education in different tracks and thereby reached higher levels of generic skills for its overall student population. Various countries in the region struggle with outdated vocational education and training systems which do not prepare students for the labor market of the future.¹²

Box 3.4 Lithuania’s and Poland’s Education Reforms and Subsequent Improvement in PISA Scores

- **Lithuania** reformed its curricula on the basis of national standards, gave more autonomy to teachers, and introduced a new financing system between 1995 and 2007.
- Trends in International Mathematics and Science Study (TIMSS) scores increased by 34 points in mathematics and 55 points in science during that period.
- **Poland’s** reforms in 1999 improved quality of teaching, administration, and supervision, and introduced independent assessments and examinations.
- Curricula were reformed to balance three dimensions of education—acquiring knowledge, developing skills, and shaping attitudes.
- Division of secondary school students into vocational and general education tracks was delayed (it now occurs after nine years of joint general schooling).
- PISA scores in mathematics increased by 25 points and in reading by 28 points between 2000 and 2006, with the result that Poland outperformed other EU-10 countries, as shown in the figure below.

Figure 3.5 PISA Reading Performance, Selected CEE Countries, 2000 - 2009



Sources: TIMSS 1999, 2003, 2007; OECD 2003, 2004a, 2007, and 2010e World Bank staff.

Note regarding above figure: Year of PISA assessment displayed on x-axis and PISA score on y-axis. The average score among OECD countries is 500 points and the standard deviation is 100 points.

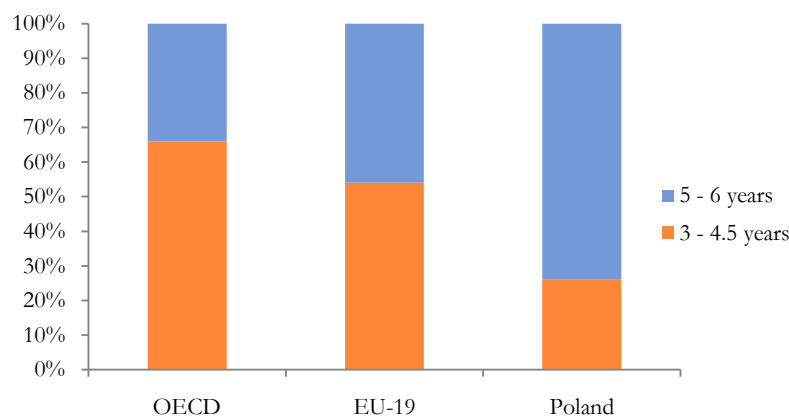
¹² This note does not specifically focus on Technical and Vocational Education and Training (TVET); however, this sub-sector needs to be part of a more comprehensive skills strategy.

3. Strengthen access to and efficiency of tertiary education through higher education financing reform and data collection as a basis for system steering

The demand for tertiary education degrees continues to be high and thus, the implementation of the Bologna Process and modernization of higher education curricula will remain high on the agenda of EU-10 governments. Despite certain challenges, the Bologna Process has been a remarkable success story, particularly where it provides the basis for more labor-market-relevant learning-outcomes-based degrees and mobility of learners and graduates across Europe. Further, even in countries where the public perception is that the system has been expanded beyond its limits, the labor market continues to reward tertiary education, and with a significant wage premium. This also applies to EU-10 countries (OECD 2009b; World Bank forthcoming). However, countries would benefit from further strengthening the Bologna Process, including public support for the Bachelors degree – which as a ‘new’ Bologna degree in continental European countries deserves particular attention as well as higher education financing reform, and improving quality assurance through data collection as a basis for system steering.

If the Bachelor’s degree does not receive sufficient public support when introduced, it is employers and young people who are taking the risk. There is still a negative perception of the labor market relevance of the Bachelor’s degree in some European countries, as Eurobarometer data show (EC 2008b; 2010c). As shown in figure 3.6 below, in Poland for example, more than 70% of tertiary graduates were enrolled in a 5-6 year long programs, compared with less than 50% in the EU-19, and less than 40% in the OECD. In this regard, the signaling function of the civil service and the stance of major employers cannot be overstated. Further, the experience of the Scandinavian countries could be of interest where a higher acceptance of the Bachelor’s degree correlates with a comparatively high participation in lifelong learning (World Bank forthcoming).

Figure 3.6 Percentage of (First-Time) Graduates, by Duration of Program



Sources: OECD and Eurostat data; World Bank forthcoming.

Higher education financing reform can provide an important means in some countries to improving system efficiency. There is an ongoing discussion on overall financing levels and the diversification of income streams of higher education institutions;¹³ however, the key question of how to increase sector

¹³ See, for example, publications of the European University Association on the topic at: <http://www.eua.be/eua-work-and-policy-area/governance-autonomy-and-funding/financial-sustainability.aspx>.

efficiency (including graduation rates, time to completion, research activity, and the contribution of universities to technological innovation and absorption) has not received sufficient attention in most European countries. While there have been some attempts to increase efficiency, for example, through per capita financing, financing reform aiming at more system efficiency is still in its early stages in many countries. Box 3.5 provides an example of how the Government of Bulgaria and the World Bank are working together on higher education financing reform issues.

Box 3.5 Higher Education Financing in Bulgaria – From Per Capita Financing to a More Comprehensive Performance-based Approach

Like in other EU-10 countries, the higher education sector in Bulgaria expanded significantly following the transition. Per-capita financing was introduced in 1999 and was linked to enrollment of students. Per-capita financing of higher education institutions (HEIs) in Bulgaria is, in principle, conducive to competition among institutions. The conceptual weakness of this model, however, is that funding is based solely on the number of students enrolled and disregards performance objectives or educational outcomes.

The lack of an incentive system linked to financing has been identified as one of the factors contributing to the inadequate quality of higher education in Bulgaria. In addition, the funding model lacks the flexibility to quickly adjust allocations across HEIs to reflect the transition of students across universities. The planning and allocation of state subsidies to HEIs is not based on labor market demand or on information on labor market outcomes of graduates.

The World Bank is now working with the Government of Bulgaria to develop performance-based models for financing Bulgarian HEIs. The models will include conceptual framework descriptions and simulations that demonstrate the impact of each model on financing of HEIs in Bulgaria.

Source: World Bank staff.

Collecting, storing, and providing data in a transparent way is important for rational decision making and sector steering. One of the areas covered by the Bologna Process is quality assurance, and, there, further work is needed in most EU-10 countries in order to find an appropriate balance between control and an improvement-oriented approach that unlocks the potential of the sector. As emphasized in *Skills, Not Just Diplomas* (Murthi and Sondergaard 2010), tools need to be developed to provide policy makers with the type of information they need to form conclusions about system efficiency and that will subsequently serve as a basis for performance-oriented financing and, generally, provide the possibility of linking incentives to results. One such intervention is tracer studies, that is, tracking systems that provide information on the labor market outcomes of graduates, subsequent learning, or both. Some European countries have considerable experience and have developed institutional setups to conduct regular and comparable surveys of graduates (for example, Italy, the Netherlands, and Norway). Two EU-10 countries, Hungary and Romania, provide good examples for the implementation of tracer studies, as discussed in Box 3.6.

Moreover, for students and parents to make informed choices, they need information about the quality of the teaching that is provided within a field of study at a particular university. The only reliable way of providing such information is to develop standardized assessments to measure how proficiently graduates master a set of agreed competencies. OECD's Assessment of Higher Education Learning Outcomes (AHELO) will be an important milestone in this direction.

Box 3.6 Tracer Studies in Hungary and Romania

Hungary and Romania are making fast progress in institutionalizing tracer studies and making them a core element in the management of the sector.

In Hungary, 2010 will mark the first year in which results from the new “Graduate Career Tracking System” will be produced (involving results from up to 30 institutions). The project is the culmination of work that began in 2008 and involved 30 ongoing EU-financed projects (totaling 16 million euro). There are several reasons why Hungary is moving ahead rapidly in this process.

First, central policy makers identified the need for collecting such data. This was done through: (a) *legislation*: the 2005 Higher Education Act in Hungary makes it mandatory for every university and HEI to carry out surveys of graduates; (b) *making it part of quality assurance discussions*: the availability of such surveys is increasingly part of institution’s accreditation; and (c) *the power of the purse*: tying such survey data to three-year financing agreements.

Second, institutions see the *usefulness of such data, for a number of reasons*: (a) *they want labor market feedback* to help them better design programs; (b) they can use such data for marketing purposes; (c) they see the value of such data for internal quality assurance purposes; and (d) they use the results as a means to strengthen their alumni network.

In Romania, information from a graduate survey will be available in 2011. By then, policy makers will have data on surveyed students who graduated in 2008/09 (that is, from 12 months after graduation) and from students who graduated in 2004/05 (that is, from five years after graduation). In Romania, the preparation of the questionnaires was, in part, developed as part of a World Bank Technical Assistance program. All the current work, including the cost of surveying, is being financed out of EU social funds.

Source: World Bank staff.

4. Establish and strengthen lifelong learning systems

Skills acquired through formal education can become obsolete if not sufficiently updated. EU Member States strive to strengthen the quality of education provided and to ensure equitable learning as part of the formal education system. In addition, Member States will benefit from recognizing prior learning (including non-formal and informal learning)¹⁴ and provide second chances to those who could not take advantage of their education the first time around. Box 3.7 describes how Finland and Ireland created successful lifelong learning systems. Particular attention needs to be devoted to what could be called the “learning poor” (World Bank forthcoming), (in contrast to what the OECD refers to as “the learning ‘rich,’” (OECD 2004b:22)) since, for a variety of reasons, those who would profit most from further learning and upskilling do not sufficiently access it.

¹⁴ The Netherlands, for example, is one of the countries that have accumulated experience with the validation of prior learning. In the tertiary sector, the Netherlands Organization for International Cooperation in Higher Education (NUFFIC) has played a leading role in this respect. European countries cannot afford to waste the skills that immigrants, including those without proper certificates, bring to their country. NUFFIC and other Dutch organizations developed “skills portfolios” and specific mechanisms and pathways for what they called Prior Learning Assessment and Recognition. However, recognition bodies should not restrict their task to the formal validation and recognition of prior learning; particularly when dealing with excluded population groups. They can take an active role and support the applicants in finding the right (re-)entry into the education system and/or the labor market.

Box 3.7 Finland and Ireland as European Good Practice Examples for Lifelong Learning

A recent World Bank (2009a) study highlights key lessons for lifelong learning policies from the Finnish and Irish experiences. In Finland, 23.1 percent of the working-age population participates in lifelong learning annually (the system is also open to pensioners). In the state budget, about 13 percent of the Ministry of Education's expenses go to adult education, but the majority of training is financed by employers (Tahvainen 2006). In Ireland, participation is somewhat lower, at 7.5 percent, and the policy focus is directed at labor market outcomes (EIS 2008).

Access to lifelong learning and competence acquisition is designed to be **simple, cost-effective, and adapted to individual needs**. Finland lowered the threshold to adult education and training by means of individual study programs (MoE-FIN 1999; Tahvainen 2006). Persons already active in the workforce are given opportunities to study toward competence-based degrees. Duration of courses is kept reasonable to prevent the length of study from becoming an obstacle. Unemployment benefits are tied to training. The most difficult challenge is reaching the poorly educated and those at the biggest risk of unemployment and social exclusion, which receive particular attention (TF-IRL 2002). The **supporting institutions are also developed**. The system of public libraries in both Finland and Ireland provides valuable support to learners (TF-IRL 2002). A **variety of governance and financing mechanisms** are used. Training is often planned, implemented, purchased, and financed together by the employer and the Labour Administration (Tahvainen 2006). The Labour Administration usually finances no more than 50 percent of the purchasing costs of the training, which is implemented by authorized education institutions. The use of study vouchers has been piloted as a useful mechanism for training that is not initiated and financed by the employer.

Source: Adapted from World Bank 2009a.

Section 4: Technological Innovation and Absorption

Key issue:

- Inefficient R&D spending slows economic growth in EU-10 countries

Selected Policy Directions:

- Redesign public R&D funding systems to emphasize applied research and collaboration with industry
- Reform state-owned research institutes, including through commercialization and employee-led privatization, to better align their outputs with the needs of industry
- Strengthen the public institutional framework for R&D and innovation
- Increase financing for start-up and innovative companies

Key Issue: Inefficient R&D Spending Slows Economic Growth in EU-10 Countries

Innovation and technology absorption are critical to support growth in the new post-crisis environment. Given the likely decline in the potential growth rate in EU-10 countries in the medium term, mostly due to lower private investment and increasingly negative demographic trends, returning to pre-crisis GDP growth rates and reducing the permanent loss in income resulting from the crisis will require faster productivity growth driven by innovation and technology absorption. An abundant literature emphasizes the close link between technology absorption and innovation and long-term, self-sustained economic growth (Goldberg et al. 2006; OECD 2010d).

At the current stage of development, technology absorption seems to have a higher impact on growth than innovation. EU-10 countries are still relatively far from the global technological frontier, as proxied by the difference in productivity levels between them and the United States, the global technological leader, with the average level of productivity in the EU-10 region not exceeding 50 percent of that in the United States (Gupta et al. 2010). As a result, returns on technology absorption are likely in many cases to be higher than returns on innovation. EU-10 countries can thus continue to increase productivity by importing technology rather than pushing the global technological frontier through its own innovation, although a certain minimum level of spending on R&D is essential to effectively absorb technology from abroad (see Box 4.1).

Box 4.1 Technology Absorption and Economic Growth: the Case of Poland

Model estimates for Poland suggest that technology absorption is indeed likely to play a more significant role in driving growth than domestic innovation: a 10 percent annual increase in foreign spending on R&D during 2006–30 would increase the level of Poland’s TFP by 18.5 percent by 2020, while higher domestic R&D expenditure of the same magnitude would have a significantly smaller impact at only 1.3 percent (table 4.1). Only in the longer term, when EU-10 countries close the gap to the global technological frontier, will they need to fully move from an absorption-based model of growth to an innovation-based model (Acemoglu, Aghion, and Zilibotti 2002; Aghion and Howitt 2006).

Table 4.1: The Impact of a 10 Percent Permanent Annual Increase in Spending on Domestic and Foreign R&D on Labor Productivity and TFP Levels in Poland

Variable	Domestic R&D			Foreign R&D		
	2013	2020	2030	2013	2020	2030
TFP	1.0	1.3	1.5	8.9	18.5	32.7
Labor productivity	0.7	1.0	1.2	5.6	13.4	26.1

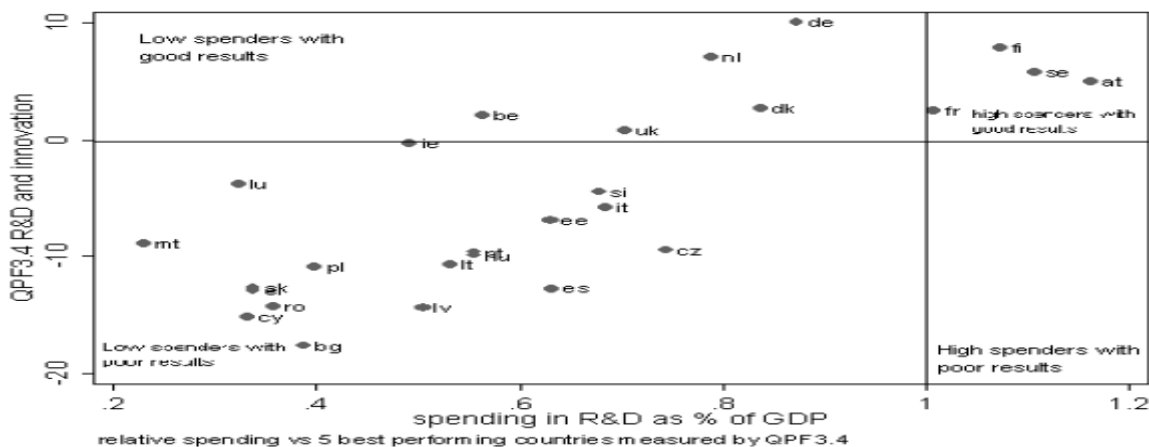
Source: Welfe and Florczak 2009.

Note: Foreign R&D refers to combined spending on R&D of six of Poland’s main trading partners: France, Germany, Italy, the Netherlands, the United Kingdom, and the United States.

Source: World Bank staff.

Yet EU-10 countries spend little on R&D, and there is scope for significant efficiency gains. All EU-10 countries are classified as low spenders with poor results in terms of the value and efficiency of public spending on R&D based on the classical proxies for R&D output, such as patents and publications (figure 4.1). Other rankings, such as the European Innovation Scoreboard or the Global Competitiveness Report, provide similarly low scores for innovation performance in EU-10 countries. In addition, private R&D spending in EU-10 countries, which tends to be more efficient than public spending, represents only 30 percent of the total spending. In developed countries this proportion is reversed, with private spending representing more than two-thirds of the total.

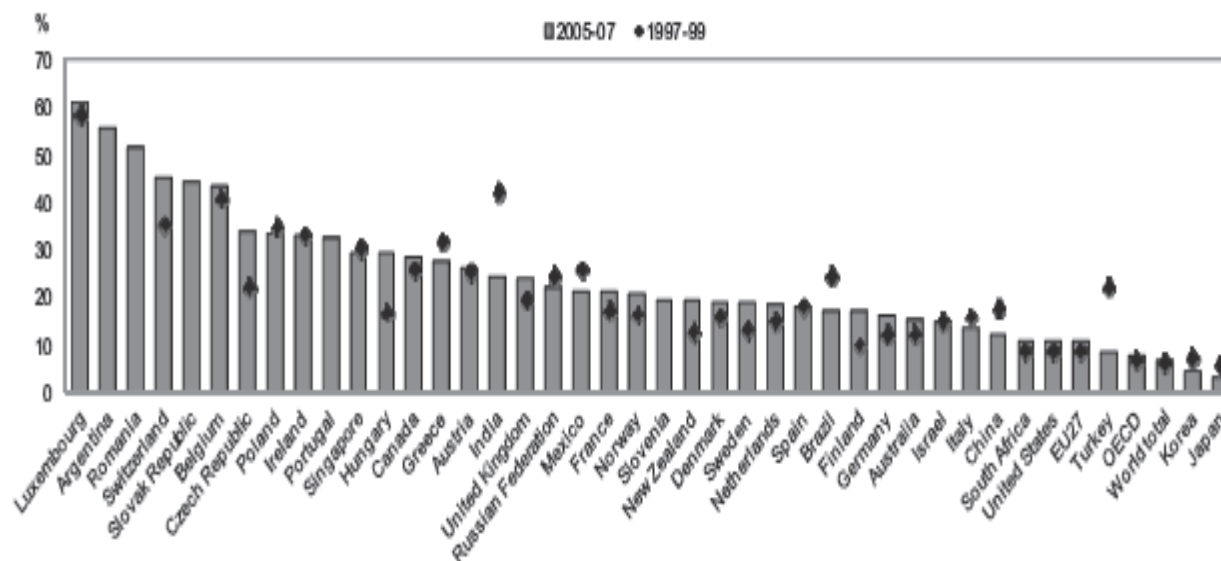
Figure 4.1 Assessment of the Amount and Quality of Public R&D Spending in EU-27



Source: Barrios and Schaechter 2009.

The rising share of international co-patents in EU-10 is, however, a positive sign. EU-10 countries are in the forefront of EU countries in terms of international co-patenting, suggesting that international firms have been able to tap the large research potential in EU-10 countries more effectively than domestic firms (figure 4.2). This is important, since there is evidence that international co-patents, resulting from collaboration between domestic researchers and international firms and research institutes, tend to be of higher quality than domestic patents, enhancing efficiency of domestic R&D spending (World Bank forthcoming).

Figure 4.2 Patent Applications with Co-investors Located Abroad, 2005–07, Percentage

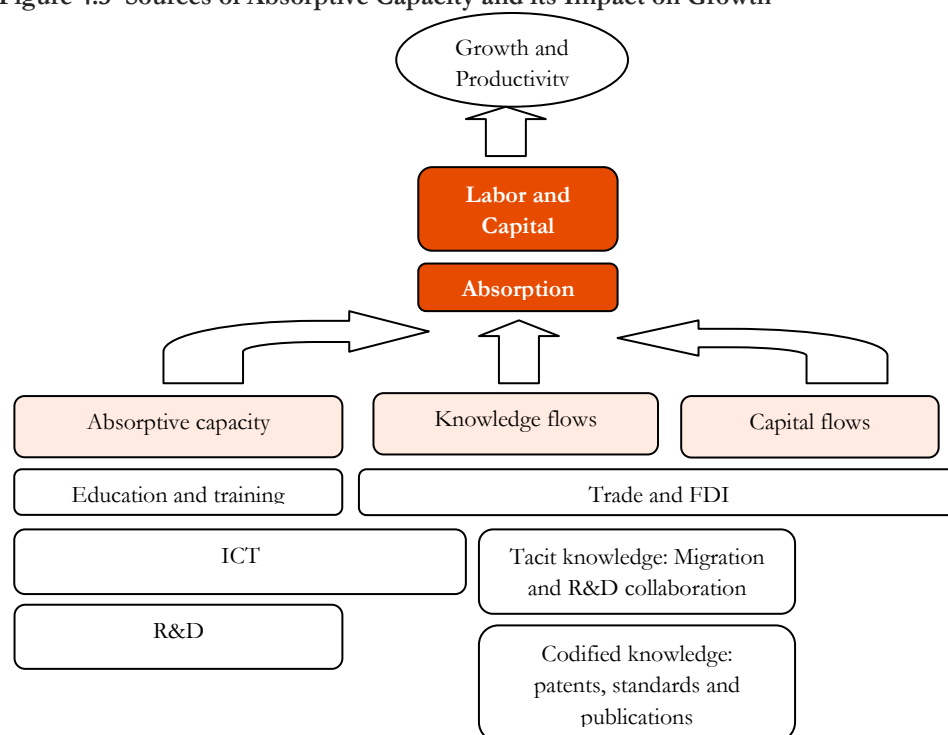


Source: OECD 2010d.

There are a number of channels through which public policy can support technology absorption.

The well-accepted argument for public policy intervention in supporting technology absorption and innovation is based on the finding that private markets tend not to generate the optimal amount of spending on R&D and innovation, undermining growth in total factor productivity (TFP) (Goldberg et al. 2006). While technology absorption is affected by an array of factors, including macroeconomic stability, fiscal policy, and geographic location, there are a number of factors that tend to be most important for countries' absorptive capacity and its impact on economic growth. These include trade openness, size of FDI inflows, labor mobility, quality of infrastructure, efficiency of patent laws, penetration of information and communication technology, quality of human capital, and the value and efficiency of public R&D spending (figure 4.3). The latter is particularly relevant for technology absorption, since a certain minimum value and quality of R&D is essential to allow firms to identify, assimilate, and exploit knowledge developed abroad.

Figure 4.3 Sources of Absorptive Capacity and its Impact on Growth



Source: Goldberg, Goddard, and Kuriakose 2010.

Selected Policy Directions to Improve Technology Absorption and Encourage Innovation

Apart from focusing on improving the investment climate, removing barriers to competition, and improving human skills, a forthcoming World Bank report recommends several policy areas for consideration. These are summarized below, and augmented with several case study examples from Poland (base on World Bank forthcoming). In each of these areas, the report, which builds on earlier World Bank work in this area,¹⁵ recommends that public interventions in support of innovation follow these three key principles:

- *Attention to the institutional environment* to immunize, as much as possible, the funding allocation from interference by political actors, corruption, and other state or specific interests capture.
- *Additionality of funds*: public interventions need to promote private risk taking instead of rent seeking and stimulate markets for private risk capital without crowding out private investment and other funding sources.
- *Neutrality of intervention*: It would be advisable for the government not to decide ex ante which technological sectors, firms, or projects to support, but rather to respond to the demands coming from the market.

1. Redesign public R&D funding systems to emphasize applied research and collaboration with industry

In many cases, efficiency of public R&D spending can be strengthened by focusing more on applied research and building stronger links between research and business. In most EU-10 countries, public

¹⁵ See, for example, Goldberg et al. 2006 and Goldberg et al. 2008.

funding, which accounts for most funding for research and development institutes (RDI) and academic research institutes, is usually allocated based on general formulas such as a number of employed researchers, rather than on measurable performance benchmarks. If there are any benchmarks, these are mostly based on academic criteria such as number of publications and citations (Racine et al. 2009) (see also box 4.2). Whenever there is competitive research funding, it is often distributed in small amounts among a large number of beneficiaries and research fields, limiting its effectiveness, especially in “lumpy” research areas, which require a certain critical mass of investment before producing results.

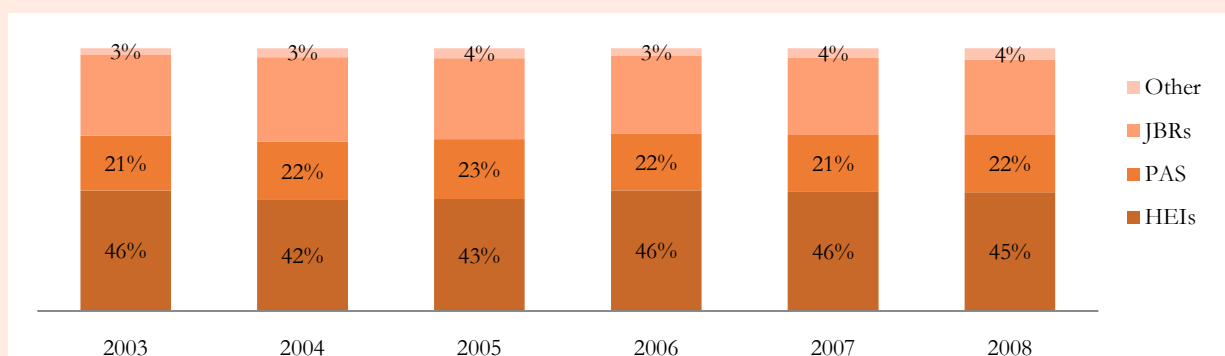
Moreover, as opposed to best practice in OECD countries where implementing agencies allocate research funding, in EU-10 countries funding is distributed by policy-making departments in line ministries. Finally, for public research and academic institutions collaborating with industry is often not seen as attractive, because they lack technology transfer offices, rules on time sharing arrangements for researchers pursuing collaboration with firms, and incentive schemes promoting industry collaboration rather than publication of academic papers (Goldberg, Goddard, and Kuriakose 2010). Academic spinoffs, that is, start-up firms formed to commercialize technologies originating from publicly funded universities, are also quite rare.

Box 4.2 Public Funding for R&D in Poland

Poland classifies as a low spender with roughly 0.6 percent of GDP spent on R&D, and ranks poorly among EU countries with regard to the efficiency of public expenditures when classical output measures, such as patents and publications, are compared (see figure 4.1). While these indicators are not the only measures of innovation and absorption, they are used here as proxies for R&D output. The essential issue is the low efficiency of public R&D financing in Poland, which results in large part from (a) a bias toward financing of basic research, and (b) a very low share of private sector R&D.

As the figure 4.4 below demonstrates, since 2003, roughly 67 percent of all public R&D financing was awarded to HEIs and institutes affiliated with the Polish Academies of Science, which focus largely on basic research, while only 34 percent of all R&D funding was allocated to more business-oriented RDIs. However, due to distorted incentives the efficiency of R&D spending in RDIs is nonetheless low. Enterprises received a meager 1.6 percent of total funding, which was largely focused on experimental development that typically leads to product upgrading and important quality certifications, but less on applied research that could lead to incremental or disruptive innovations.

Figure 4.4 Distribution of Budgetary Funding by Type of Research Institution



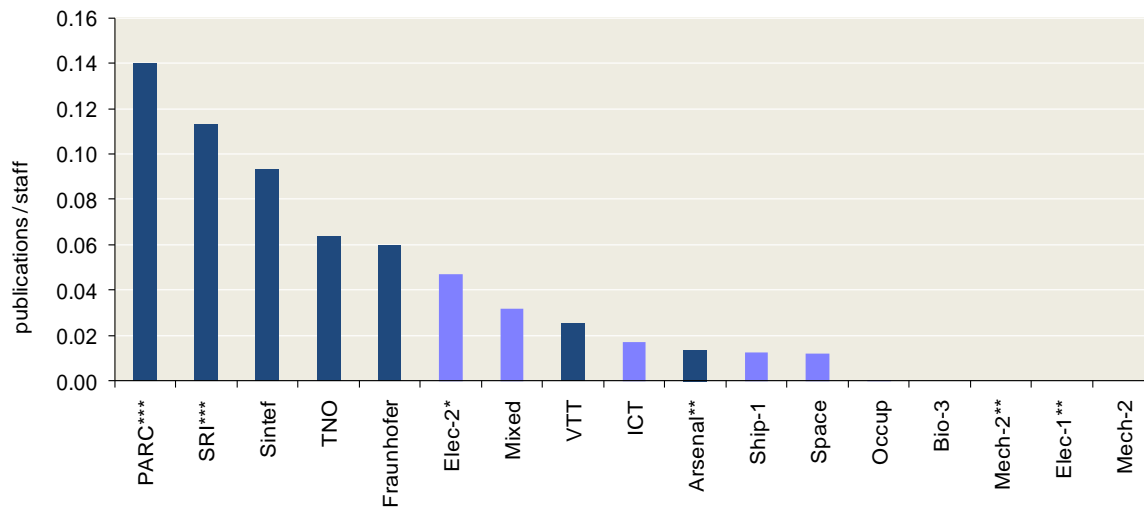
Source: Ministry of Science and Higher Education, and World Bank forthcoming.

Note: HEI = higher education institution. PAS = Polish Academies of Science. JBR = jednostki badawczo-rozwojowe (research and development institutes).

2. Reform state-owned research institutes, including through commercialization and employee-led privatization, to better align their outputs with the needs of industry

Historically, outputs produced by public R&D institutes have often not directly been driven by production needs or market demand, and have lacked feedback mechanisms between end users and the institutes, thus severely limiting the efficiency of R&D spending. R&D institutes in the EU-10 countries are a legacy of central planning; they were part of a production and innovation system in which R&D was not performed “in-house,” but was driven by goals identified by central planners in responsible line ministries. Funding for RDIs was provided directly or indirectly by the state. Although over the past 20 years many countries in the EU-10 region have undertaken various RDI restructuring efforts, in many cases the socialist legacy still continues to be a challenge (box 4.3). RDIs in the region remain much less efficient than RDIs located in EU-15 countries, whether measured by the frequency of publications, number of patents, or industry revenue per researcher (figures 4.5 and 4.6).

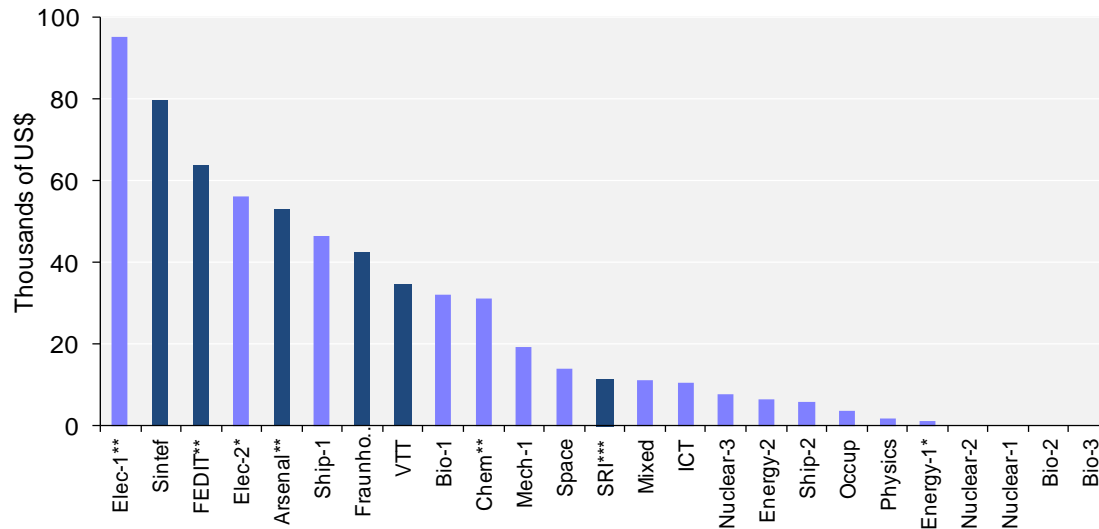
Figure 4.5 Number of Annual Publications per RDI Staff in Selected EU-10 and EU-15 Countries



Source: Goldberg, Goddard, and Kuriakose 2010 using Science Citation Index.

Note: Dark blue for seven RDIs based in EU-15. The remaining RDIs are based in EU-10 countries. Data for three RDIs—Fraunhofer, Mixed and Space—are based on 2008 data; all others based on 2003–07 averages.

Figure 4.6 Industry Revenue per Researcher in RDIs in Selected EU-10 and EU-15 Countries



Source: Goldberg, Goddard, and Kuriakose 2010.

Note: Dark blue for six RDIs based in EU-15. The remaining RDIs are based in EU-10 countries.

Box 4.3 Restructuring of RDIs Faces Important Legacy Challenges

The following factors are likely to prevent RDIs from being as productive and dynamic as they could be and are in need of remediation.

Lack of market experience. RDIs existed for decades in a protected environment controlled and supported by the state. The scientists and engineers employed there had limited cooperation with industry, and they have only a superficial understanding of market-oriented R&D. They worked for a single customer and, although some state that their work had potential application, apparently there was little concern about the cost of potential innovation and of market value.

Limited experience with application-oriented R&D. RDIs were focused on scientific achievement, with no real concerns about application. They had a strong interest in basic research, usually quite removed from the needs of their local economy. For this reason they are more interested in cooperation with foreign partners than in support from national industry, even if they are often not fully competitive at the international level.

“Old-fashioned” administration and governance. Most managers are in their 50s; they were trained during the Soviet era and are not far from retirement. The administration of RDIs often has a difficult time adopting a more pragmatic approach. The management boards have characteristics similar to the administration. Most members are appointed for scientific reasons, political reasons, or both. These boards include a small number of industry representatives. Although they are supposed to stimulate the restructuring process, it seems that, generally, they are not very involved in this aspect.

A large number of less productive employees. In the past, RDIs had a large number of support staff providing less productive services (gardeners, cafeteria employees, and so forth). Although some scientists have left the institution, most of the less productive employees had stayed, largely because of lack of opportunities to find jobs elsewhere. Consequently, the less productive, administrative employees can often represent up to 30 percent of the

workforce.

Loss of dynamic scientists. During the past decade, many young and dynamic scientists left the RDIs. They took more lucrative positions, often provided by foreign subsidiaries of Western firms, or moved to the United States or Western Europe where they were offered more financially and intellectually rewarding jobs. As a consequence, these RDIs were left with staff who are not motivated to make needed changes.

Lack of transparency. The accounting techniques were not too rigorous and the financial data were usually kept confidential. For these reasons, the figures provided by the institutions during the preparation of the restructuring program are not always fully accurate or reliable.

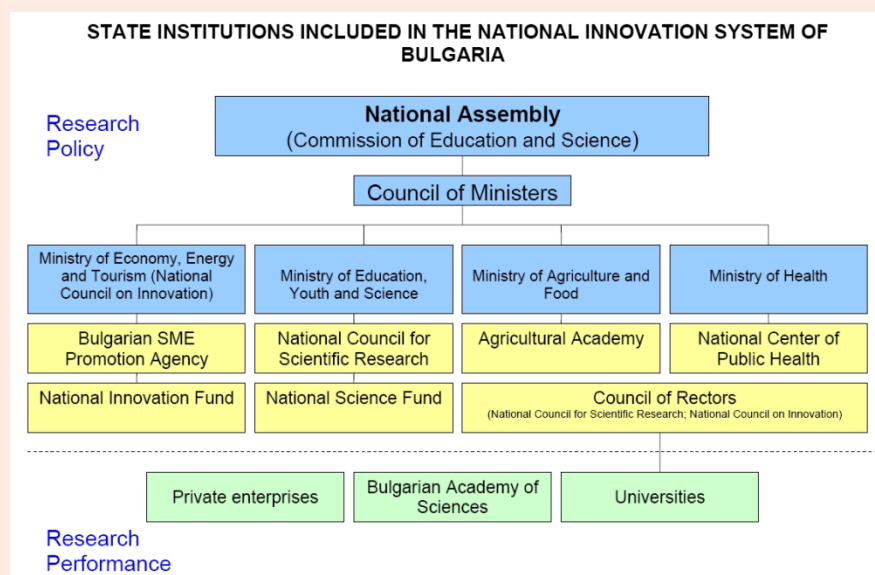
Source: Based on Racine et al. 2009.

3. Strengthening the public institutional framework for R&D and innovation

In many EU-10 countries, public policies on R&D and innovation are designed and implemented by a variety of institutions, leading to overlapping objectives, strategic incoherence, and poor utilization of public resources. Often there is no single public institution responsible for the government's overall strategy and policy implementation, as the example of Bulgaria demonstrates (box 4.4).

Box 4.4 Institutional Framework for R&D and Innovation in Bulgaria

Public policy on R&D and innovation in Bulgaria is designed and implemented by different institutions. The Ministry of Education, Youth and Science and the Ministry of Economy, Energy and Tourism lead major reforms and programs. At the same time, the Council of Ministers serves as a forum for coordination between ministries, and where R&D and innovation initiatives can be debated and agreed before submission to Parliament. As in many countries, this fragmentation of responsibilities has made it difficult to develop an integrated national STI strategy, and it has resulted in problems such as running programs with overlapping objectives, limited coherence and lack of rationalization of resources. Improving the articulation of the institutional framework would help Bulgaria to fully exploit the opportunities provided by EU funds that support competitiveness and human resource development.



Source: ERAWATCH

The *Ministry of Economy, Energy and Tourism* and the *Ministry of Education, Youth and Science* are the government bodies that play the dominant roles in developing Bulgaria's national research, innovation, and technology strategy and policy. Several other entities are involved but with a more narrow scope. The *Ministry of Economy, Energy and Tourism (MoEET)* is responsible for the formulation of innovation policy and strategy in the business sector. The *National Council for Innovation* is a consultative body to the MoEET and includes representatives from the business sector, academia, the scientific community, and nongovernmental organizations.

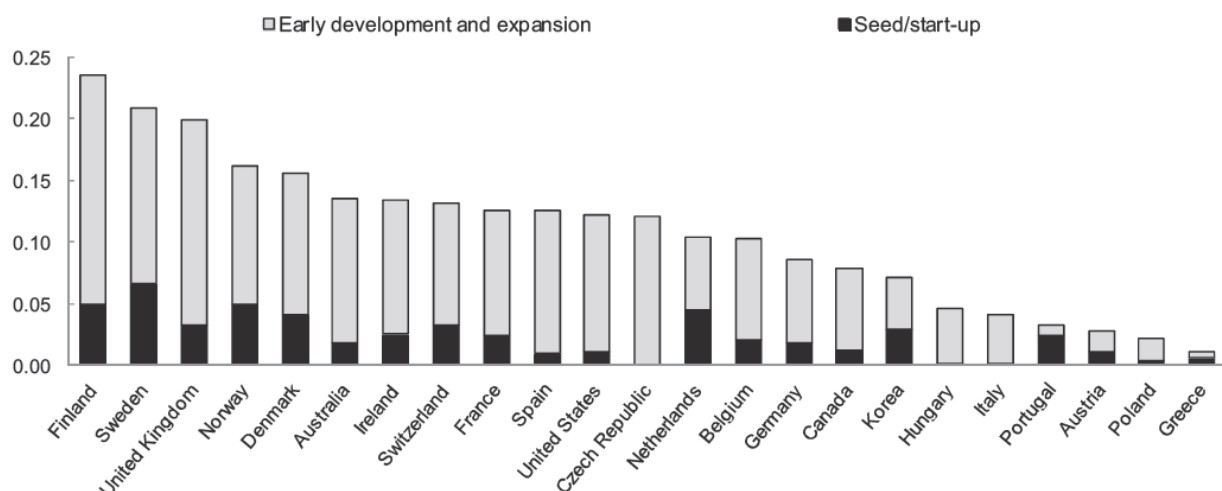
The *Bulgarian SME Promotion Agency (BSMEPA)*, which reports to the MoEET, prepared and now implements the measures of the *National Innovation Strategy*, including the administration of the *National Innovation Fund* established in 2005. The *Ministry of Education, Youth and Science (MEYS)* is responsible for national research policy. The *National Council for Scientific Research* is the coordinating body for research policy and is comprised of representatives from ministries and scientific organizations. The *National Council for Scientific Research* participates in the preparation of and approves the *National Strategy for Research and Development*, and defines funding priorities for the *National Science Fund*, established by the MEYS in 1990. A number of other ministries also play a role in innovation policy.

Source: World Bank 2010d.

4. Increasing financing for start-up and innovative companies

New enterprises, especially those supported by venture capital funds, are a critical driver of innovation (e.g. Lerner 2009). This is especially because start-up enterprises faced with incumbent large firms entrenched in existing markets focus on creating new markets and business opportunities, increasing overall productivity. However, funding for innovative projects is particularly vulnerable to market failure because high risks involved in financing such projects preclude availability of mainstream financing sources such as banks, venture capital and private equity funds, and institutional investors. Because capital markets and venture capital funds in EU-10 countries are not fully developed (figure 4.7), the funding gap is particularly acute for the financing of early stages of technological development, that is, the investment phase between the emergence of an innovative idea and development of a business project. The relative scarcity of capital, including from “business angels,” and the small value of potential projects, lead to high administrative cost of preparation and monitoring of financial investments. This increases the funding gap for innovative projects, although a few countries in the region have tried to mitigate this problem by supporting private start-up funds (box 4.5).

Figure 4.7 Venture Capital Investments in Selected OECD Countries in 2008 (as a percentage of GDP)



Source: OECD 2010d.

New and additional financing mechanisms include mini grants, matching grants, and venture capital leverage. These instruments potentially address key pressure points along the innovation and commercialization continuum—mini grants for early-stage research, matching grants for pre-commercialization-stage development and international co-patenting, and venture capital leverage for commercialization and scaling up.

Box 4.5 Poland's National Capital Fund (NCF)

NCF is a fund of funds that invests in venture capital funds operating in Poland. The company was established by the Government of Poland in 2005 with the aim of minimizing the size of the equity gap that prevails on the Polish small and medium enterprise market. NCF commits to venture capital funds that invest in small and medium companies based in Poland and focus on innovative R&D and high-growth projects with targeted investments of up to 1.5 million euro. NCF supplies financing to the selected funds either through equity investments or through provision of long-term debt. As a fund of funds, NCF does not commit to companies directly.

NCF investments are either equity investments or long-term debt financing and can take any of the following forms:

- Acquiring shares or stakes in a fund
- Participating in limited partnerships, limited joint-stock partnerships, or in entities with no legal personality
- Acquiring investment certificates or investment units issued by funds
- Acquiring bonds, convertible bonds, preferred bonds, or subscription warrants issued by funds.

In addition, NCF offers grants to cover a part of the costs of preparing and monitoring a fund's investment portfolio. The NCF funding mechanism assumes preferential treatment of investors who co-invest in NCF portfolio funds along with NCF.

The NCF has so far committed more than PLN 100 million to the creation of four venture capital funds, with a total capital of PLN 180 million, or US\$60 million.

Source: National Capital Fund, www.kfk.org.pl.

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