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Table of contents

Thematic chapters

Boxes

Tables

Figures

This Survey *is published on the responsibility of the Economic and Development Review Committee of the OECD, which is charged with the examination of the economic situation of member countries.*

The economic situation and policies of Poland were reviewed by the Committee on 8 February 2018. The draft report was then revised in the light of the discussions and given final approval as the agreed report of the whole Committee on 28 February 2018.

The Secretariat's draft report was prepared for the Committee by Nicola Brandt, Antoine Goujard and Pierre Guérin from the OECD secretariat under the supervision of Peter Jarrett. Research assistance was provided by Patrizio Sicari and editorial assistance was provided by Sylvie Ricordeau.

The previous Survey of Poland *was issued in March 2016.*

Information about the latest as well as previous Surveys *and more information about how* Surveys *are prepared is available at* www.oecd.org/eco/surveys.

BASIC STATISTICS OF POLAND, 2016

(Numbers in parentheses refer to the OECD average)*

LAND, PEOPLE AND ELECTORAL CYCLE

Population (million)	38.0		Population density per km^2	124.0	(37.2)
Under 15 (%)	15.3	(17.9)	Life expectancy (years, 2015)	77.6	(80.5)
Over 65 (%)	16.1	(16.6)	Men	73.5	(77.9)
Foreign-born (%, 2011)	1.8		Women	81.6	(83.1)
Latest 5-year average growth (%)	-0.3	(0.6)	Latest general election	October 2015	

ECONOMY

Gross domestic product (GDP)			Value added shares (%)		
In current prices (billion USD)	471.4		Primary sector	2.7	(2.5)
In current prices (billion PLN)	1 858.6		Industry including construction	33.7	(26.7)
Latest 5-year average real growth (%)	2.6	(1.9)	Services	63.6	(70.8)
Per capita (000 USD PPP)	27.1	(42.2)			

GENERAL GOVERNMENT

Per cent of GDP

Expenditure	41.2	(41.2)	Gross financial debt	71.9	(99.4)
Revenue	38.7	(38.3)	Net financial debt	43.1	(64.6)

EXTERNAL ACCOUNTS

Exchange rate (PLN per USD)	3.943		Main exports (% of total merchandise exports)		
PPP exchange rate (USA = 1)	1.788		Machinery and transport equipment	38.2	
In per cent of GDP			Manufactured goods	18.5	
Exports of goods and services	52.3	(53.6)	Miscellaneous manufactured articles	16.6	
Imports of goods and services	48.2	(49.3)	Main imports (% of total merchandise imports)		
Current account balance	-0.3	(0.2)	Machinery and transport equipment	36.0	
Net international investment position	-57.3		Manufactured goods	17.8	
			Chemicals and related products, n.e.s.	14.7	

LABOUR MARKET, SKILLS AND INNOVATION

Employment rate for 15-64 year-olds (%)	64.5	(66.9)	Unemployment rate, Labour Force Survey (age 15 and over) (%)	6.2	(6.3)
Men	71.0	(74.7)	Youth (age 15-24, %)	17.6	(13.0)
Women	58.1	(59.3)	Long-term unemployed (1 year and over, %)	2.2	(2.0)
Participation rate for 15-64 year-olds (%)	68.8	(71.7)	Tertiary educational attainment 25-64 year-olds (%)	28.7	(35.7)
Average hours worked per year	1 928	(1 763)	Gross domestic expenditure on R&D (% of GDP, 2015)	1.0	(2.4)

ENVIRONMENT

Total primary energy supply per capita (toe, 2015)	2.5	(4.1)	CO_2 emissions from fuel combustion per capita (tonnes, 2015)	7.4	(9.2)
Renewables (%, 2015)	9.6	(9.6)	Water abstractions per capita (1 000 m3, 2015)	0.3	
Exposure to air pollution (more than 10 µg/m^3 of $PM_{2.5}$, % of population, 2015)	100.0	(75.2)	Municipal waste per capita (tonnes, 2015)	0.3	(0.5)

SOCIETY

Income inequality (Gini coefficient, 2015)[a]	0.292	(0.311)	Education outcomes (PISA score, 2015)		
Relative poverty rate (%, 2015)[a]	11.1	(11.3)	Reading	506	(493)
Median disposable household income (000 USD PPP, 2015)[a]	14.7	(22.9)	Mathematics	504	(490)
Public and private spending (% of GDP)			Science	501	(493)
Health care	6.4	(9.0)	Share of women in parliament, lower or single house (%)	27.4	(28.7)
Pensions (2012)	10.4	(9.0)	Net official development assistance (% of GNI)	0.15	(0.39)
Education (primary, secondary, post sec. non tertiary, 2014)	3.4	(3.7)			

Better life index: *www.oecdbetterlifeindex.org*

* Where the OECD aggregate is not provided in the source database, a simple OECD average of latest available data is calculated where data exist for at least 29 member countries.

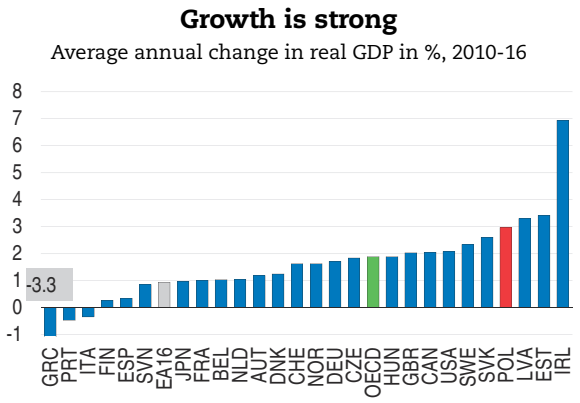
a) 2014 for the OECD average.

Source: Calculations based on data extracted from the databases of the following organisations: OECD, International Energy Agency, World Bank, International Monetary Fund and Inter-Parliamentary Union.

Executive summary

- *Growth is strong, and the labour market is booming*
- *New public benefits have helped to bring down poverty*
- *Raising Poland's capacity to innovate would ensure continued convergence to higher living standards*
- *Investment in higher education and research will strengthen innovation and technology absorption*
- *Raising skills promoting stronger employment will be key for long-term growth prospects*
- *Higher tax revenues or spending prioritisation will be needed to finance planned spending increases*

Growth is strong, and the labour market is booming

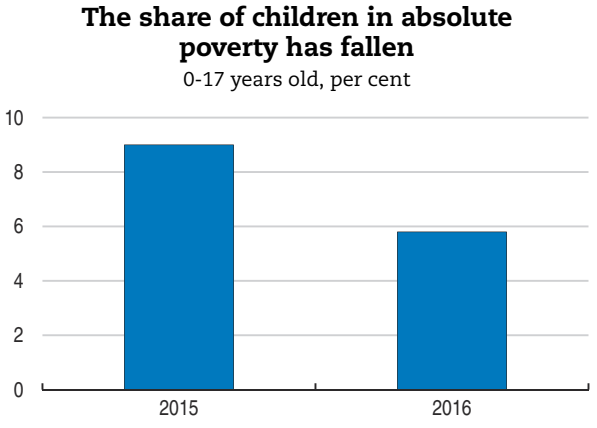


Source: OECD (2017), *OECD Economic Outlook: Statistics and Projections* (database).

StatLink http://dx.doi.org/10.1787/888933689235

Economic growth remains strong. Rising social transfers and a booming labour market are underpinning rapid consumption growth. The unemployment rate is at a record low level, labour shortages are spreading, and there are early signs of accelerating wages. The labour market is expected to tighten further, leading to somewhat faster wage and price inflation. After a severe contraction in 2016, investment is projected to recover, driven by faster disbursements of EU structural funds, capacity constraints and low real interest rates.

New public benefits have helped to bring down poverty

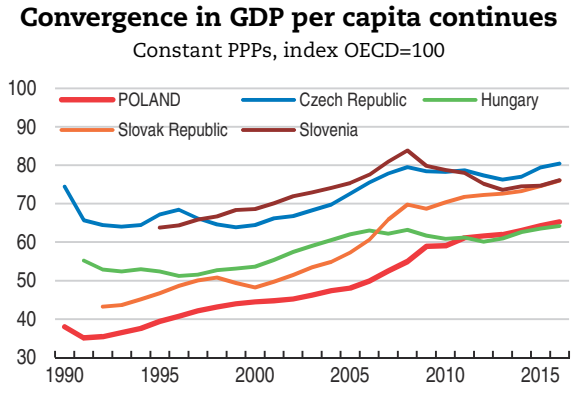


Source: Statistics Poland.

StatLink http://dx.doi.org/10.1787/888933689254

Unlike in many other countries poverty and income inequality have fallen, and large family benefits introduced in 2016 have helped to bring down child poverty further. They are also meant to promote fertility in the context of very rapid ageing. On the other hand, there is a risk that the benefits might induce less-skilled women to leave the labour market for longer after childbirth, shortening their contribution periods to pensions. Together with the recent lowering of the retirement age back to only 60 for women, this will heighten risks of old-age poverty. The government is working to improve currently limited access to affordable childcare services. Insufficient institutional care for the elderly is another barrier to female employment and improved well-being for seniors.

Raising Poland's capacity to innovate would ensure continued convergence to higher living standards



Source: OECD (2017), *OECD National Accounts Statistics* and *OECD Economic Outlook: Statistics and Projections* (databases).

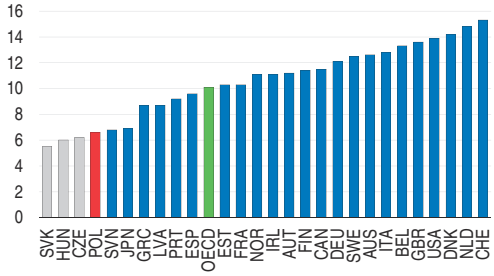
StatLink http://dx.doi.org/10.1787/888933689273

Poland's income convergence has mainly resulted from efficiency gains thanks to sectoral restructuring and foreign technology absorption. As its labour productivity is still 40% below the OECD average, Poland now needs to strengthen its technology adoption and own innovation capacity. Research and development (R&D) investment is weak as is innovation activity, in particular in small and medium-sized enterprises (SMEs). Infrastructure is still a bottleneck, and there is much room to improve its environmental impact. In its Strategy for Responsible Development the government plans higher R&D tax incentives along with increased public support for innovation in SMEs, venture capital market and infrastructure development, largely dependent on EU structural funds financing.

Investment in higher education and research will strengthen innovation and technology absorption

Poland's share of global top publications is low

Per cent of all documents,[1] 2015



1. See Figure 6 (Panel A).

Source: OECD (2017), *OECD Science, Technology and Industry Scoreboard 2017* (database).

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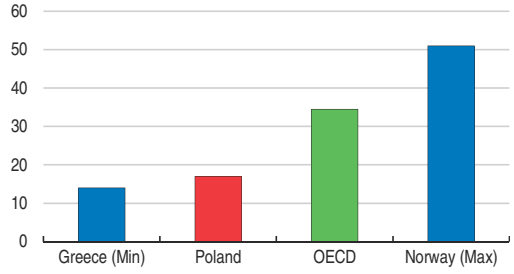
Poland's spending on higher education and research, the quality of its research and the supply of researchers are all relatively low but rising. The government plans a much needed reform of higher education and public research to strengthen the quality of training for students and researchers and currently weak science-industry collaboration. The new agency for academic exchange is an opportunity to work more closely with Polish and foreign researchers trained abroad to build on their knowledge and networks. Developing mentoring and consulting services for small firms to help them cope with often complicated procedures to draw on innovation support and find partners in science would ensure policy effectiveness.

Raising skills promoting stronger employment will be key for long-term growth prospects

Participation in lifelong learning remains weak

Participation in training for secondary educated adults with weak literacy skills, % of population



1. See Figure 32 for notes.

Source: OECD (2016), *Skills Matter: Further Results from the Survey of Adult Skills*, OECD Publishing, Paris.

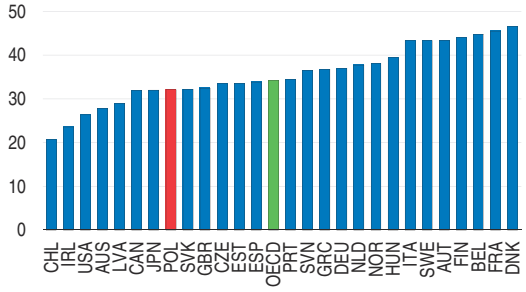
StatLink http://dx.doi.org/10.1787/888933689311

Too many workers have weak basic and digital skills. Reaching out to employers, in particular among Poland's many relatively unproductive SMEs, to involve them in planning vocational education and adult training and in providing work placements would create more learning opportunities in line with labour market needs. Continued expansion of high-quality early childcare will improve opportunities, in particular for children from disadvantaged families. Strong immigration from Eastern neighbours is helping alleviate labour shortages, but a migration policy strategy and better monitoring mechanisms and integration policies are needed.

Higher tax revenues or spending prioritisation will be needed to finance planned spending increases

The tax burden is relatively low

Per cent of GDP, 2015[1]



1. Or latest year available.

Source: OECD (2017), *OECD Tax Revenues Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933689330

The authorities implemented a set of measures to boost tax compliance that succeeded in shrinking the public deficit despite rising social transfers. Yet, more revenues or spending prioritisation are needed to improve public infrastructure, health care and higher education and research in line with the government's plans. The government should also prepare for a possible fall in available EU structural funds in the next financing period. Limiting reduced VAT rates, increasing environmentally related taxes and giving a stronger role to the progressive personal income tax would yield additional revenues, while contributing to more equity and better environmental outcomes. Modernising energy infrastructure and shifting away from coal would lower urban air pollution and CO_2 emissions while securing more reliable energy supply with favourable knock-on effects on public health.

MAIN FINDINGS	KEY RECOMMENDATIONS
Maintaining macroeconomic stability and sustainable growth	
If many people do retire at the lowered statutory pension age of 60 for women and 65 for men, the share of minimum pensioners and old-age poverty will rise, particularly among women, entailing fiscal costs and lower average income.	Evaluate the reform's effects, and make corrections such as aligning male and female retirement ages and indexing them to healthy life expectancy. Inform the public about the impact of working longer on pension income.
Women's labour force participation and thus their pension contribution histories could be impacted negatively by the new child benefit.	Invest in childcare and long-term care facilities. Taper the phase out of the child benefit for the first child.
Higher social spending along with improved public infrastructure, skills and research quality requires higher tax revenues.	Strengthen environmentally related taxes, limit the use of reduced VAT rates and exemptions, and make the personal income tax more progressive, e.g. by introducing a lower initial and more intermediate tax brackets and ending the preferential tax treatment of the self-employed.
Macroeconomic policy settings are quite stimulatory: real interest rates are near zero, and the budget is moving to an expansionary position.	Implement a tighter fiscal stance through revenue-raising tax reforms or increased spending prioritisation. If the NBP's economic assessment suggests considerable upward risk for price stability, it should raise interest rates in a timely fashion to ensure that inflation remains well within its target range.
Regulatory uncertainty is holding back investment in the energy sector and elsewhere in the economy. The transition to auctions guaranteeing prices as a new support mechanism for renewable energy has taken several years, and there is still uncertainty about future auctions. New legislation has created prohibitive conditions for establishing wind farms.	Develop and implement clear and stable climate-change policies aligned with European and international objectives to reduce uncertainty for innovative green investments. Ensure the stability and clarity of policies affecting investment decisions.
The government improved tax compliance successfully, but tax procedures remain overly time consuming for SMEs.	Include a simplification component for SMEs to the government's tax compliance strategy.
Strengthening higher education, research and innovation	
Funding for higher education is relatively low, and research quality and industry-science collaboration are weak. University fundraising through business collaboration, adult learning and voluntary giving is limited. The government is preparing a major reform of the higher education and research systems.	Enhance industry-science collaboration. Continue to increase funding for higher education and research over time, to merge small universities and independent research institutes to build strong research universities, and to allow underperforming institutions that do not improve over time to shut down.
Doctoral training is unstructured and lengthy with low graduation rates. Employment conditions for post-doctoral researchers are unstable, pay remains low, and career progression is insufficiently tied to research quality. Addressing this would help attract more qualified researchers, including those trained abroad.	Improve the quality of doctoral training by structuring it through coursework and tutoring and tightening entry criteria. Offer well-remunerated academic positions, and base career progression on an evaluation of research and teaching quality by faculty and external experts.
Private-sector R&D spending is very low, notably for SMEs, which hinders new technology adoption and innovation. R&D financing is overly dependent on EU funds.	If the take-up of the new R&D tax allowance is low among small innovative firms, adjust its provisions. Plan for national financing of business R&D and innovation programmes beyond the current EU budgetary cycle, if necessary.
Boosting skills to promote strong and inclusive growth	
High immigration from Eastern neighbours is alleviating labour market pressures, but a lack of monitoring hampers the ability of policies to improve its impact on the labour market, and there is widespread abuse of simplified procedures to hire foreigners.	Develop a migration policy strategy to better monitor integration of foreigners in line with labour market needs, the protection of their rights and access to education and training for them and their children.
Too many adults have weak basic skills. Vocational education suffers from poor alignment with labour market needs. There is a lack of work-based tertiary vocational education programmes.	Develop a national skills strategy with a strong basic skills component. Incentivise employers to develop workplace-based vocational education and adult training.

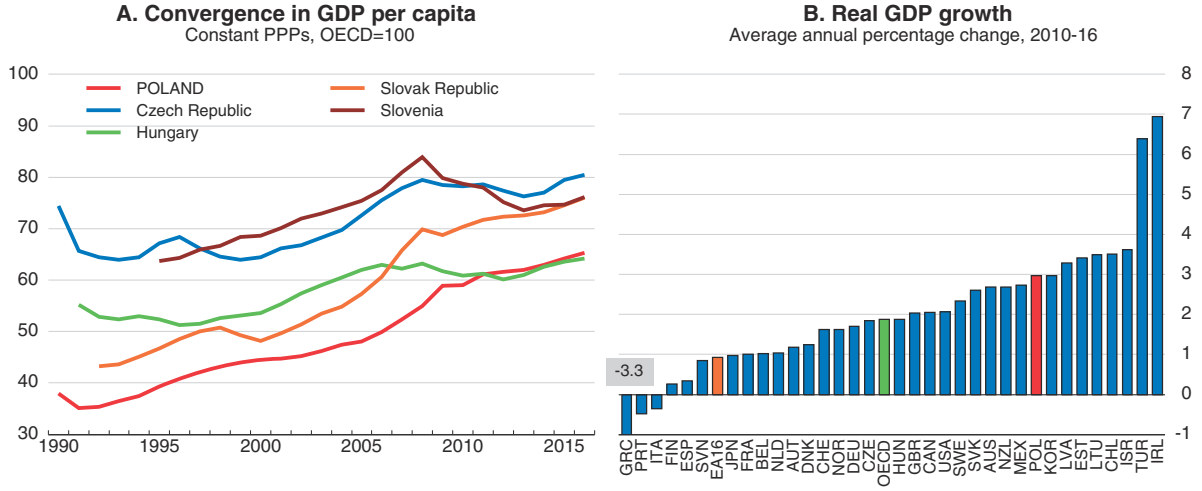
Assessment and recommendations

- *Ensuring continued convergence with higher living standards*
- *The macroeconomic outlook is positive*
- *Financing higher social spending and public investment in skills and research*
- *Making investment greener and improving its impact on innovation and productivity*
- *Labour market developments*
- *Investing in higher education and research*
- *Investing in adult learning and vocational training*
- *Promoting innovation and investment*

Ensuring continued convergence with higher living standards

Poland has experienced strong economic growth without any obvious macroeconomic imbalances, the labour market is booming, and the outlook is positive. This is boosting household income and contributing to more inclusive economic development. Catch-up with average living standards in other OECD countries is continuing (Figure 1).

Figure 1. **GDP growth and catch-up with living standards in other OECD countries are continuing**



Source: OECD (2018), *OECD National Accounts Statistics* and *OECD Economic Outlook: Statistics and Projections* (databases) and updates.

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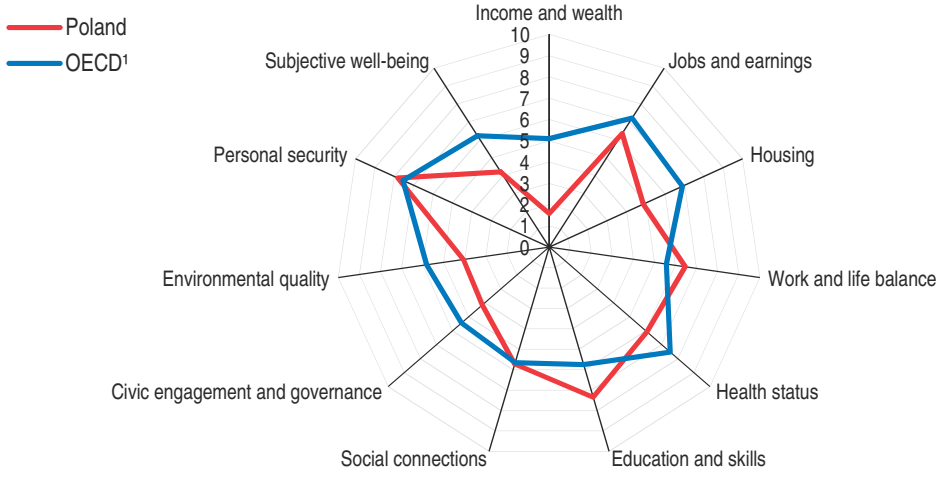
Poland scores at or above the average OECD country in terms of work-life balance, personal safety and education (reflecting above-average PISA scores and high average educational attainment) based on the OECD Better Life Index (Figure 2). Thanks to a long-standing tertiary education boom Poland has a highly qualified workforce and it has been very successful in integrating into global trade, most recently with a boom as an outsourcing destination for increasingly high value added business services. Life expectancy has increased faster over the last 25 years than in most OECD countries (Figure 3) and is projected to increase further. Unlike in other countries, poverty rates and inequality, as measured by the Gini coefficient, have actually declined, as a relatively wide range of households have benefitted from the labour market recovery and rising incomes, and poverty is now close to the EU average (Figure 4). For example, in 2015 the at-risk-of-poverty rate (the share of people with less than 60% of the median household income) was 3 percentage points lower than in 2004. The recent introduction of child benefits has further reduced child poverty significantly, promoting well-being and inclusiveness.

Poland needs to build on its current economic strength and social progress to confront its challenges. The country scores below the OECD average in terms of health status and

Figure 2. **Poland's performance in the OECD's Better Life Index is mixed, 2017**

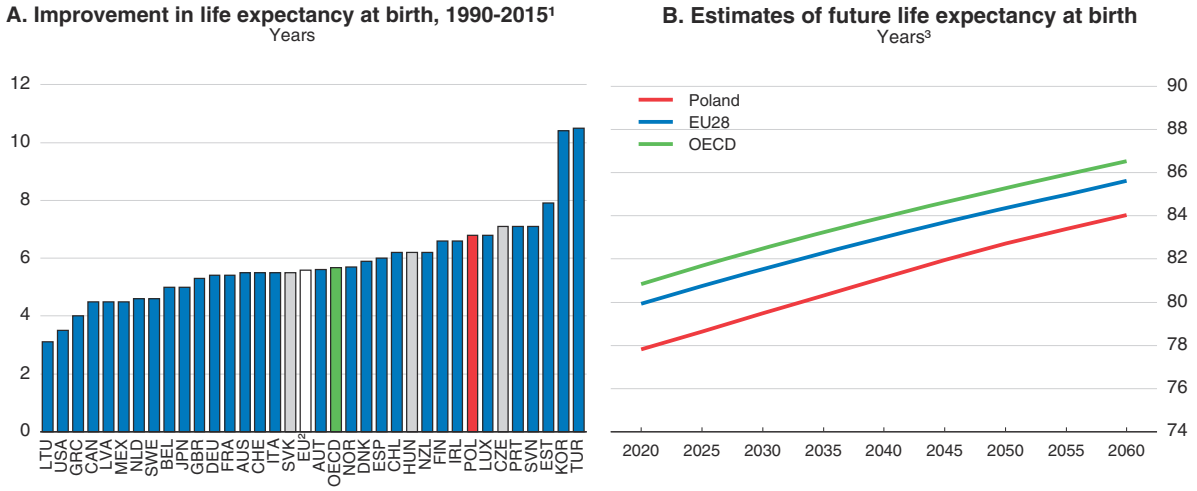


1. Unweighted average.

Source: OECD (2017), *OECD Better Life Index*, *www.betterlifeinitiative.org*.

StatLink http://dx.doi.org/10.1787/888933687677

Figure 3. **Life expectancy continues to improve**



1. Or latest available year; 2002-15 for Latvia.
2. OECD European Union members plus Lithuania.
3. The data displayed are five-year averages.

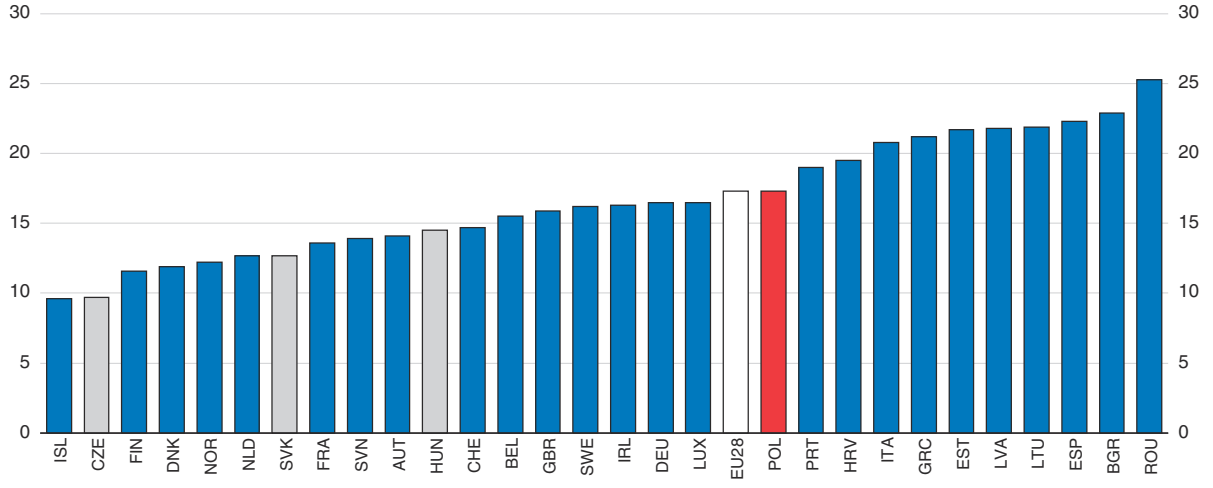
Source: OECD (2017), *OECD Health Statistics* (database); United Nations (2017), "World Population Prospects: The 2017 Revision", Department of Economic and Social Affairs, United Nations, New York.

StatLink http://dx.doi.org/10.1787/888933687696

environment quality as well as income and subjective well-being (Figure 2). Housing affordability is also a challenge, as Polish households spend a higher share of their incomes on housing, including utility costs and maintenance, than on average in the OECD. Life expectancy remains well below the OECD average and is particularly unequal, as the difference between the lowest and the highest educated men is 12 years compared to 7 years on average in the OECD. In 2015 more than 28 000 people died prematurely as a result of outdoor air pollution, which as a share of the population is higher than almost anywhere else in the OECD. Hourly labour productivity was still roughly 40% below the

Figure 4. **Population at risk of poverty is in line with the EU average**

At 60% of median equivalised income after social transfers, 2016[1]



1. Or latest available year.

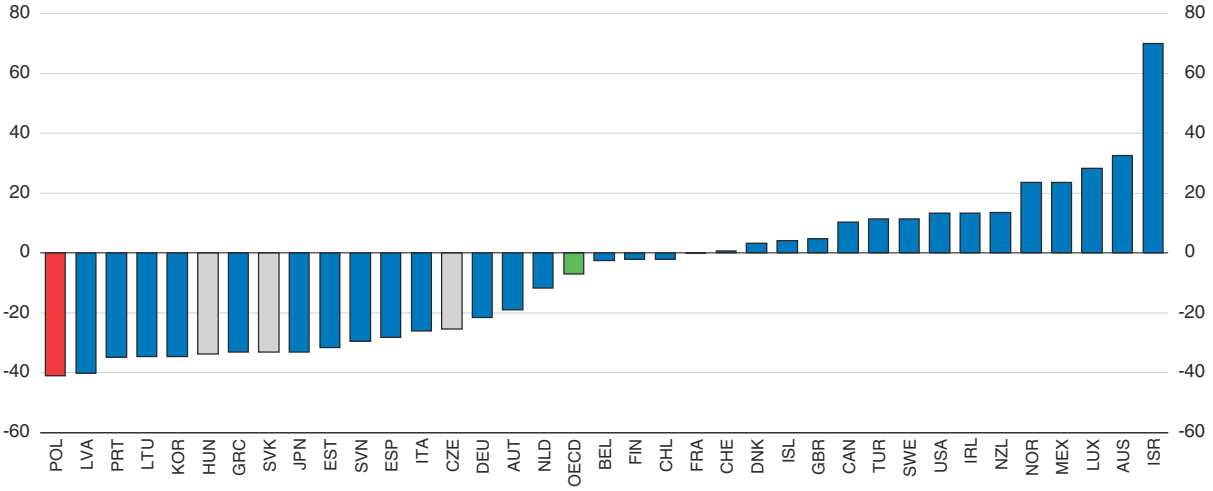
Source: Eurostat (2018), "Income and living conditions", *Eurostat Database*.

StatLink http://dx.doi.org/10.1787/888933687715

OECD average in 2016, and, as in other countries, the growth rate of total factor productivity has declined since 2008, curbing economic growth. Poland is confronted with very rapid ageing, as the working-age population might decline by 40% by 2060 according to some projections (Figure 5). The recent lowering of the retirement age is likely to further weigh on seniors' employment and risk increasing old-age poverty, particularly among women. Despite efforts to improve access to childcare it remains insufficient and expensive, especially in rural areas, and institutional long-term care for the elderly falls significantly short of needs.

Figure 5. **The working-age population will decline sharply**

Percentage change, 2015-2060



Source: United Nations (2017), "World Population Prospects: The 2017 Revision", Department of Economic and Social Affairs, United Nations, New York.

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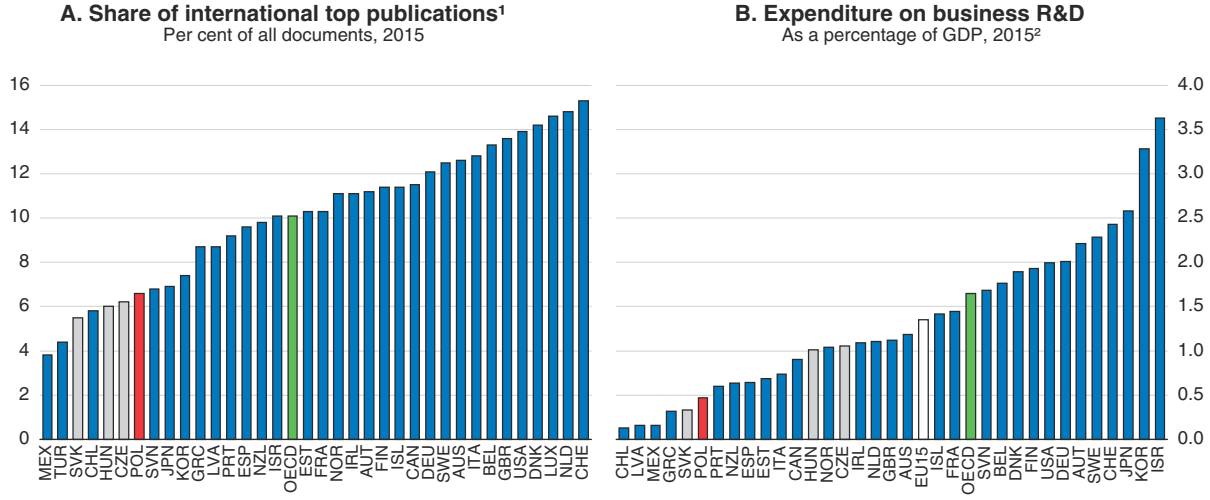
To sustain rising living standards Poland has to develop its capacity to innovate and invest in skills and infrastructure, the key subjects of this report. For now catch-up has been driven to a large extent by a restructuring of the economy from agriculture to more productive sectors and by buying foreign technologies. Indicators of scientific research quality are below those in the leading OECD countries, and business R&D investment remains weak despite rapid recent growth (Figure 6). Vocational training suffers from limited business engagement, and adult learning is not well developed, inhibiting citizens' ability to acquire stronger basic and digital skills. This is holding back the economy's capacity to innovate and the ability of Poland's plentiful small enterprises to adopt new technologies, modernise their organisation and production procedures, and thus improve their productivity and grow. Policies to strengthen higher education, adult learning and vocational education are therefore discussed in what follows. To help Poland confront rapid ageing the Survey also proposes policies to bolster seniors' and female employment and use the workforce's skills more effectively, while making Poland more attractive to domestic and foreign workers alike. A large share of public investment in infrastructure is financed by EU Structural Funds – around 50% in the transport sector – along with 85% of programmes to support private-sector innovation, small and medium-sized enterprises and entrepreneurship (Box 1). As it is unclear how the availability of these funds will develop after 2022, a commitment is needed now to ensure continued financing from domestic sources thereafter. The Survey therefore proposes policies to raise higher public revenues from internal sources.

Figure 6. **Investments to promote high-quality science and business innovation are needed**



1. Share of the scientific output of domestic research institutions that is included in the set of the 10% most cited papers in their respective scientific fields, fractional counts.
2. Or latest year available.

Source: OECD (2017), *OECD Science, Technology and Industry Scoreboard 2017* and *OECD Research and Development Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933687753

Against this backdrop this Survey has four main messages:

- Investment in higher education and research is too low, and conditions and incentives for excellence and stronger industry-science collaboration are insufficient.
- Firms' engagement in vocational education is weak, and so is workers' access to adult learning, thereby impacting negatively on productivity and equality of opportunity.

Box 1. **Structural funds of the European Union**

As part of the 2014-2020 EU multiannual financial framework, Poland will receive about 86 billion euros from European structural funds channelled through different programmes, which makes Poland the largest beneficiary of the EU cohesion policy in absolute terms and among the largest on a per capita basis. National co-financing of EU projects by the Polish authorities will top up EU structural funds by 19 billion euros. Investment in network infrastructures in the transport and energy sectors will receive the largest share of funding followed by investments designed at boosting competitiveness of SMEs, investments for accelerating the energy transition and funding for research and innovation. Overall, EU structural funds are expected to amount to about 2.7% of GDP annually and 54% of public investment over the ongoing EU budget window (European Commission, 2017a).

As elsewhere in the European Union, the disbursement of EU funds has been slow. At the end of 2017, only 13% of funds allocated to Poland have been spent and 55% have been assigned to specific projects compared with 16% and 53% on average in the EU, respectively. The slow pace at which EU funds are spent is, however, in line with the previous EU budget period (European Commission, 2017b). It is worth noting that EU funds can be disbursed up to two years after the end of the budget period. This explains the large boost in public investment in Poland in 2015 – the final year for which expenditures could be claimed against the 2007-2013 EU budget framework – and the subsequent large decline in public investment in 2016.

Going forward, several factors could reduce the amount of EU structural funds received by Poland in the next EU budget period extending from 2021-2027. First, the exit of the United Kingdom from the European Union will reduce the size of the EU budget, and thereby the financing available for EU cohesion policy. Second, Poland's relatively quick convergence to the average EU income level will likely limit Poland's access to EU cohesion funds. Third, a change in the requirements for the attribution of EU structural funds, e.g. conditions based on the implementation of structural reforms, may also reduce the amount of EU cohesion funds received by Poland.

- Counteracting the impact of demographic change on employment and avoiding a rise in old-age poverty, in particular among women, requires: making pensioners aware of the benefit of working longer for their pension income; investing in childcare and long-term care services and other policies to facilitate having children and combining work with family life; and making Poland attractive for foreign and domestic workers alike.
- Tax reform could secure financing for higher social spending, as well as much needed skills, research and infrastructure investments, while improving the system's impact on inequality and the environment.

Poland's Strategy for Responsible Development adopted in February 2017 (Box 2) aims to address a number of these challenges.

Box 2. **The Strategy for Responsible Development**

The Strategy for Responsible Development sets out a vision to strengthen industry, innovation and infrastructure in Poland and lays the basis for higher income and more social cohesion. It is the authorities' plan to meet the objectives from the 2030 Agenda for Sustainable Development. It proposes over 700 actions together with more than 70 indicators to track progress in strengthening industry, e.g. by promoting digitalisation and focusing

Box 2. **The Strategy for Responsible Development** *(cont.)*

government support on sectors where Poland is believed to have a competitive advantage. It provides for stepped up support for SMEs, simplification of regulation and tax payments, stronger export promotion, and vocational and higher education reform along with greater support for innovation and exports and energy investments. The increase in child benefits along with further development of childcare services is seen as a policy to lower child poverty and counter demographic challenges. The Strategy also mentions the need to develop migration policies and incentives for older workers to stay longer in the labour market, although without specifying details.

Quantitative targets include:

- Increase total R&D spending from 1% of GDP in 2015 to 1.7% in 2020 and 2.5% in 2030.
- Increase investment from 20.7% of GDP in 2015 to 22-25% in 2020 and 25% in 2030.
- Lower the at-risk-of-poverty rate from 17.6% in 2015 to 14% in 2020 and 12% in 2030.

While the government has set up policies that can help reach these targets, early trends suggests that greater progress will be needed in the future. R&D spending fell to below 1% of GDP in 2016. Following a contraction in private and public investment owing to the switchover of budget periods for EU structural funds, but also heightened uncertainty, the investment rate fell below 20% in 2016-17. While the new child benefits have helped lower extreme poverty, particularly among children, the relative rate of poverty, defined as the share of people living with less than 60% of median household income, fell only slightly to 17.3% in 2016 before the impact of the new child benefits was felt.

The macroeconomic outlook is positive

Economic activity is firming, as growth was 4.6% in 2017, before decelerating somewhat in 2018-19 (Table 1). With potential growth estimated by the OECD at less than 3%, this resulted in the estimated output gap turning positive in 2017. However, there are substantial uncertainties surrounding future employment and trend productivity growth and output gap estimates from other institutions imply less pressure on capacity utilisation in the future. Private consumption has grown at its fastest rate since 2008, on the back of strengthening wage gains, as the labour market is becoming increasingly tight, and the new child benefit programme, which is estimated to have increased aggregate real disposable income by 2.2%. The majority of domestic savings comes from the corporate sector, but the household saving ratio is expected to increase in coming years on the back of an increasingly tight labour market and a faster rise in wages. After a severe contraction in 2016, investment turned up again in 2017 and should strengthen going forward, supported by still very low real interest rates and a rebound in public investment as EU structural funds kick in again.

Poland's exports of goods are diversified both in terms of composition and destination (Figure 7), and its export performance has continued to improve in recent years, as labour costs remain moderate and euro-area demand is strengthening. Exports of goods and services as a share of GDP have risen from 46.3% in 2013 to 52.3% in 2016. Growth in services exports has outstripped increases in goods exports since 2014 thanks to the rapid development of business and transport services, as Poland is positioning itself as a top destination for business process outsourcing and logistics (Figure 8). Job creation in those two sectors has been particularly strong. A large trade surplus has emerged since 2013, but a rising primary income deficit has offset some of the effect on the current account balance.

Table 1. **Macroeconomic indicators and projections**

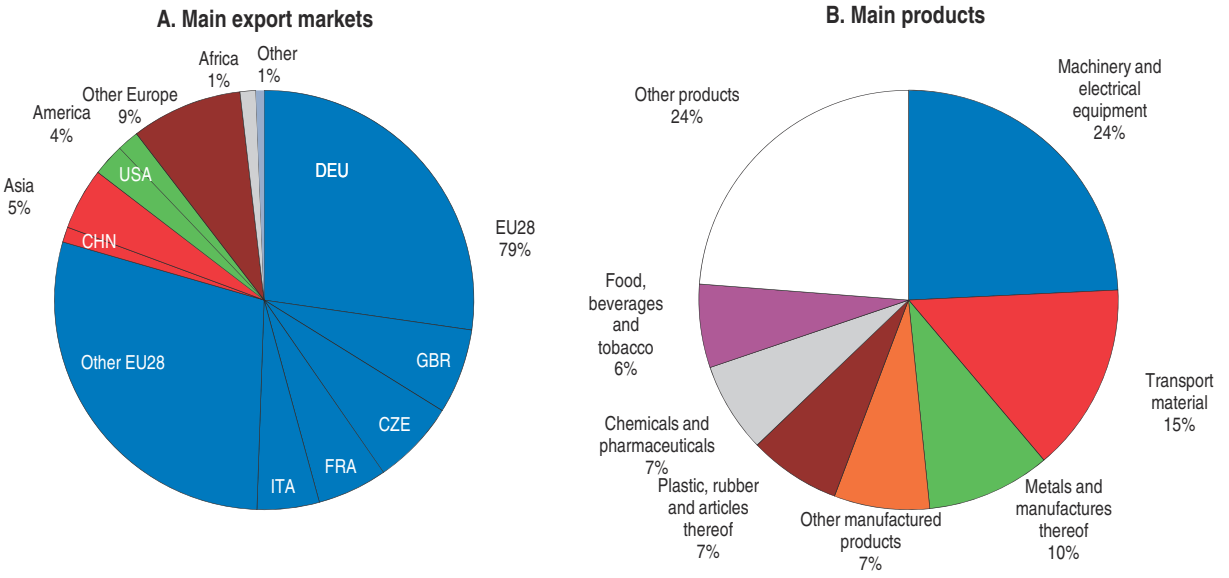
	2014	2015	2016	2017	2018	2019
	Current prices PLN billion	Percentage changes, volume (2010 prices)				
GDP	1 719.8	3.8	2.9	4.6	4.2	3.7
Private consumption	1 032.6	3.0	3.9	4.7	4.4	3.9
Government consumption	312.1	2.4	1.7	2.7	3.3	2.8
Gross fixed capital formation	339.4	6.1	-7.9	5.2	9.0	5.9
Of which: Housing	52.2	-11.5	23.1	10.0	4.0	4.0
Final domestic demand	1 684.1	3.5	1.0	4.4	5.1	4.1
Stockbuilding[1]	10.9	-0.2	1.2	0.5	-0.3	0.0
Total domestic demand	1 695.0	3.3	2.2	4.9	4.6	4.0
Exports of goods and services	818.4	7.7	8.8	6.7	7.0	6.0
Imports of goods and services	793.6	6.6	7.9	7.7	8.1	6.8
Net exports[1]	24.8	0.6	0.7	-0.2	-0.2	-0.2
Other indicators (% change, unless otherwise specified):						
Potential GDP	-	3.1	2.8	2.7	2.8	2.9
Output gap[2]	-	-1.5	-1.4	0.4	1.8	2.6
Employment	-	1.4	0.7	1.6	0.6	0.6
Unemployment rate[3]	-	7.5	6.2	4.9	4.2	3.8
GDP deflator	-	0.8	0.4	2.0	2.4	2.5
Consumer price index	-	-0.9	-0.6	2.1	2.6	2.9
Core consumer prices	-	0.5	-0.2	0.7	1.7	2.9
Wage rate, total economy	-	1.4	4.6	6.6	7.5	7.8
Household saving ratio, net[4]	-	-0.4	1.7	2.1	2.6	2.8
Trade balance[5]	-	3.1	4.0	4.0	3.6	3.2
Current account balance[5]	-	-0.6	-0.3	0.2	0.2	0.2
General government financial balance[5]	-	-2.6	-2.5	-2.0	-2.2	-2.2
Underlying government financial balance[2]	-	-2.3	-2.4	-2.2	-3.0	-3.3
Underlying government primary balance[2]	-	-0.8	-0.9	-0.8	-1.4	-1.6
General government gross debt[5]	-	69.3	71.9	71.3	70.8	70.5
General government debt, Maastricht definition[5]	-	51.1	54.1	53.5	53.0	52.7
General government net debt[5]	-	42.0	43.1	42.5	42.0	41.7
Three-month money market rate, average	-	1.7	1.7	1.7	1.9	2.9
Ten-year government bond yield, average	-	2.7	3.0	3.4	3.5	4.5

1. Contributions to changes in real GDP, actual amount in the first column.
2. As a percentage of potential GDP.
3. As a percentage of the labour force.
4. As a percentage of household disposable income.
5. As a percentage of GDP.

Source: OECD Economic Outlook: Statistics and Projections (database) and updates.

The labour market is tightening: the unemployment rate is at a 20-year low, and job vacancies have reached a record high level (Figure 9, Panel A). Business surveys indicate labour shortages as a key factor limiting production and firms' growth (Panel B; Deloitte, 2017). Many Ukrainian workers have come to Poland (mostly on temporary jobs). They reached an estimated 5% of the Polish labour force in 2016, and their inflow continues to accelerate, providing a strong countervailing effect to the decline in the working-age population that started in 2011 (Figure 10). This is likely to be one of the key factors in holding down the increase in wages despite record low unemployment. However, wage pressures are set to strengthen going forward, reflecting labour market tightness. It is likely to get increasingly difficult to fill new vacancies with immigrants from Ukraine and other Eastern neighbours, as labour shortages are spreading to more and more sectors and the

Figure 7. **Poland's structure of trade in goods is well diversified**[1]



1. 12-month cumulated flows (values) as of June 2017.
Source: Eurostat (2017), *Comext Database*.

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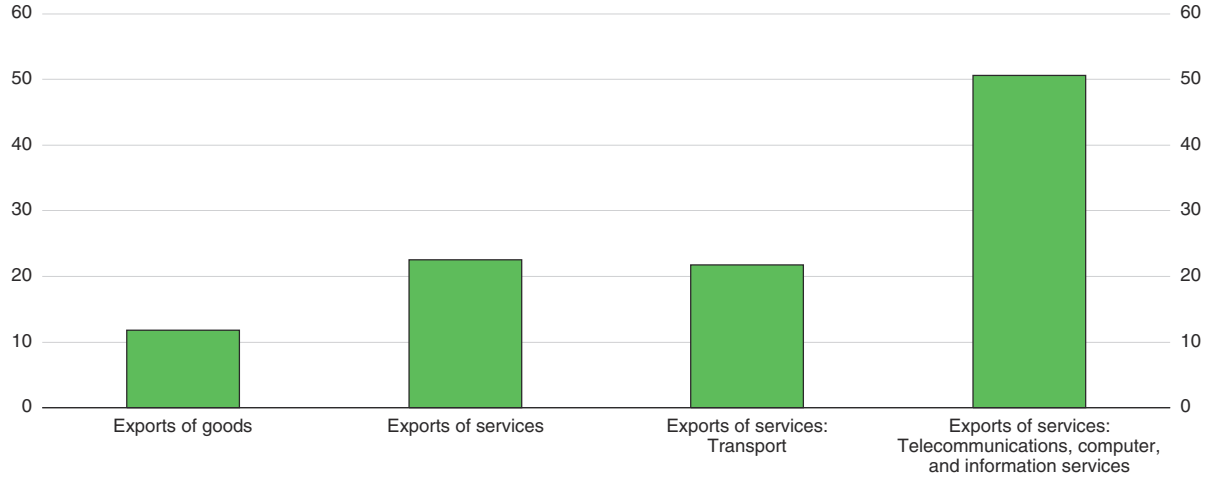
Figure 8. **Growth in services exports has been strong**
Export growth from 2014 to 2016, per cent changes



Source: Eurostat (2017), "Balance of Payments by Country (BPM6)", *Eurostat Database*.

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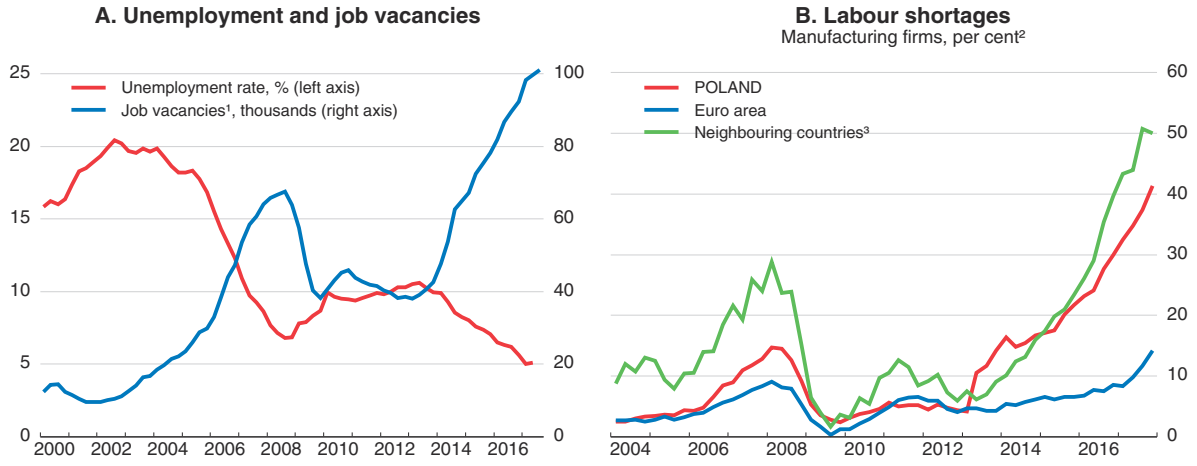
economic situation in Ukraine itself is improving. Moreover, the public sector could contribute to an acceleration in wages as the public-sector pay freeze currently in place is unlikely to be sustainable.

Investment contracted sharply in 2016 with the switchover to the new budgetary period for EU structural funds. As in other countries benefitting importantly from such financing, the investment cycle is closely related to the timing of their disbursements, underlining the economy's dependence on these funds. The share of firms that see uncertainty as a major investment obstacle is 10 percentage points higher than in the

Figure 9. **The labour market is tightening**



1. Four-quarter moving average.
2. Percentage of manufacturing firms pointing to labour shortages as a factor limiting production.
3. Unweighted average of Hungary and the Czech and Slovak Republics.

Source: OECD (2017), *OECD Economic Outlook: Statistics and Projections* (database); Statistics Poland; EIB (2017), "Investment Survey", European Investment Bank, Luxembourg.

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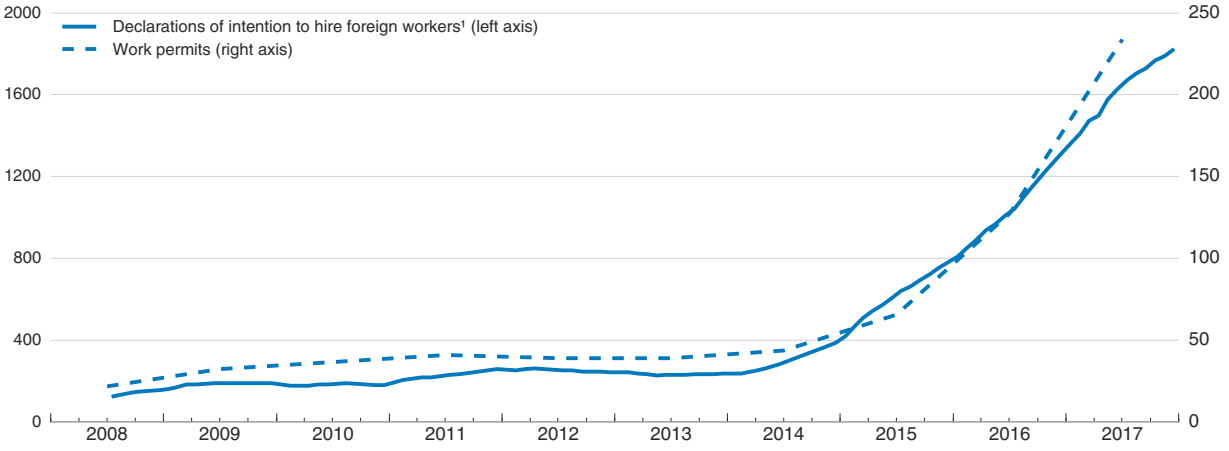
Figure 10. **Hiring of immigrant workers is increasing sharply**

Thousands



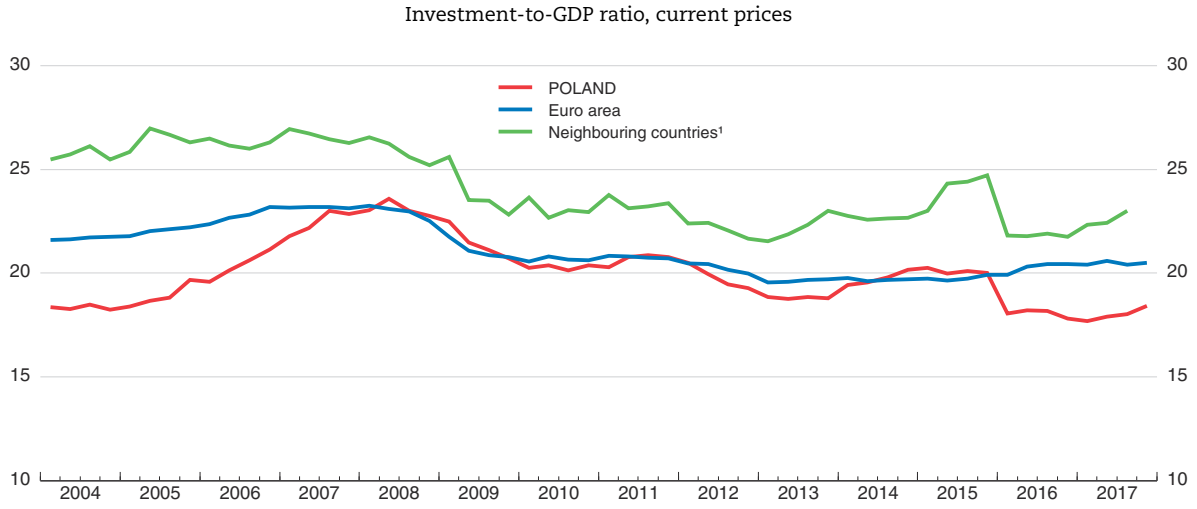
1. 12-month moving sum.

Source: Ministry of Family, Labour and Social Policies (*www.mpips.gov.pl/analizy-i-raporty/cudzoziemcy-pracujacy-w-polsce-statystyki/*).

StatLink http://dx.doi.org/10.1787/888933687829

European Union on average (European Investment Bank, 2017), and regulatory instability in some sectors may be an important factor. Beyond that, reforms regarding the criteria for the appointment, tenure and dismissal of judges should be in line with international standards and abide by the rule of law. Investment started to recover in 2017, but the investment-to-GDP ratio is low relative to historical standards (Figure 11). Poland also ranks poorly in terms of the quality and environmental efficiency of its capital stock (Figure 12), suggesting additional investment needs. Investment is expected to strengthen, reflecting an increase in the absorption of EU funds.

Figure 11. **Investment contracted abruptly with the switchover to the new budgetary period for EU funds**



1. Unweighted average of Hungary and the Czech and Slovak Republics.
Source: OECD (2017), *OECD Economic Outlook: Statistics and Projections* (database), and updates.

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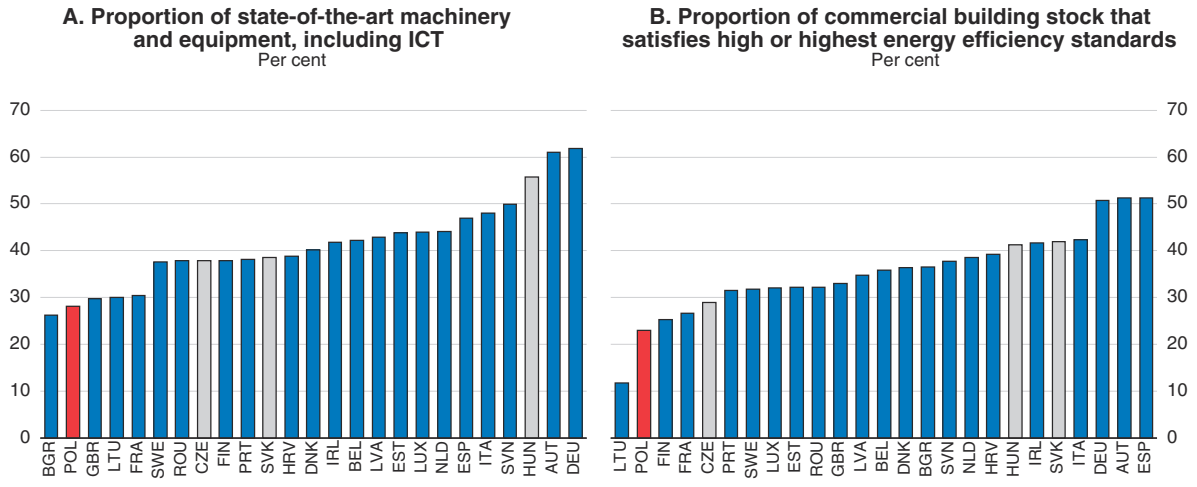
Figure 12. **The reported quality of Poland's capital stock is low, 2015**



Source: EIB (2017), "Investment Survey", European Investment Bank, Luxembourg.

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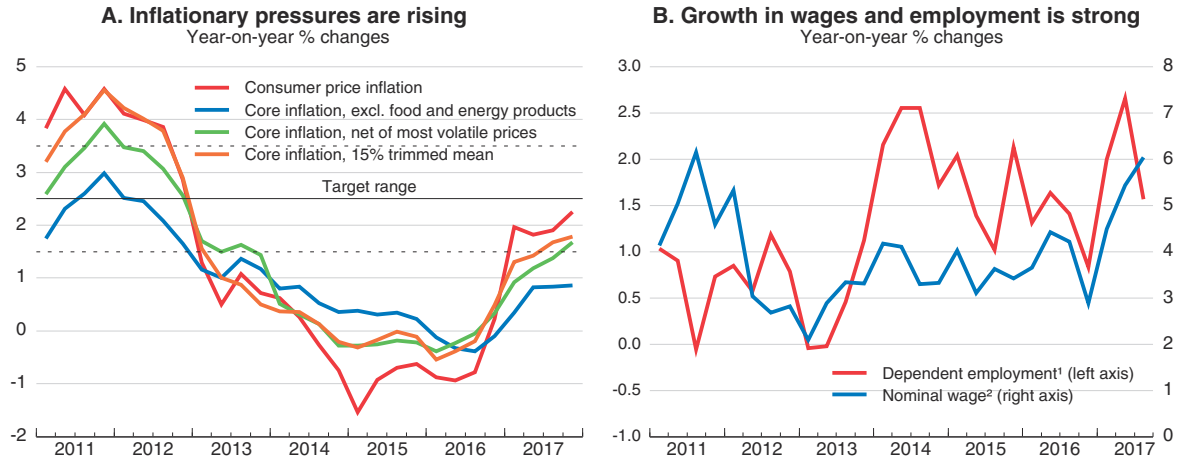
After a bout of deflation from mid-2014 to late-2016, consumer price inflation has returned, driven mainly by increases in energy and food prices. With inflation running below target for about five years the central bank has appropriately kept its main policy rate at a record low of 1.5% since March 2015 (Figure 13, Panel A). Inflation excluding food and energy prices has increased since early 2017, but remains low. Yet, alternative measures of core inflation used by the National Bank of Poland (NBP) have risen faster, and further increases are expected in line with accelerating wage growth (Panel B), as the labour market is tightening (Figure 9). However, pass-through from a tighter labour market to prices seems to have weakened compared to historical standards in Poland as in other countries. This seems to be confirmed by the level of firms' and consumers' inflation expectations that remain relatively

low notwithstanding increases at the end of 2016 (Figure 14). If the economic assessment suggests that there is considerable upward risk for price stability, the NBP should raise interest rates in a timely fashion to ensure that inflation remains well within its target range (2.5+/- 1%).

Figure 13. **Inflation is close to the NBP's target**



1. Employment in total economy, excluding the self-employed.
2. Average nominal gross wage and salary in the enterprise sector; economic entities employing at least 10 persons.

Source: Narodowy Bank Polski; OECD (2017), *OECD Economic Outlook: Statistics and Projections* (database); Statistics Poland.

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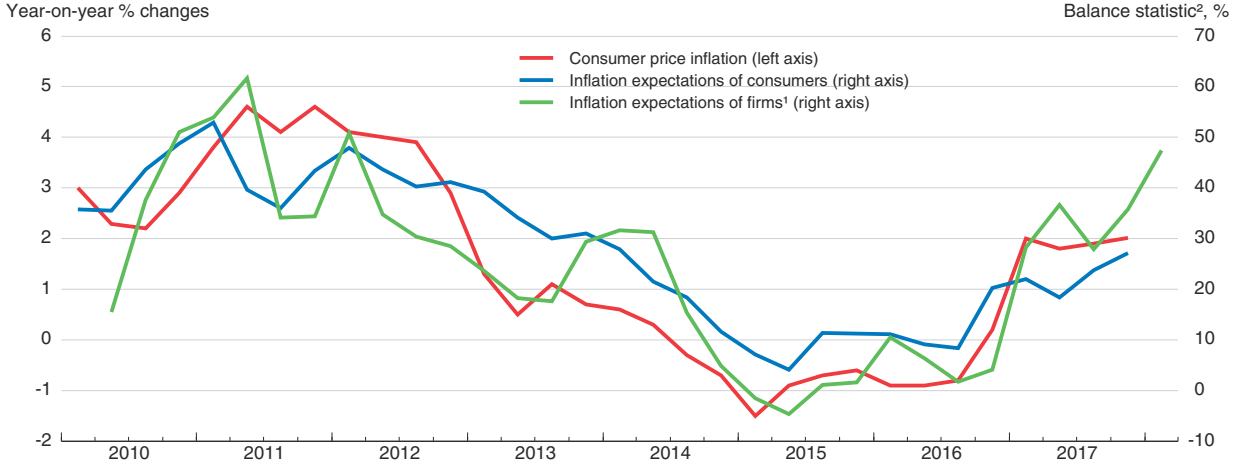
Figure 14. **Consumers' and firms' inflation expectations**



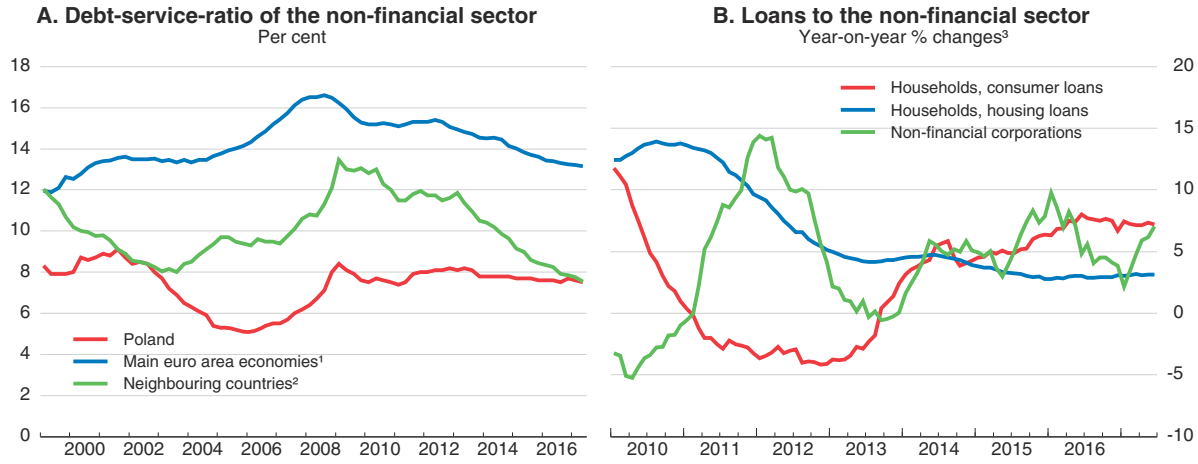
1. As business inflation expectations are found to be more strongly (positively) correlated with price developments 3 months in the future, the displayed series is shifted forward by one quarter.
2. Based on the percentage of respondents declaring that, in the next 12 months, prices will rise faster than currently.

Source: Narodowy Bank Polski; Statistics Poland.

StatLink http://dx.doi.org/10.1787/888933687905

Based on publicly available data the financial sector appears robust. The debt-service ratio of the non-financial corporate sector, which measures the amount of income used for interest payments and amortisation, is low in international comparison (Figure 15, Panel A). The fact that non-financial corporate sector debt has increased over time relative to GDP, albeit from a low level, explains that Figure 16 signals increased non-financial sector

Figure 15. **The financial sector appears resilient**



1. Unweighted average of Germany, France, Italy and Spain.
2. Unweighted average of Hungary and the Czech and Slovak Republics.
3. Adjusted for exchange rate changes.

Source: BIS (2018), *Debt Service Ratios for the Private Non-financial Sector* (database), Bank for International Settlements, *www.bis.org/statistics/dsr.htm*; Narodowy Bank Polski, *Monetary and Financial Statistics* (database).

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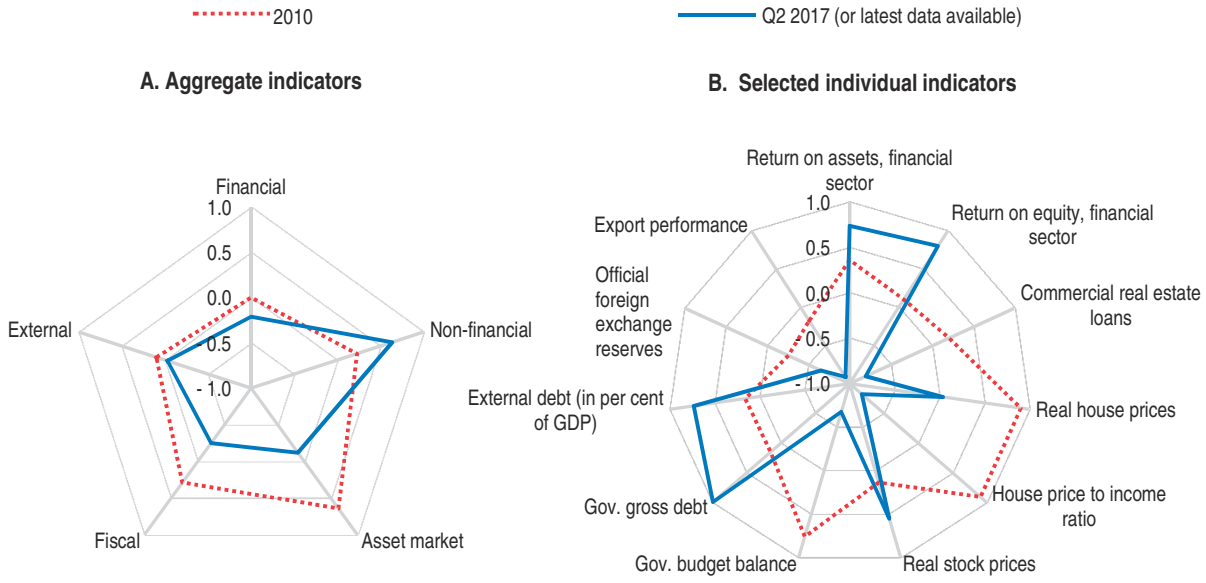
Figure 16. **Evolution of macro-financial vulnerabilities**

Index scale of -1 to 1 from lowest to greatest potential vulnerability[1]



1. For each aggregate macro-financial dimension, displayed in Panel A, the vulnerability index is based on a simple average of all indicators from the OECD Resilience Database that are grouped under that dimension's heading. Indicator values are normalised to take values between – 1 and 1. They are positive when the last observation of the underlying time series is above its long-term average, indicating more vulnerability, and negative when the last observation is below its long-term average, indicating less vulnerability. Long-term averages are full-sample estimates calculated since 2000.

Source: Calculations based on OECD (2017), *OECD Resilience Indicators* (database), November.

StatLink http://dx.doi.org/10.1787/888933687943

vulnerability. The banking sector's average core Tier 1 capital ratio stood at 17.2% at end-September 2017, much higher than Basel III requirements. Bank lending has remained resilient, as economic activity is gathering pace (Panel B), although bank profitability has declined since 2015, notably because of a new tax on bank assets and other external burdens (Figure 16, Panel B). Low interest rates are putting pressures on the net interest margin, although this ratio has recovered since 2015. While the economic risks associated with the portfolio of foreign-currency-denominated mortgage loans appear limited and not of a systemic nature (National Bank of Poland, 2016a), the details of a law to facilitate the voluntary restructuring of such loans (to limit borrowers' future exchange rate risks) through bilateral negotiations between banks and their clients, have yet to be fully decided, creating uncertainty. Discussions over this matter, including the regulatory package recommended by the macro-prudential authority (the Financial Stability Committee) in early 2017, have been ongoing for over two years and need to be quickly drawn to a close. Household debt is relatively low at 36.3% of GDP in spring 2017, compared with 58.1% of GDP in the euro area, and home prices are roughly stable and low relative to incomes, as demand and supply remain in balance despite a high level of transactions. The risk of excessive demand is contained by macro-prudential regulation, such as the maximum loan-to-value ratio of 80%, and, in the medium term, by ageing. The level of government debt relative to GDP is rather moderate, as are real stock prices.

The projection is subject to various risks. Stronger-than-projected growth in the euro area, Poland's main export market, would boost exports and the current account balance. Labour shortages and skills mismatches could become more widespread, which would weaken productivity growth and economic activity. Inflation could be stronger than expected, as wage pressures could accelerate more than projected on the back of a strong labour market and a risk of lower labour force participation resulting from recent policy measures. If policy uncertainty were to intensify or the disbursement of EU funds were to accelerate less than expected, investment and GDP growth could be weaker. Additional shocks that are difficult to quantify are reported in Table 2.

Table 2. **Events that could lead to major changes in the outlook**

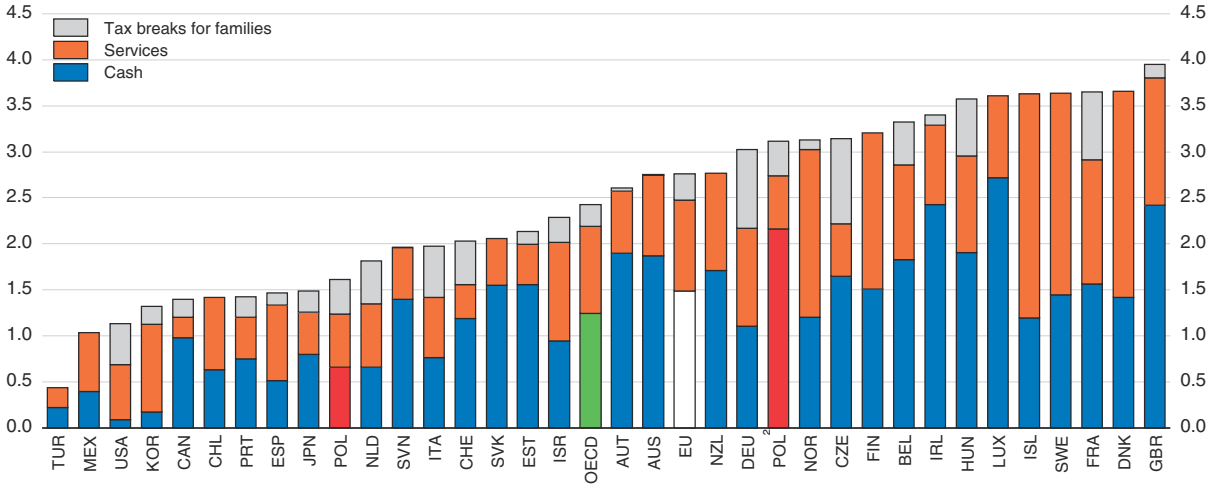
Shock	Possible impact
Worldwide rise in protectionism.	This would have adverse effects on exports and firm entry, harming productivity and potential growth.
Faster-than-projected tightening of global financial conditions.	This would lead to higher domestic rates, and the zloty could depreciate, driving up interest payments and risks of fiscal policy slippages. The tight connection between the sovereign and banking sectors, which has been strengthened by the exemption of banks' government bond purchases from the new bank asset tax and the purchase by the authorities of stakes in two banks, could generate an adverse feedback loop with negative effects on economic activity.
Disorderly exit of the United Kingdom from the European Union.	A disorderly exit of the United Kingdom from the European Union would severely weaken Poland's exports, as it is Poland's second biggest export partner (see Figure 7above).

Financing higher social spending and public investment in skills and research

Public spending is increasing, reflecting rising social transfers. The lowering of the minimum retirement age implemented in October 2017 and the 500+ child benefit programme introduced in April 2016 are expected to cost about 1.5-2% of GDP annually. The new child benefits will double public support for families to ca. 3% of GDP (Figure 17). Stronger public investment related to projects financed in cooperation with the European Union will also contribute to a rise in public spending. As a result, the fiscal policy stance

Figure 17. **Poland's public support for families is now probably above the OECD average**

As a percentage of GDP, 2013[1]



1. Or latest available year.
2. Poland's public spending on family benefits of 2013, augmented with the costs of the family 500+ child benefits introduced in 2016. Other changes between 2014 and 2016 are not taken into account for lack of data, so that it seems safe to consider that family support is now above the OECD average, although there are no data for 2016.

Source: OECD (2017), *OECD Family Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933687962

will be expansionary in 2018, as reflected in the deterioration of the underlying primary balance. However, the headline deficit should remain well below 3% of GDP thanks to buoyant tax revenues resulting from strong, consumption-led growth and improved tax collection in addition to the constraining impact of the government's expenditure rule, which applies to 90% of general government spending. Given the strength of the economy implementing a tighter fiscal stance through revenue-raising tax reforms or through still greater spending prioritisation would be appropriate.

There are a number of reasons to expect further pressure on public spending in the longer run. As incomes rise, so do public demands for better social protection and public services, as evidenced by the recent doctors' protest against low pay and poor working conditions. Poland's public health spending is among the lowest in the OECD. High out-of-pocket spending, an estimated 9% of the population without insurance and a shortage of health professionals, contributes to inequality in access to health care. A third of the population reports skipping medical consultations as a result of high costs, the largest share in the OECD. The government plans to increase public health-care spending to 6.0% of GDP in 2025 from 4.5% in 2015. It will be important to ensure that this serves to reduce out-of-pocket payments to improve access to health care. Better strategic planning of health-care workforce training and improvement in working conditions in the sector are also needed to address labour supply constraints (Domagała and Klich, 2018). To strengthen Poland's capacity to innovate the government also intends to increase R&D spending to 1.7% of GDP by 2020, notably through more generous R&D tax incentives (see Box 2). Given the large share of public investment and innovation support financed via EU funds, continuity of investment incentives for the private sector might require a substantial increase in government spending after 2022, when the availability of EU Funds might diminish considerably. The debt sustainability analysis in Box 3 illustrates that further revenue-raising measures or spending

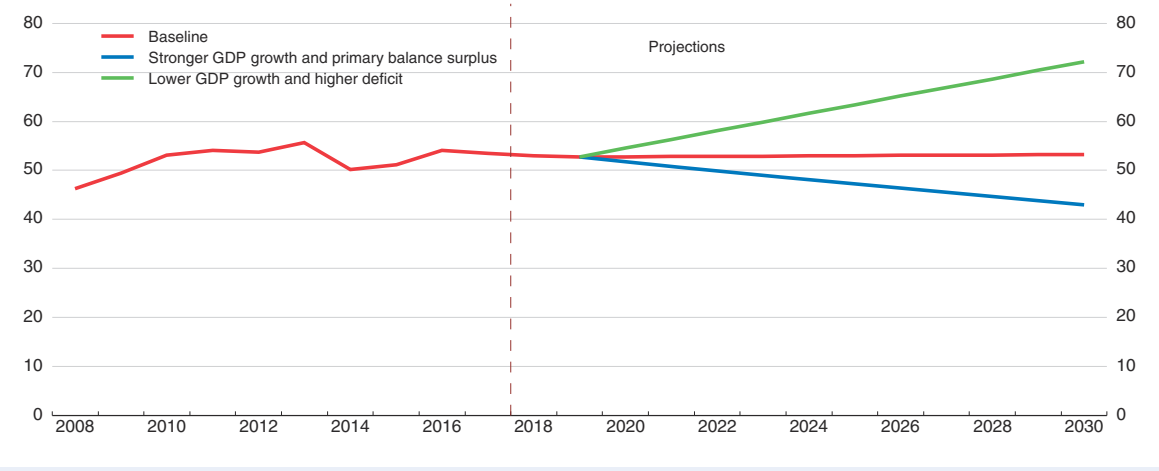
prioritisation would be needed for the public finances to remain in line with the government's fiscal framework and avoid a rapid rise in public debt. Besides preventing unfinanced spending increases, the fiscal framework requires that spending be reduced if the public debt-to-GDP thresholds – 43% and 48% – are exceeded or if the nominal general government deficit exceeds 3% of GDP. And public debt must be kept below 60% of GDP according to the constitution.

Box 3. **Debt sustainability analysis and quantification of structural reforms**

In a baseline scenario of a primary deficit stable at 0.5% of GDP, the debt-to-GDP ratio is roughly constant (Figure 18). However, should the primary deficit rise to 2.0% of GDP in 2020 and stabilise at this level thereafter due to unfinanced increases in spending and nominal growth be 0.5 percentage points weaker, public debt would be on an upward trajectory. In contrast, stronger nominal growth resulting from some of the growth-enhancing reforms advocated in this *Survey* (Table 3) and stronger revenues leading to a primary balance surplus of 0.25% of GDP from 2020 onwards would put public debt on a declining path, and the debt-to-GDP ratio would reach about 43% of GDP in 2030. Table 4 illustrates that with current government plans some of its planned spending increases would be unfinanced (green scenario). It also summarises tax and spending reform options that could help the government reach the blue-line scenario instead, if combined with structural reforms. It should be noted that the effects of structural reforms on growth in Table 3 are a lower-bound estimate of the benefits from structural reforms advocated in this *Survey*, since additional measures such as an increase in funding for public universities and research output as well as the implementation of a national basic skills strategy and more workplace-based vocational education and adult training are not quantified in Table 3.

Figure 18. **The debt-to-GDP ratio is expected to be stable**

Illustrative public debt paths, general government debt, Maastricht definition, as a percentage of GDP[1]



1. The baseline corresponds to the projections from Table 1 until 2019. Thereafter assumptions are: nominal GDP growth of 5.4% in line with the OECD estimate of potential growth of 2.9% and a GDP deflator of 2.5%, effective interest rate of 4.5% and a primary balance deficit stable at 0.5% of GDP. The stronger GDP growth and primary balance surplus scenario assumes nominal growth to be 0.5 percentage points stronger than in our baseline and a primary balance surplus of 0.25% of GDP from 2020 onwards. In the lower GDP growth and higher deficit scenario, nominal GDP growth is 0.5 percentage points weaker than in our baseline and the primary balance deficit is at 2.0% of GDP from 2020 onwards.

Source: OECD (2017), *OECD Economic Outlook: Statistics and Projections* (database) and updates; OECD staff calculations.

StatLink http://dx.doi.org/10.1787/888933687981

Box 3. **Debt sustainability analysis and quantification of structural reforms** *(cont.)*

Table 3. **Potential impact of selected structural reforms**[1]

Effect on the level of GDP

Policy	Measure	Effect in 2025	Effect in 2030
Increase in retirement age	Gradual increase in the statutory retirement age from 60 to 65 for women phased in over 2019 to 2030.	0.45%-1.02%	1.02%-2.32%
Additional spending on child-care and long-term care services	Gradual increase by 2% to bring it near the OECD average by 2030. A third could be financed by transforming some family transfers and tax credits into in-kind benefits.	0.57%	1.69%
Additional spending on business R&D	Increase by 0.35% of GDP by 2020.	0.31%	0.59%
Total effects from structural reforms		1.33%-1.90%	3.30%-4.60%

1. GDP gains for the increase in retirement age and spending on child-care and long-term care services are calculated based on the model of Cavalleri and Guillemette (2017). The range of estimates for the increase in retirement age corresponds to different estimates for the elasticity of elderly employment with respect to changes in the statutory retirement age, which are scaled based on the estimated changes in elderly employment in Poland in the last quarter of 2017 due to the lowering of the statutory retirement age (see Guillemette and Guérin (2017) for details). Estimates for the GDP effects of an increase in business R&D spending are based on B. Égert and P. Gal (2017) "The quantification of structural reforms: A new framework", *OECD Economics Department Working Paper*, No. 1354.

The government plans to finance higher spending mainly by reducing tax fraud. Indeed, efforts to improve VAT compliance seem to have been very successful so far, as the losses due to tax evasion may have been reduced by about 25% in 2017. While they are still substantial (at about 2% of GDP (PwC, 2017)), this progress is impressive. A coherent policy package has helped achieve this (Box 4). The government expects further improvements in the years to come. Based on historical examples of neighbouring countries that have improved their VAT compliance, the expected revenue gains seem optimistic (IMF, 2017a). It is unlikely that the government will be able to finance the new child benefits and higher healthcare spending with improved tax compliance alone (Table 4, Panel A), not least because some of the improvements may be temporary, as compliance has been shown to be cyclical (Cabrillac and Pappadà, 2017).

Box 4. **The authorities' strategy to improve tax compliance**

A set of policy measures have helped Poland achieve important progress in tax compliance.

- The creation of the National Revenue Administration (Krajowa Administracja Skarbowa, KAS) in March 2017, merging tax administration, customs and fiscal control operations. A centralised data warehouse was set up with improved data modelling tools to detect and predict irregularities.
- Large firms have had to provide VAT data on a monthly basis in a unified format (the Standard Audit File for Tax) since July 2016 and SMEs since January 2017, facilitating audit checks. From January 2018, nearly all firms will have to submit such files.
- A package of measures was introduced to tackle VAT fraud, notably carousel fraud related to intra-EU liquid fuel trade.
- On 13 January 2018 a new law entered into force that will enable the tax authorities to better control the risk of tax fraud, in particular VAT, through the banking system. In certain cases, the authorities may request a temporary bank account freeze. The purpose of this act is to implement an ICT system (STIR) facilitating bank data transmission and algorithmic (big data) analysis for tax administration purposes.

Box 4. **The authorities' strategy to improve tax compliance** *(cont.)*

- A split VAT payment mechanism whereby all taxable entities registered for VAT purposes will be legally required to have a separate VAT account linked to their standard bank accounts is to be enforced from July 2018. VAT related transactions covered by the split payment mechanism are to be made exclusively via this account facilitating monitoring by tax authorities.
- Sanctions against VAT fraud have been strengthened.
- A general anti-avoidance rule was introduced for the corporate income tax.

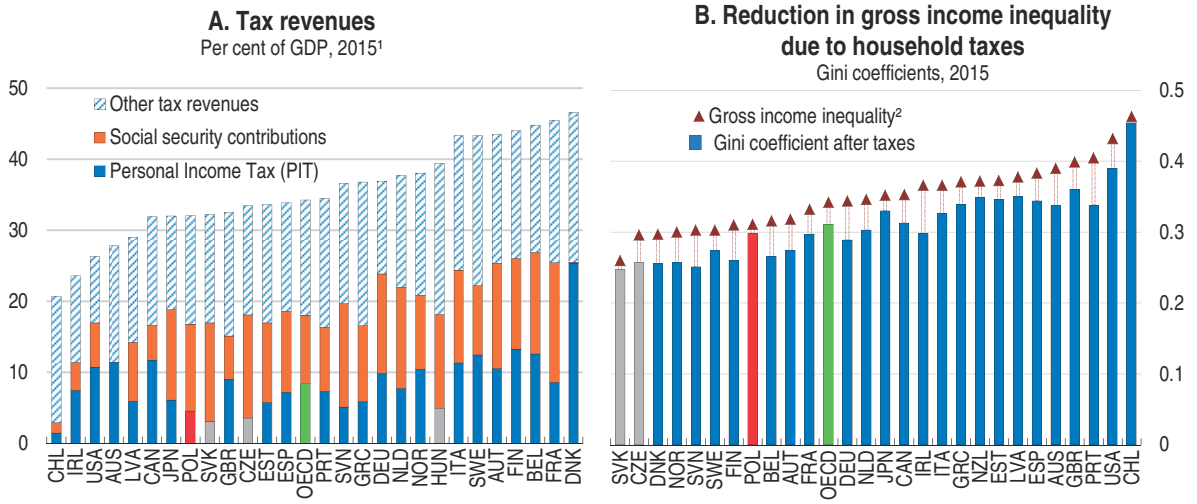
Table 4. **Government fiscal plans until 2025 and OECD's recommendations**

Panel A. Key government tax and spending plans until 2025
Government planned spending
Child benefits programme (500+): 1.2% of GDP in 2017.
Additional health-care spending: 1.3% of GDP corresponding to an increase in public health-care spending from 4.65% in 2018 to 6% in 2025 relative to GDP two years earlier in each case.
Additional pension spending due to the lowering of the retirement age: 0.5% of GDP.
Increase in R&D spending not financed by EU funds: 0.35% of GDP.
Total government spending plans: 3.35% of GDP.
Government planned receipts
Improved tax compliance: 1.5% of GDP.
Tax on bank assets: 0.2% of GDP.
Total government revenue plans: 1.7% of GDP.
Panel B. OECD's proposals to finance the government's spending plans and OECD-recommended reforms
Estimated costs of OECD reform proposals
Increase in public investment to compensate the possible reduction in EU funds for infrastructure and innovation investment by 50% in the next EU budgetary programme: 1.3% of GDP.
Net increase in long-term and childcare spending: 0.7% of GDP. Increasing spending on childcare and long-term care services by 2% of GDP by 2030 could be partially financed by eliminating child tax credits and family benefits that existed before the introduction of the 500+ benefit programme, together worth 0.6% of GDP. In net terms this would imply increased spending of roughly 0.7% of GDP by 2025.
Increase in public spending on higher education and research: 0.5% of GDP. A 0.5% increase in public funding for universities would bring Poland's spending on tertiary education roughly into line with the United Kingdom and the Netherlands.
Aligning the special pension regime for farmers and miners with the general regime and align the female retirement age with those of men: -1.2% of GDP.
Total spending increases including government spending plans: 4.7% of GDP.
Revenue gains from OECD reform proposals
Reducing by half the VAT revenue shortfalls due to reduced rates and exemptions: 1.2% of GDP.
Increasing personal income tax revenues to close 25% of the gap with the OECD average: 0.9% of GDP.
Increasing environmental taxes: 0.8% of GDP.
Total revenue increases including government revenue plans: 4.7% of GDP.

Source: OECD calculations. Numbers may not add to totals because of rounding.

Tax revenues are below the OECD average (Figure 19, Panel A), and the contribution of the progressive personal income tax to overall revenues is low in international comparison. As a result, the tax system is not very progressive and does little to lower inequality (Panel B). Tax reform could help to increase revenues and improve the system's impact on the environment and inequality.

Figure 19. **The tax burden is relatively low, and the system's impact on redistribution is weak**



1. Or latest year available.
2. After social transfers.

Source: OECD (2017), *OECD Tax Revenues Statistics* and *OECD Income Distribution and Poverty Statistics* (databases).

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Reduced VAT rates and exemptions lower revenues by up to 2.5% of GDP (Ministry of Finance, 2016). Limiting the reliance on reduced rates would allow for lowering statutory rates to some extent, while still increasing tax revenues. Social policy targets are more efficiently reached through the personal income tax (PIT) system or targeted social transfers, which are currently low in Poland, than through reduced VAT rates. These also benefit higher-income households, sometimes disproportionately, for example in the case of the reduced VAT rate on hotels and restaurants.

Giving a stronger role to the personal income tax would imply a more progressive tax system and help raise revenues. Poland has only two tax brackets, and the top rate of 32% has a relatively high threshold in that only 3% of taxpayers are subject to this rate (Ministry of Finance, 2017). The self-employed can choose to be taxed at a 19% flat rate. Top marginal tax rates including social contributions are towards the lower end among OECD countries (OECD Tax Database). Evidence suggests that increasing income tax progressivity from moderate levels can reduce inequality substantially without a negative impact on economic growth (IMF, 2017b). There would be room to introduce a new tax bracket for medium-to-higher incomes, which could be between the lower 18% and the upper 32% rate, and lower the threshold for the top rate. Since 18% is relatively high, introducing a lower bottom statutory rate for the lowest incomes should also be considered. The self-employed should also be subject to progressive income taxes to ensure horizontal and vertical equity and limit possibilities for tax avoidance. Capital income is subject to a flat rate of 19%, which is among the lowest rates in the OECD (OECD, 2017a). Increasing the capital income tax rate at the individual level would raise the progressivity of the overall tax system, since capital income is more unevenly distributed than labour income. Higher property taxes, which contribute relatively little to overall revenues, would be a complement to such a reform (Table 5). The 2017 increase in the tax-free allowance for low-earning households helped to raising the system's overall progressivity and is welcome.

Table 5. **Past OECD recommendations on fiscal policy, public investment and green growth**

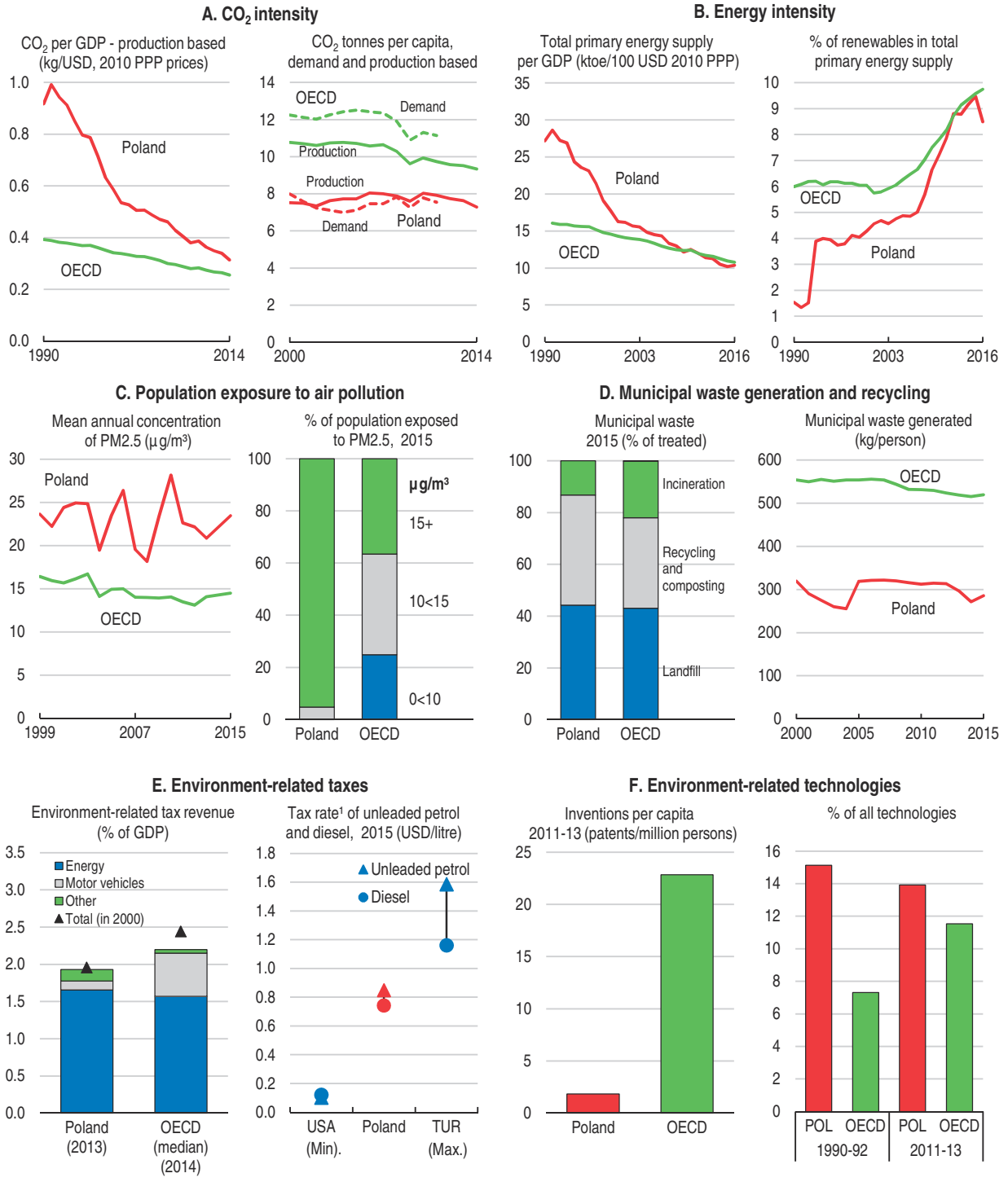
Main recent OECD recommendations	Actions taken since the 2016 *Survey*
Raise revenues by broadening the VAT base, eliminating reduced rates and exemptions, and increasing property and environmental taxes.	Exemption for specific services related to certain financial and insurance services was repealed as of July 2017. Furthermore, a bill eliminating the reduced VAT rate on specific hygienic and pharmaceutical products came into effect in January 2018.
To improve tax compliance, introduce strong central management for the tax authority, improve coordination, invest in ICTs, and focus more resources on auditing large taxpayers.	The government set up a National Revenue Administration and invested in new ICTs.
Redesign and increase the least distortive taxes, by establishing market-value-based property taxes and by taxing capital gains on investment properties.	No action taken.
Bolster local capacity by providing central government technical assistance and integrated e-procurement processes.	Electronic procurement will be mandatory as from 2018.
Ensure that climate change policies are clear and aligned with European and international objectives. Invest in interconnections with neighbouring countries in the electricity and gas sectors.	The transition from green certificates to auctions guaranteeing prices as a new support mechanism has taken several years, and a lack of clarity about volumes, reference prices and support periods for future auctions is creating much uncertainty. Legislation in 2016 created prohibitive conditions for establishing wind farms, new costly administrative requirements for existing installations and legal uncertainty concerning taxation. Investments in interconnection capacity with Lithuania and the Czech Republic have been delayed, and the interconnection level remains the lowest in the EU.

In January 2017 the government introduced a reduced corporate income tax rate of 15% for firms with revenues below 1.2 million euros, while the standard statutory rate of 19% is among the lowest in the OECD (OECD, 2017a). Roughly half of OECD countries have reduced rates for small businesses (OECD, 2015a), but this creates incentives to under-report revenues, complicating tax enforcement. It can also be a barrier to firm growth (IMF, 2017c). If such effects materialise, the reduced rate should be reconsidered. The government is in the process of closing corporate income tax loopholes, e.g. by tightening criteria to claim deductions available to foreign-controlled companies. Limiting the deductibility of interest from the corporate tax base in line with the OECD Base Erosion and Profit Shifting (BEPS) project (OECD, 2015b) would lead to a less distortive financing structure for the economy while broadening the tax base.

Another way to raise revenues, provide stronger incentives to invest in green infrastructure and promote well-being would be to increase environmental taxes. While such revenues are close to the OECD-country median (Figure 20, Panel E), this is mainly attributable to high fuel intensity due to a large and heavily polluting car fleet. Tax rates on air and water pollution and on CO_2 emissions are low, and many environmentally harmful fuel uses are exempt from taxation. Bringing taxes more into line with environmental externalities could help raise substantial revenues (OECD, 2016a), provide stronger incentives to replace ageing and highly coal-intensive infrastructure and heating equipment in homes with greener alternatives and promote environmental innovation, which remains low (Panel F).

The proposed tax reforms give the government a choice of options to finance its spending plans and prepare for a possible drop in available EU funds. The options would also make room in the longer term to increase spending on higher education and research, as well as childcare and long-term care, as recommended elsewhere in this *Survey*. This is quantified in an illustrative manner in Panel B of Table 4.

Figure 20. **Green growth indicators: Poland**



1. Excise taxes, excluding all VAT or VAT-equivalent components levied on energy consumption.

Source: OECD (2017), *Green Growth Indicators* (database). For detailed metadata: *http://stats.oecd.org/wbos/fileview2.aspx?IDFile=7ad102dd-e16d-4da0-a20c-624582b9984e.*

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Making investment greener and improving its impact on innovation and productivity

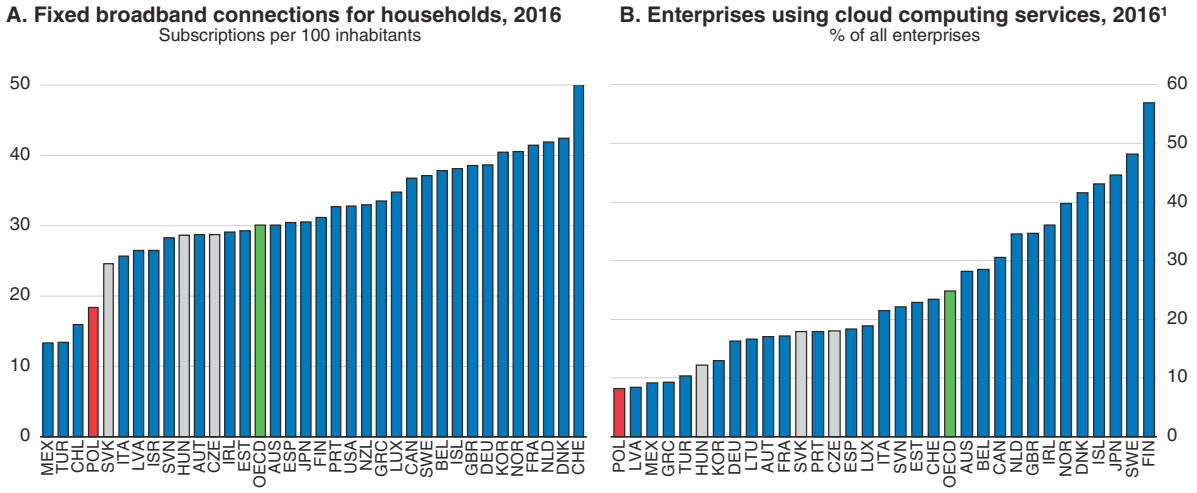
Thanks to abundant availability of EU structural funds Poland has invested substantially in transport and digital infrastructure. Yet, improving the quality of investment would strengthen its impact on innovation, environmental efficiency and economic development (OECD, 2016a). Local governments are responsible for a large share of infrastructure investments but lack management capacity and sometimes incentives to oversee large infrastructure projects and develop local zoning plans and energy-efficiency strategies. They would benefit from the central government's technical assistance (Table 5), which would also help lagging regions catch up.

Better public procurement procedures would also help raise the quality of public investment. Despite some improvements in recent years, Poland is one of the EU countries with the largest numbers of procurement contracts attributed to single bidders (European Commission, 2017b). Moreover, the environmental-efficiency and innovation impact of public infrastructure investment is hindered by the reluctance of local authorities to award contracts based on non-price criteria, even though there has been some progress since a change in the public procurement law required consideration of other criteria as well (OECD, 2017b). E-procurement will be mandatory as of 2018, and developing integrated electronic procurement processes for all levels of government would improve market transparency and boost competition. A reform of procurement law and public purchasing policies is under preparation. Its purpose is to enhance competition in public procurement and increase the use of green and innovation-related criteria. Facilitating data collection at the central level to conduct impact analyses would help in the design of a strategy to further boost competition and innovation in public procurement. Finally, in line with Poland's plan to increase tax compliance and fight corruption, joining the newly set-up European Public Prosecutor's Office, as most other EU countries have done, could help combat cross-border tax fraud and the misuse of EU structural funds.

Continuing progress in improving digital infrastructure, notably by ensuring a swift absorption of EU funds earmarked for developing ICTs, would help boost innovative investment and foster public sector efficiency. The digital infrastructure has improved fast, but the share of households with broadband access remains low, and Poland lags in terms of firms' usage of cloud computing services (Figure 21) and big data analysis (OECD, 2017c). This hinders innovative investments and the ability of enterprises to manufacture new products and adopt new production processes. Strengthening e-government appropriately features high on the government's digital strategy, as OECD data confirm that there is room to catch up to other OECD countries in terms of moving administrative procedures online. In that respect, establishing a Digitalisation Council as Norway has done to advise government agencies engaged in ICT projects could be helpful.

Regulatory instability has hampered the development of renewable energy and other technologies that would improve air quality. While Poland has reduced its greenhouse gas (GHG) emissions and the energy intensity of its economy, the use of low-quality coal for Poland's often inefficient household heating and electricity generation is more prevalent than in other European countries, contributing to high CO_2 emissions and air pollution (Figure 20). A majority of the population is exposed to dangerous levels of particulate matter (Panel C), explaining the high risk of respiratory disease and premature death mentioned above. Renewable energy generation had grown rapidly until 2015, but over 80% consists of

Figure 21. **Fixed broadband penetration and ICT use in enterprises**



1. Cloud computing refers to ICT services used over the Internet as a set of computing resources to access software, computing power, storage capacity and so on.

Source: OECD (2017), *OECD Broadband Portal* (*www.oecd.org/sti/broadband/broadband-statistics/*) and *OECD Digital Economy Outlook 2017*, OECD Publishing, Paris.

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biomass, whose burning has worse effects on air pollution than the gas it replaced. The transition of renewables support from green certificates to auctions took several years, and there is still substantial uncertainty (Table 5). Many plants burning biomass and fossil fuels had to be closed down, and the renewables share dropped substantially in 2016 as the decline in the price of green certificates made their production unprofitable. While this is good news in terms of air pollution, conditions for investments in environmentally friendlier renewable energy sources suffer from additional barriers. A 2016 law created prohibitive conditions for new onshore wind parks and high costs and uncertainty for existing ones (European Commission, 2017a). Strengthening electricity transmission, distribution and interconnection capacity, which remains low, and ensuring easier access to the grid by streamlining administrative procedures would promote renewables development and improve energy security. Improvements in energy efficiency in homes and in combustion efficiency in boilers will help to enhance air quality and reduce energy bills. Higher environmental taxes are a crucial complement to ensure the effectiveness of programmes promoting technology replacement, including for inefficient heating boilers, and promote green innovation, as illustrated by the Swedish experience with a NOx charge (OECD, 2010a).

Labour market developments

Unemployment has fallen, but further progress in strengthening seniors' employment is at risk

Unemployment has been falling fast as a result of rising employment but also a shrinking labour force. Starting from a low level, employment rates of workers over 55 have risen particularly quickly, accounting for half the increase in the total employment rate between 2006 and 2015 (Lewandowski, 2017). Statistical analysis shows that the 2009 and 2013 pension reforms limiting early retirement and gradually increasing the statutory pension age to 67 played key roles, as participation for cohorts affected by the reforms rose substantially compared to those who were not. Unemployment for older workers fell in line

with that of other age groups. The recent reversal of the 2013 reform responded to widespread popular demand. At the same time, it could compromise the progress concerning seniors' employment. Benefit replacement rates will be among the lowest in the OECD for workers now entering the labour market if they retire at the new statutory age (Table 6), particularly for women whose retirement age will remain unusually low compared to other OECD countries. Their average age at labour market exit today is among the lowest in the OECD (Figure 22).

Table 6. **Gross pension replacement rates for average income earners entering the labour market in 2017**

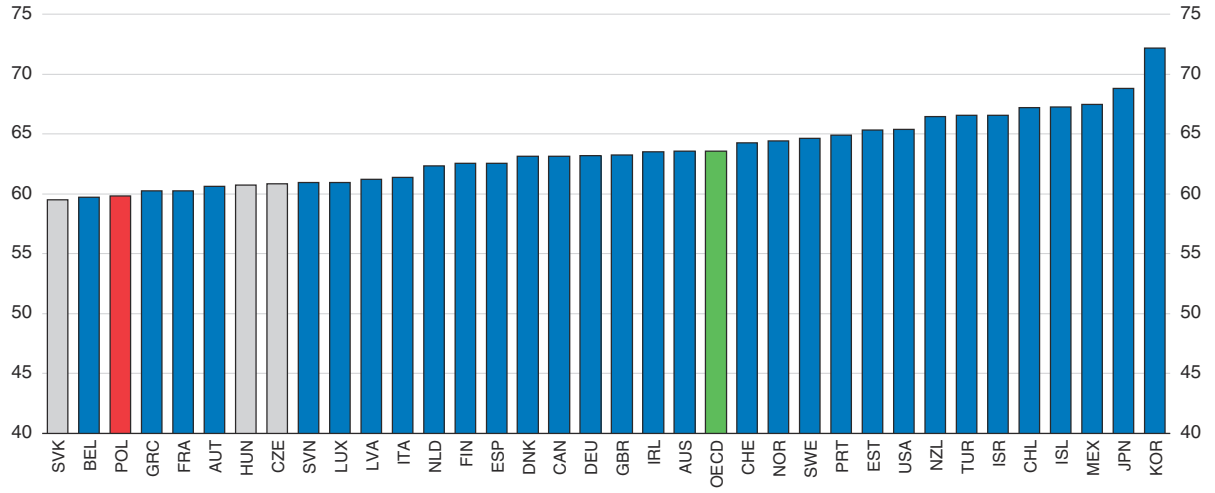
in % of pre-retirement income, individual earnings (women where different)

OECD members	Pension age		Replacement rate		OECD members *(cont.)*	Pension age		Replacement rate	
	Male	Female	Male	Female		Male	Female	Male	Female
Australia	67		32.2	*(29.4)*	New Zealand	65		40.0	
Austria	65		78.4		Norway	67		45.1	
Belgium	65		46.7		Poland	65	*(60)*	31.6	*(27.9)*
Canada	65		41.0		Portugal	68		74.0	
Chile	65		33.5	*(30.3)*	Slovak Republic	68		64.3	
Czech Republic	65		45.8		Slovenia	60		38.1	*(40.1)*
Denmark	74		86.4		Spain	65		72.3	
Estonia	65		49.7		Sweden	65		55.8	
Finland	68		56.6		Switzerland	65	*(64)*	42.1	*(41.8)*
France	64		60.5		Turkey	61	*(59)*	69.9	*(67.0)*
Germany	65		38.2		United Kingdom	68		22.1	
Greece	62		53.7		United States	67		38.3	
Hungary	65		58.7		**OECD**	**65.8**	***(65.5)***	**52.9**	***(52.3)***
Iceland	67		69.0						
Ireland	68		34.1		Argentina	65	*(60)*	71.6	*(64.3)*
Israel	67	*(64)*	67.8	*(60.0)*	Brazil	55	*(50)*	69.5	*(52.9)*
Italy	71		83.1		China	60	*(55)*	76.0	*(65.1)*
Japan	65		34.6		India	58		87.4	*(83.1)*
Korea	65		39.3		Indonesia	65		62.1	*(57.8)*
Latvia	65		47.5		Russian Federation	60	*(55)*	33.7	*(28.6)*
Luxembourg	60		76.7		Saudi Arabia	45		59.6	
Mexico	65		26.4	*(24.8)*	South Africa	60		16.0	
Netherlands	71		96.9		EU28	65.9	*(65.5)*	58.3	*(58.2)*

Source: OECD Pension model results reported in OECD (2017), *Pensions at a Glance 2017*, OECD Publishing, Paris.

Although legally there is nothing that prevents workers from working beyond the statutory retirement age, the pension reform is likely to have an impact on employment rates for older workers. Studies show that the statutory pension age is a powerful focal point that tends to have a strong effect on retirement decisions beyond any financial incentive effects (Seibold, 2016; Cribb et al., 2016). In fact, almost all workers newly eligible because of the recent change seem to have applied for pension benefits so far. The impact on employment remains unclear, though, as some applicants may remain in the labour market. Furthermore, only 40% of the current cohort newly eligible for pensions was employed. Still, if retiring at the earliest possible date were to become a trend, it could entail heightened poverty risks according to simulations based on an overlapping-generations model, substantially increasing the share of pensioners who have no more than a minimum pension (Figure 23; Tyrowicz and Brandt, 2017). Fiscal costs due to a higher share of minimum pensioners could increase by up to 0.9% of GDP annually on average until 2030.

Figure 22. **Women's average effective age of retirement is among the lowest in the OECD, 2016**[1]



1. The average effective age of retirement is calculated as a weighted average of (net) withdrawals from the labour market at different ages over a 5-year period for workers initially aged 40 and over. In order to abstract from compositional effects in the age structure of the population, labour force withdrawals are estimated based on changes in labour force participation rates rather than labour force levels. These changes are calculated for each (synthetic) cohort divided into 5-year age groups.

Source: OECD (2017), *OECD Pensions at a Glance*, OECD Publishing, Paris; estimates derived from the European and national labour force surveys (*http://oe.cd/pag*).

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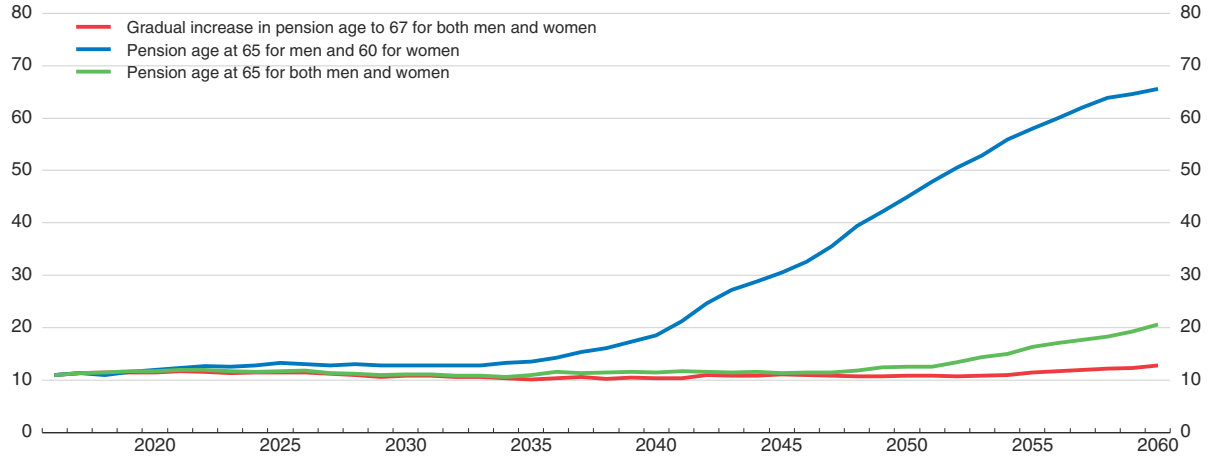
Figure 23. **The share of minimum pensioners among women is expected to increase sharply**

Simulations based on an overlapping generations model, per cent



Source: J. Tyrowicz and N. Brandt (2017), "Simulating the effects of pension reforms in Poland in an overlapping generations model", *Technical Background Paper*, OECD, Paris.

StatLink http://dx.doi.org/10.1787/888933688076

Aligning the statutory pension age for women with that of men at 65 would alleviate the increase in old-age poverty among women and reduce additional fiscal costs from 0.9% to 0.3% of GDP. The model does not take into account that women often have patchy career paths related to motherhood, implying that estimates represent a lower bound.

Providing workers with better information about their pension situation could still induce them to delay their retirement. There is ample evidence that workers everywhere have a poor understanding of the basic features of pension systems and the influence of the

age at which they retire on their pension income (OECD, 2016b). The government has started to send out more detailed and clearer annual information to workers about their entitlements. It will be important to ensure that this information is easy to grasp, even though conveying the uncertainty about future benefits in a notional defined contribution system without causing confusion is notoriously difficult (Antolín and Harrison, 2012). The recently provided personalised pension information included simple examples comparing pension benefits when retiring at the new statutory age and 5-10 years later. It should also include the evolution of benefits over the beneficiary's expected lifetime, and minimum pensioners should be informed how much longer they need to work to lift their pension income sizeably above this level. A study is also needed on whether Polish workers actually read and understand the information they receive, as experience from Chile suggests that this is rarely the case. Furthermore, the government should continue to conduct regular nation-wide awareness campaigns, such as in Chile, the United Kingdom and the Netherlands, to provide simple pension calculators, such as in Canada, France and Chile, and introduce seminars, targeting groups that are likely to have low financial literacy. Employer-based seminars have been shown to be particularly effective, for example in the United States, as individuals seem to follow the advice or behaviour of colleagues, friends and neighbours (OECD, 2016b; Duflo and Saez, 2003). In 2017 Social Insurance Institution advisors offered individual pension advice to 1.1 million citizens.

The government plans to set up occupational pension plans in a more systematic way to ensure that workers have additional retirement income. The private pension pillar was substantially transformed in 2014 when authorities transferred almost half of open pension funds (OFEs) assets to the public pension agency (ZUS), registering them in individual pension accounts (see OECD (2014) for more details). Currently there is a discussion about transferring a further 25% of remaining OFE assets to the demographic reserve fund and transforming the rest into mutual funds. Furthermore, a draft law creates Employee Capital Plans (PPK) with contributions from employers and employees and incentives from the government. It is a voluntary scheme in that employees will be able to opt out. Developing such a pillar will require building trust in more regulatory stability than in the past – as changes to OFEs have been frequent and sweeping – and effective financial education campaigns. Soft compulsion, such as automatic enrolment and default minimum contribution levels envisaged by the government, has proven to work well in a number of countries such as Chile, Australia, the United Kingdom and the United States, as many people seem to opt for the path of least resistance (OECD, 2016b; Choi et al., 2002).

Efforts to strengthen job-search assistance and training programmes for older workers will also be needed. Other measures to facilitate longer working lives include: i) aligning the rules of special pension schemes with the general system, which are substantially more generous for farmers and miners in particular, but also for some other professions; ii) harmonising employment protection for all age groups to avoid disincentives to hiring older workers, who are currently better protected; and iii) providing government support to spreading good practices in terms of managing senior workers, in particular for SMEs (OECD, 2015c).

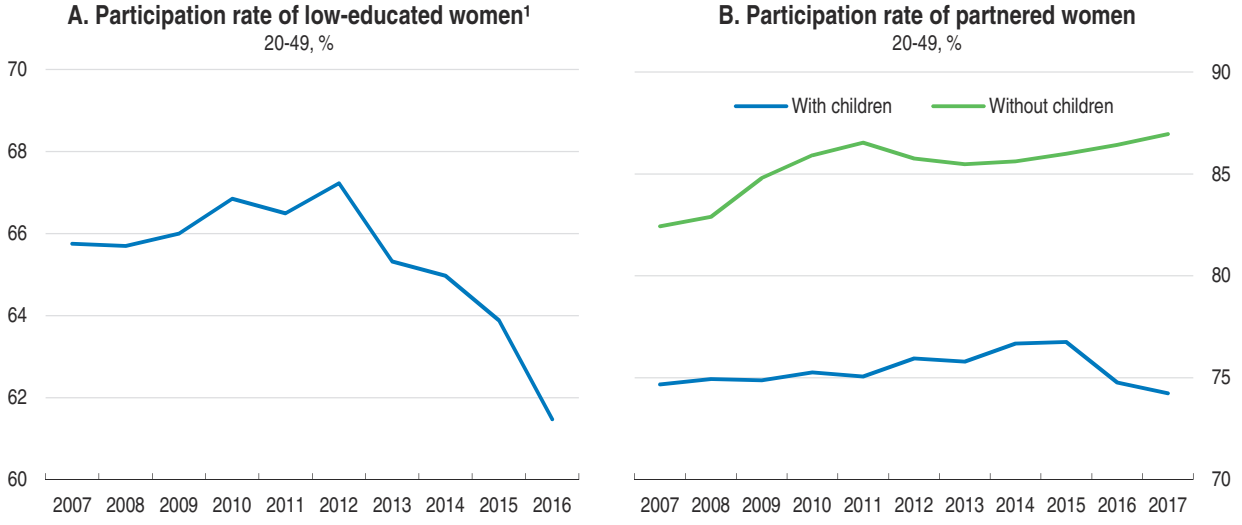
Strengthening female employment

The new family benefit has reduced poverty and might raise fertility. Before this, social spending was low with a limited impact on poverty. The 500+ benefit increases family benefits per beneficiary almost five-fold, while more than doubling the number of

beneficiaries. Extreme poverty fell by 1.4 percentage points in 2016 compared to 1 percentage point in 2015. Extreme poverty among children fell by more than 3 percentage points (Statistics Poland, 2017a and b), and further progress is likely to have taken place in 2017, as benefit disbursement started only in the summer of 2016. Some research finds that generous family benefits can also have a positive impact on fertility, although estimated effects differ widely and are low in some studies (Laroque and Salanié, 2014; Luci-Greulich and Thévenon, 2013; Riphahn and Wiynck, 2016).

But there are also risks. Evidence from other countries suggests that there can be negative effects of child benefits on female labour supply, which are greater for low-educated mothers (Schirle, 2015; Haan and Wrohlich, 2011). The participation rate among lower-skilled Polish women had started to fall already in 2013, when paid maternity and parental leave were significantly extended, and continued to do so after the introduction of the new child benefit in 2016 (Figure 24, Panel A). The participation rate of partnered women with one or two children fell significantly after the introduction of child benefits while it continued to increase among childless women (Panel B). Estimates suggest that the participation rate among partnered women with children was lowered by close to 3 percentage points in the first half of 2017 as a result of the reform (Magda et al., 2017). A microsimulation model likewise suggests that employment among mothers would fall in the longer term, with a particularly strong impact in villages and small towns; however, the calibration of the model is based on somewhat dated data (Myck, 2017). Combined with the lowering of the retirement age, patchier careers could reinforce old-age poverty risks for low-qualified women.

Figure 24. **Labour force participation among low-educated women has been declining**



1. With at most lower secondary or basic vocational education.

Source: I. Magda, A. Kielczewska and N. Brandt (2017), "The impact of large child benefits on female labour supply – the case of Poland's 500+ programme", *Technical Background Paper*, OECD, Paris.

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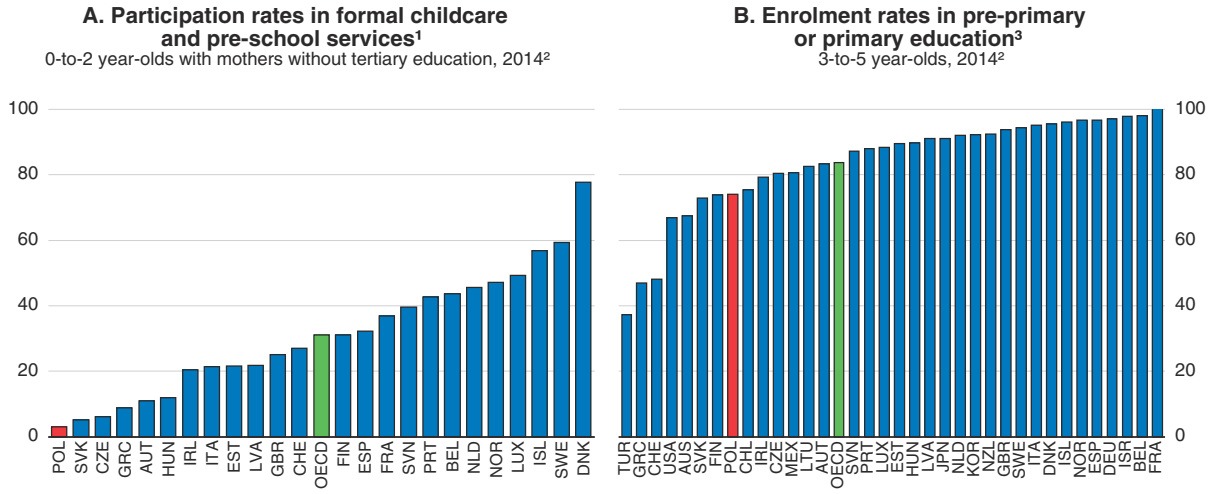
The OECD tax-benefit model confirms that parents who take up a job that would lift family income just above the eligibility ceiling for the first child can be financially worse off. An unemployed single mother of two taking up a job that pays the average wage would retain less than 20% of her earnings as a result of taxes and benefit withdrawal. Once taking childcare costs into account, which can be very high in the private sector – often the only

available option, she would actually lose money. The government would need to subsidise at least 50% of these costs before it starts to pay for her to take up such a job. Some Polish cities, such as Szczecin, have started to experiment with childcare vouchers. Another solution to alleviate the negative work incentives would be to taper the benefit withdrawal for the first child. Alternatively, it could be withdrawn gradually for all children but with a much higher income ceiling.

Further developing high-quality childcare services will be vital to promote female employment and make it easier for people to have as many children as they want. More than 45% of inactive prime-age women cite care responsibilities as a reason for not participating in the labour market according to Labour Force Survey data. Studies for other countries show that the availability of subsidised childcare has a positive effect on female employment (Nollenberger and Rodríquez-Planas, 2015; Givord and Marbot, 2015). As an example, the fertility rate in Germany has started to rise from a low level, and research suggests that massive investment in childcare is a factor behind this (Haan and Wrohlich, 2011). Access to childcare services is improving and is quite good for 3-5 year olds – since 2014 the coverage for that age group has further increased to 84.8% – thanks to support from EU funds and government subsidies. Yet, it remains insufficient, in particular for the youngest children in rural areas and for women without tertiary education (Figure 25, Panel A). This is where the greatest efforts to extend coverage are needed, complemented with strengthened job-search assistance and training measures for women.

Figure 25. **Use of formal childcare is low, especially for children of less-educated mothers**



1. Data refer to children using centre-based services (e.g. nurseries or daycare centres and pre-schools, both public and private), organised family daycare, and care services provided by paid professional childminders, excluding those using unpaid informal services provided by relatives, friends or neighbours.
2. Or latest available year.
3. Potential mismatches between the enrolment data and the coverage of the population data (geographic coverage and/or the reference data used) may lead to overestimated or underestimated enrolment rates.

Source: OECD (2017), *OECD Family Statistics* (database).

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Children of lower-educated parents would benefit particularly strongly from high-quality early childhood education, as it has been shown to yield considerable benefits for cognitive skills (Felfe et al., 2015). The decision to lift mandatory entry to primary school to seven and abandon mandatory pre-school education for five-year olds, has led to a

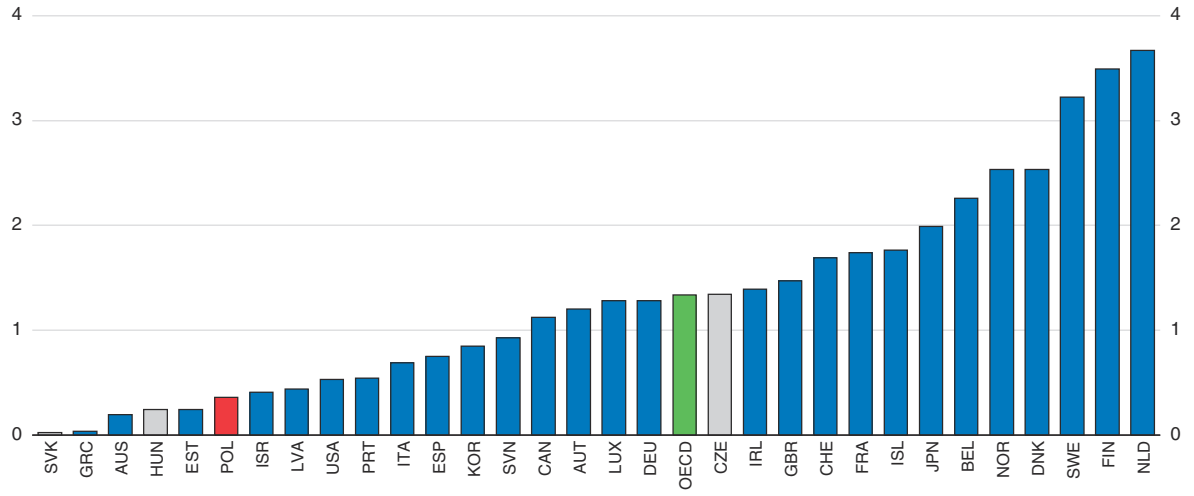
temporary drop in participation among 3-5 year olds (see also Table 7). Stepping up the expansion of available pre-school and childcare places and reaching out to parents who may be unaware of the benefits of early childhood education and care could improve the education results of children from disadvantaged backgrounds throughout their lives and prevent insufficient availability of early childhood education and care from constituting a barrier to female activity. Plans to increase financing for early childhood education are welcome. Developing long-term-care facilities for the elderly will also be crucial to allow parents to better reconcile work and family obligations and ensure access to care. Currently long-term care is provided predominantly by family members with very little institutional support. Formal care provision is very scarce, reaching less than 5% of the dependent population, and public funding is low (Figure 26). There are few opportunities to work part time in Poland. Hence, campaigns to inform recruiters about the advantages of part-time work and ways to manage this could be useful. Illustrative OECD simulations suggest that increasing spending on childcare and long-term care services by 2% of GDP by 2030, bringing it near to the OECD average, combined with an increase in the pension age to 65 for both men and women, could increase GDP quite substantially (Table 3 above) through higher employment. The child tax credit and means-tested family benefits that have been maintained after the introduction of the new child benefits could be transformed into childcare service support to make such a reform more feasible from a fiscal standpoint and reduce the complexity of support for families.

Table 7. **Past OECD recommendations on labour market policy**

Main recent OECD recommendations	Actions taken since the 2016 *Survey*
Strengthen labour law enforcement, and further align contributions on civil- and labour-law contracts.	Social contributions on the most common civil-law contracts were increased to the amount applying to the minimum wage, and some civil law contracts are now subject to an hourly minimum wage.
Increase the statutory pension age, as previously planned. If early retirement is allowed, it should be at the same age for men and women and at actuarially neutral rates. Remove the prohibition to lay off workers less than four years before retirement.	The pension age was lowered back to 65 for men and 60 for women.
Implement easier foreign credentials recognition and validation of experience and skills acquired abroad. Engage actively with the diaspora to advertise Polish investment, business and job opportunities. Provide information on how to come and work in Poland.	The migration strategy elaborated by the previous government was abandoned, and a new strategy has yet to be developed. The integrated qualifications framework adopted in 2016 in line with the European qualifications framework makes it easier to compare qualifications and competences across countries.
Continue to expand access to early childhood education and care, particularly for poorer families.	Places in early childhood education have increased further, but the enrolment rate of 3-5 year-olds in pre-school fell temporarily following the decision to increase the mandatory school age to 7 and abandon mandatory pre-school education for 5 year-olds in 2016. It was made mandatory for 6 year olds, though. Bigger government subsidies for preschool education introduced from January 2017 and new regulations introduced from September 2017 increased substantially available places for children in preschool institutions. Funding for the development of childcare institutions will rise in 2018.
In addition to childcare services develop long-term care services, and move towards individual taxation only.	Some cities are experimenting with childcare vouchers, and the central government and EU regional funds provide subsidies to help local governments and private institutions develop childcare for children under three.

Figure 26. **Poland's public spending on long-term care is low**[1]

As a percentage of GDP, 2015[2]



1. Refers to total public expenditure reported as related to either health or social long-term care under the System of Health Accounts definitions.
2. Or latest available year.

Source: OECD (2017), *OECD Health Statistics* (database).

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Making the best of migration and improving job quality

Connecting to the Polish diaspora to advertise interesting job and business opportunities in Poland (Table 7) and facilitating integration of foreign migrants can also help alleviate the pressures from ageing and labour shortages. Annual emigration flows have stabilised at about 1% of the working-age population. At the end of 2016 about 2.5 million Poles were living outside Poland for more than three months, mostly in the United Kingdom and Germany (Statistics Poland, 2017c). The current inflow of Ukrainians is partly offsetting these demographic developments, but many work in professions that do not match their often high qualifications; better foreign credentials recognition will be needed to provide for good skills matches and to address shortages in higher-skill professions. As the strong inflow of Ukrainians may not be sustained, opening up to workers from a wider set of countries is desirable, but this will require access to language training for workers and to education from a very young age for their children (Table 7). This is not ensured, given that Poland's immigration experience is recent, and the migration strategy abandoned in 2017 has not yet been replaced. It will be crucial to develop a new strategy as foreseen in the Strategy for Responsible Development.

Requiring only a simple declaration of intent to workers from neighbouring non-EU countries for short assignments makes Poland one of the most open countries in the OECD. Abuse of the simplified procedure is widespread according to the trade unions, which report dozens of complaints every day from Ukrainian workers who came to Poland after having paid for what turns out to be a falsified declaration of intent to hire them. Setting up a system to monitor immigrant workers' skills and their willingness to stay in Poland beyond a short assignment would enable the government to better understand the impact of immigration on the labour market and develop policies to improve it.

The share of temporary contracts has been falling, but remains among the highest in the European Union (26%). These workers suffer from a wage penalty, and low job security and

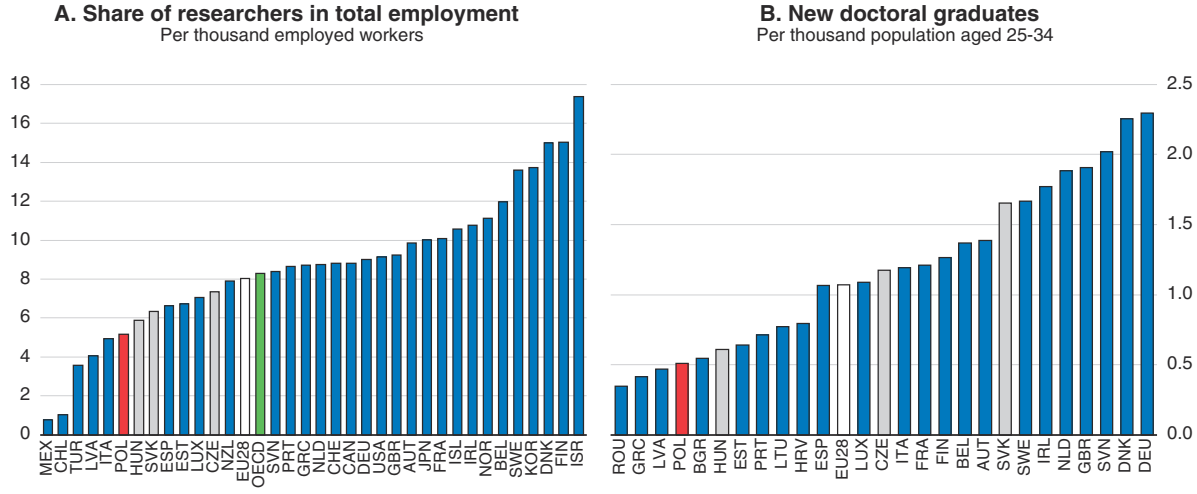
quality (Gora et al., 2017) compared to workers on permanent contracts with otherwise similar characteristics. More than 14% of temporary workers work on freelancing type of contracts based on general civil rather than labour law, which are not fully covered by social security benefits and workers' rights. The use of such civil-law contracts is often illegal, but employers' probability of being inspected over their use of such contracts is below 1% (Gora et al., 2017). Few infractions are fined, and the average penalty is low (OECD, 2016a). Hence, labour-law enforcement needs to be strengthened, as previous *Surveys* have argued (Table 7). Around 3% of workers have no written contact at all according to Labour Force Statistics. Statistics Poland estimates employment in the informal or hidden economy at 5%.

Investing in higher education and research

Strengthening funding, researchers' training and careers

There is room to improve the quality of higher education and research in Poland – the key ingredients to strengthen the economy's capacity to innovate and adopt new technologies. Academic research excellence and availability of researchers have been shown to stimulate the growth of local industrial R&D from both domestic and foreign sources (Abramovsky et al., 2007; Belderbos et al., 2014; Siedschlag et al., 2013). Poland has benefitted from an unprecedented tertiary education boom, but the quality of some of its higher education institutions and research output overall is weak by international standards despite notable improvements. The supply of researchers is low, but rising (Figure 27, Panel A). A draft law being prepared by the government is intended to address many of these concerns.

Figure 27. **The supply of researchers is weak, 2015**[1]



1. Or latest year available.

Source: OECD (2017), *OECD Research and Development Statistics* (database); European Commission (2017), *Research and Innovation Observatory – Horizon 2020 Policy Support Facility*, *https://rio.jrc.ec.europa.eu/en/stats*.

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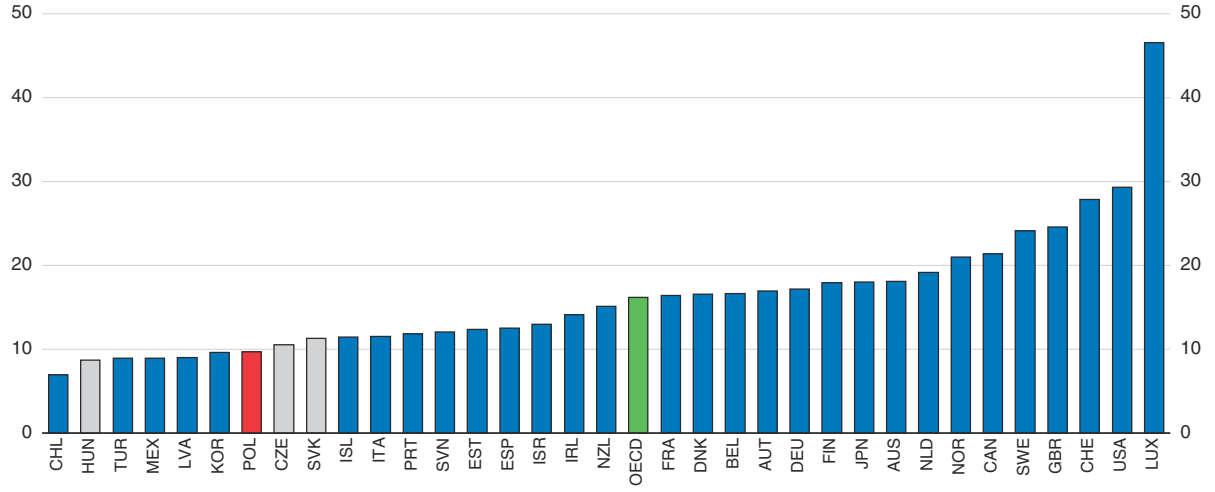
While spending on tertiary education has risen, it remains low in relation to the large number of students (Figure 28). A multi-year plan to increase funding linked to improvements in spending is needed. The sector is fragmented, with many small, specialised institutions. Building larger, more diversified universities through financially supported mergers might

Figure 28. **Tertiary education spending per student is low**

Thousand USD in PPPs, 2014



1. Spending for core educational services, ancillary services and R&D.

Source: OECD (2017), *OECD Education at a Glance 2017* (database).

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ensure a more efficient use of infrastructure and staff. With its envisaged higher education reform Poland wants to promote voluntary mergers with "federations" of higher education institutions as an intermediate step to full mergers. However, examples from other OECD countries, such as France, suggest that some element of compulsion may be necessary to make these mergers happen. Integrating the best public research institutes, which are currently independent and interact little with universities, would also help to make better use of experienced research staff and infrastructure and to build a number of highly ranked research universities, which are currently lacking. The government plans to award extra funding for a multi-annual period to the best performing universities. While this can be useful to build some strong research universities, this should not drain funding from higher education institutions with other important missions, such as vocational training.

The funding formula for higher education and research institutes provides incentives to take on large numbers of doctoral students without regard to quality. They are typically supervised by a single professor, many of whom do not produce high-quality research themselves. Structured doctoral training programmes are lacking. As a result, roughly half of Poland's doctoral candidates do not work on their thesis, and their graduation rate is low (European Commission, 2017c; Figure 27). Doctoral studies need tighter entry requirements and shorter duration, along with a more structured transmission of disciplinary knowledge and transversal skills. These programmes could be linked to competitively awarded doctoral fellowships. The government plans to develop more structured doctoral training with Ph.D. grant funding based on a competition and stricter requirements to award a doctoral degree. This could help foster effectiveness, mobility and collaboration among Polish and foreign universities, which are currently weak.

Criteria for the evaluation of higher education institutions by the Committee for the Evaluation of Scientific Institutions (KEJN) have to be better linked to quality, such as publication impact, rather than quantity, such as the number of publications and doctoral students. Continuing to allow higher education institutions to close down if they fail to

improve after several years of negative evaluations by the independent accreditation agency PKA is appropriate. Entitling PKA to conduct institutional assessments to help institutions improve rather than focussing narrowly on study programme evaluations would be helpful in that respect. The new graduate tracking system will be useful for such evaluations, as it will help improve transparency regarding the ability of higher education institutions to provide their graduates with good career opportunities.

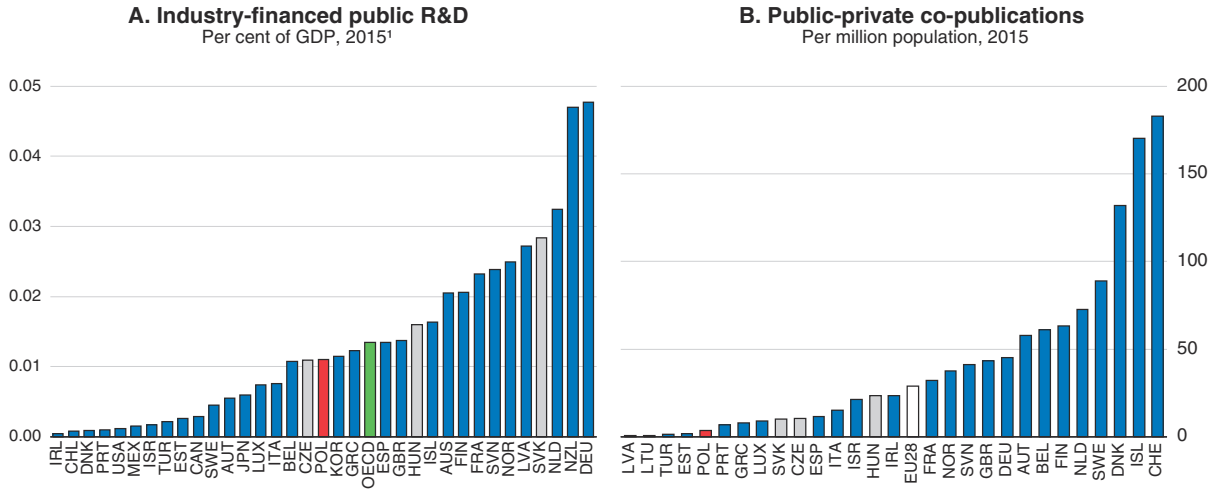
Employment conditions for young researchers in Poland are unstable, pay remains relatively low despite improvements, and conditions for doing research are not often attractive. As an example, even top departments for social sciences and humanities lack office space for post-doctoral researchers and sometimes even full professors, weighing on collaboration. Senior research staff enjoy high job security, independently of their research and teaching achievements. Reforms are needed to enable universities to offer well-remunerated entry-level positions for a limited but sufficiently long time to allow researchers to develop their work. This should be followed by a possibility to obtain a full professorship at the same university or elsewhere conditional on an evaluation of research quality and impact by both faculty members and independent experts, possibly also from other countries. Further pay and career progression should depend on similar review mechanisms. Making academic careers more attractive with pathways more similar to those found abroad would also help to attract the Polish research diaspora and foreign researchers, although grants for short stays at Polish universities are also required. The Polish government wants to promote academic exchange through a new dedicated agency. Providing sufficient flexibility to combine a career in research with family life, for example by lengthening the duration of entry-level contracts in line with family-related career breaks and postponing the final evaluation accordingly, will help attract and retain women. They are relatively well represented in lower-ranking positions, but become rarer with each step in the hierarchy.

Enhancing industry-science cooperation

The government wants to create better incentives to commercialise research results, since, in general, industry-science collaboration is weak in Poland (Figure 29). It intends to do so by giving more weight to successful commercialisation in institutional and individual evaluations determining research funding. First steps in this direction were taken in 2017, including with a new programme that promotes developing applied research as an employee in a company in collaboration with a highly-ranked university to obtain a doctorate degree. It should go further by allowing professors to work part-time on commercial activities, as well. Some university technology transfer offices are very active in helping local business to use their universities' know-how and research, but many such offices suffer from weak financing and difficulties in attracting and retaining qualified staff. A 2016 law stipulates that 2% of institutional R&D funding has to be set aside for research commercialisation. Merging them across universities that are close to each other would help reap economies of scale and stimulate research collaboration across institutions.

Most university assets, including intangibles, remain subject to public finance law, lengthening and complicating procedures. Since the market for innovations moves fast, this can severely impinge on chances for successful commercialisation. It reduces flexibility: one example is that research institutions cannot accept a lower price for their know-how in return for their business partners renting some of their laboratory infrastructure. The system has held back universities' cooperation with SMEs, in particular, as they often cannot afford the intellectual capital prices established through external

Figure 29. **Industry-science cooperation is weak**



1. Or latest year available.

Source: OECD (2017), *OECD Research and Development Statistics* (database); Eurostat (2017), *European Innovation Scoreboard 2017*, *http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en*.

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expertise, and they need simpler procedures. In many other OECD countries higher education and research institutions' intangible assets do not belong to the public finance sphere, offering more freedom of operations.

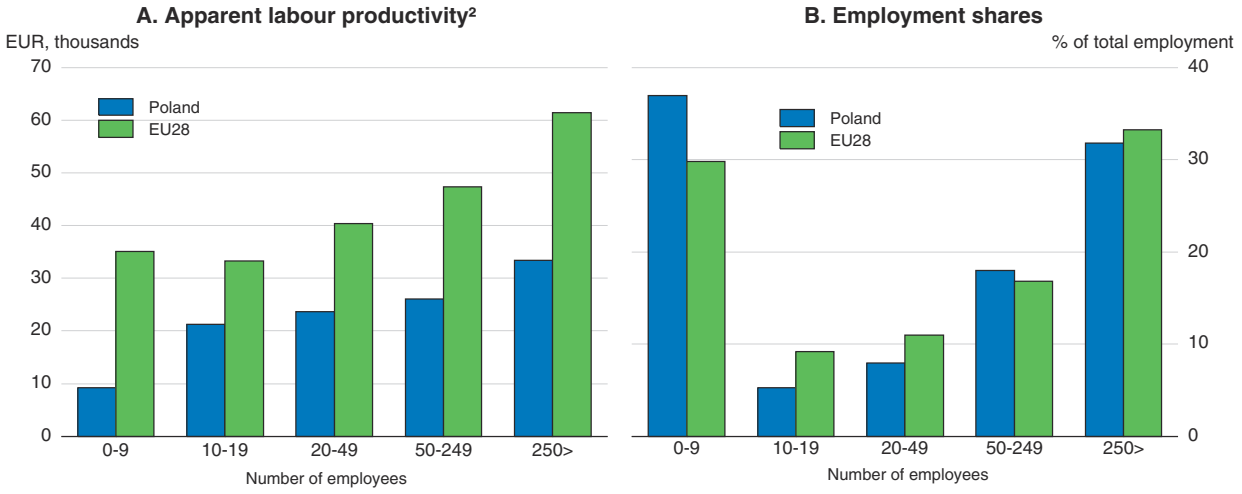
Investing in adult learning and vocational training

Enhanced education and training will be essential to help Poland's many small and relatively unproductive firms to become more efficient. Focussing on high-tech start-ups will not be enough to lift the performance of the Polish economy. Relatively unproductive micro firms operating in mature sectors employ a large share of the labour force, and they need support to modernise and improve their efficiency (Figure 30). Many adults have exceptionally weak literacy, numeracy and, above all, digital skills and struggle to understand even simple texts and basic algebra or use a computer. This also holds for managers (Figure 31). The shares of adults with no computer experience and of those who failed the core ICT test of the OECD Survey of Adult Skills (PIAAC) are among the highest in the OECD (OECD, 2016c). Training for their managers and the general workforce is needed.

The Polish government plans with the OECD to develop a skills strategy involving the whole government and stakeholders, including early-childhood and compulsory education, and this is welcome. Basic skills should feature high on this agenda, as Poland currently lacks a strategy to improve literacy and basic skills, which would help to lift economic opportunities and well-being for the poorest. There is insufficient awareness about such skills deficiencies and the need to develop relevant programmes. In Germany, France and the United Kingdom, basic-skills strategies feature information campaigns to raise awareness, specialised training measures for basic-skills trainers, partnerships with schools and employers to reach workers and parents with weak literacy, as well as training for job-search assistants and continuing-education teachers to identify clients with weak basic skills (OECD, 2016a). Basic-skills training combined with practical work experience in firms can be particularly helpful to motivate candidates.

Figure 30. **Labour productivity is low across all firm sizes**

2015, total business economy[1]



1. 2014 for EU28.
2. Gross value added per person employed.

Source: Eurostat; OECD (2018), *OECD Structural and Demographic Business Statistics – SDBS* (database).

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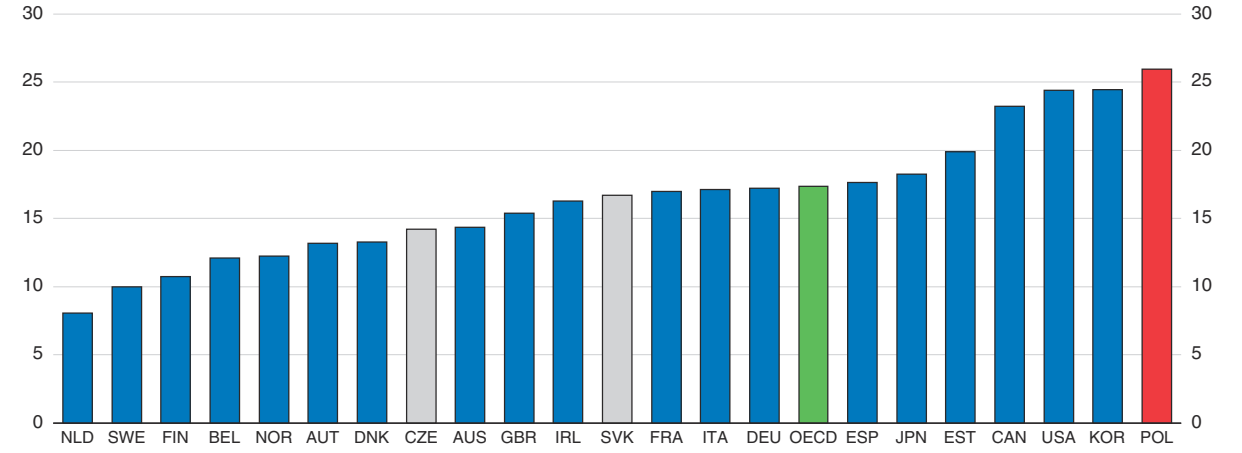
Figure 31. **Low skills are pervasive among Polish managers[1], 2012**

Low-skilled managers aged 20-65 with at least upper secondary education, per cent of total



1. Share of managers with at least upper secondary education scoring below level 2 in at least one of the PIAAC proficiency scales, i.e. literacy, numeracy and problem-solving in technology-rich environments.

Source: OECD (2013), *OECD Skills Outlook 2013* (database).

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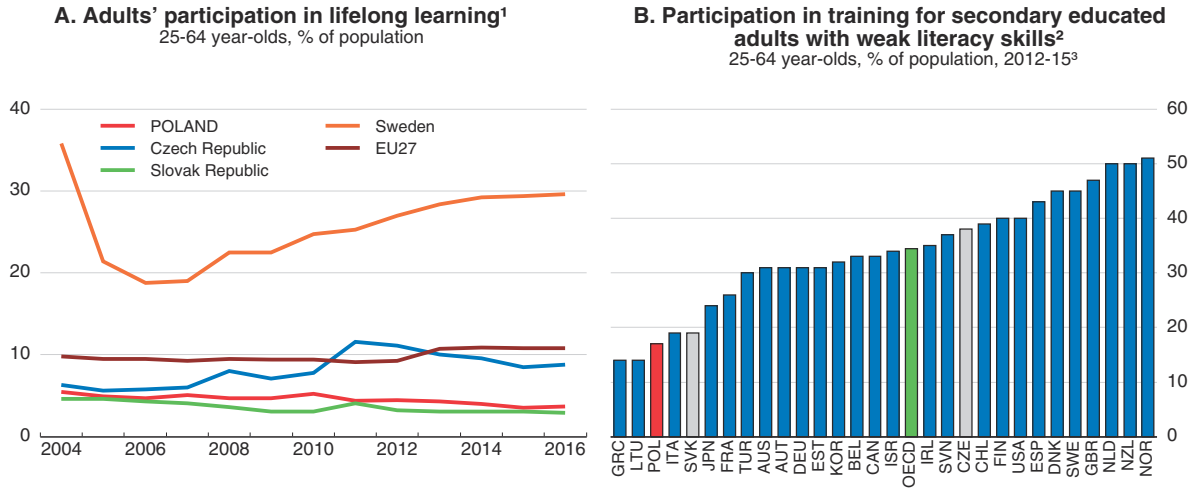
Participation in adult learning is low and has been declining over the last decade (Figure 32), particularly among older workers and the low skilled, who need it most. Data from the OECD Survey of Adult Skills reveal that more than 60% of Polish adults have no intention to participate in adult learning compared to 40% on average elsewhere. And while three-quarters of firms complain that they cannot find workers with the right skills, few show a willingness to invest in their employees' training (PARP, 2015). This may point to SMEs' lack of longer-term skills strategies and understanding of the benefits of training, but also to doubts about its necessity. The government should campaign to convince firms that without investing in training they cannot hope to find workers with the right skills.

Advertising successful examples, such as training programmes from a number of German investors in Poland (see Chapter 1), along with studies that point to the net longer-term gains from training investments (see, for example, BIBB, 2015), would be helpful. In 2016 the Polish Agency for Enterprise Development (PARP) started to certify providers of training and other enterprise support services, such as consulting and mentoring, through certified private accreditors, and this should become the norm to improve information available to potential trainees about providers' quality. The government's pilot project to build a network of local adult learning centres focussing on low-skilled and inactive adults with regular evaluations (Table 8) is an opportunity to raise quality standards.

Figure 32. **Adult participation in lifelong learning remains weak**



1. Percentage of 25-64 year-olds who participated in formal or informal training or education in the four weeks prior to the survey.
2. Access to formal and informal training of 25-64 year-olds scoring below level 2 in PIAAC's reading proficiency scale.
3. The data are based solely on Flanders for Belgium and England for the United Kingdom.

Source: Eurostat (2017), "Adult learning", *Eurostat Database*; OECD (2016), *Skills Matter: Further Results from the Survey of Adult Skills*, OECD Publishing, Paris.

StatLink http://dx.doi.org/10.1787/888933688247

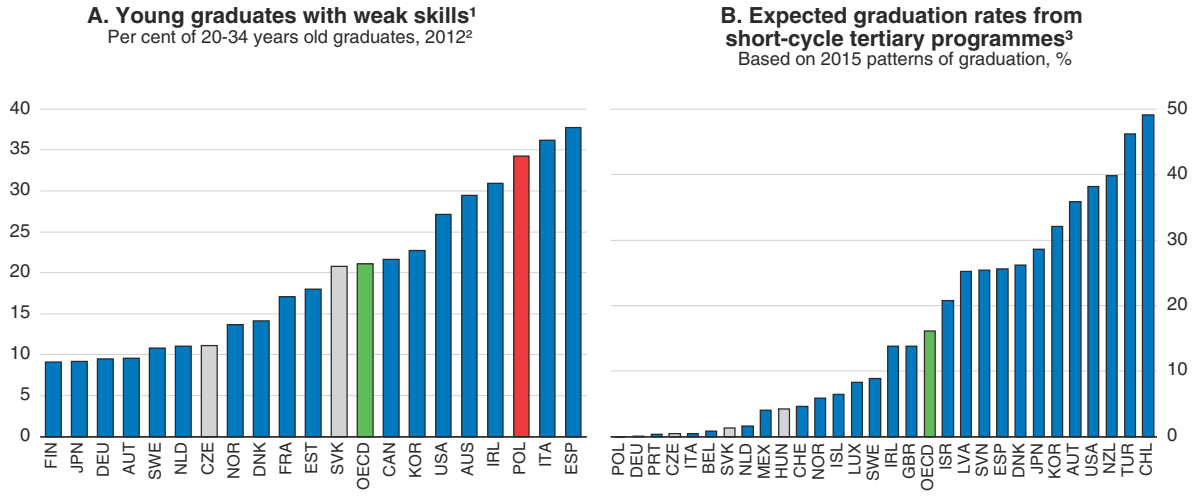
Table 8. **Past OECD recommendations to enhance skills**

Main recent OECD recommendations	Actions taken since the 2016 *Survey*
Link university teachers' pay and career prospects to their performance, and continue strengthening links with business and foreign universities.	University staff's pay has increased over recent years, and further increases are planned. In October 2017 the government established a dedicated agency to promote academic mobility and international cooperation of Polish higher education institutions (NAWA).
Continue to strengthen individual support for students in elementary and lower secondary education, and attract the best teachers to basic vocational schools, e.g. by improving their pay and career opportunities.	Caps on pay for practitioners to teach in vocational schools have been lifted in 2017.
Encourage more enterprises to offer work placements for vocational students.	PARP is setting up some sectoral skills councils with business representatives to define skills needs and develop strategies. Mandatory six-month internships have been progressively rolled out in vocational higher education institutions.
Develop a basic-skills strategy.	There is a pilot project to build a network for local adult learning centres (Lokalny Ośrodek Wiedzy i Edukacji, LOWE). Poland is cooperating with the OECD to develop a national skills strategy involving the whole government and stakeholders.

While the average reading, math and science skills of 15-year-old Poles is above the OECD average, basic vocational education at the secondary level suffers from a bad reputation and weak employer engagement. Many of the weakest students are in these schools, and enrolment has been declining for many years. A 2017 reform replaced basic vocational schools with so called sectoral schools offering a first professional qualification after three years and a second qualification after two more years, at which point there is the possibility to take matriculation (*matura*) exams opening the way to tertiary education, the same as in general upper secondary schools. A matriculation exam with more of an emphasis on practical skills in the students' vocational specialisation instead, akin to the Swiss *Berufsmatura*, would better correspond to the skill set of vocational students. This would require persuading employers to offer work placements, participate in programme design and exams in the spirit of apprenticeship systems in German-speaking countries. Given rising skills shortages, employers' interest in training workers has risen recently. The government is currently holding seminars with employers from a large range of sectors, including sectoral skills councils set up by PARP (Table 8), to identify the need for new training programmes and develop guidelines for schools and employers to work together, as there is little experience with such cooperation. Poland's numerous SMEs often shy away from the logistical difficulties and costs of setting up training. Australia's Group Training Organisations, which pool recruitment and placement of apprentices, quality control and management of employer responsibilities, could be a solution (OECD, 2016d). Offering rewarding pay and career prospects to attract teachers with strong pedagogical skills to vocational schools with opportunities to update their industry knowledge through part-time work will be essential to help weak students to progress, especially since a large part of the teaching workforce is set to retire (Table 8).

Better business engagement in vocational higher education is also needed. The share of young tertiary education graduates with literacy and numeracy skills at the limit of illiteracy is high (Figure 33, Panel A), indicating that too many youngsters enter university who would be better off with a more vocational orientation combined with basic-skills training. Public higher vocational schools are mainly located in former regional capitals. They suffer from declining student enrolment, a lack of short-cycle programmes with work-based learning opportunities (Panel B) and weak alignment with regional labour market needs. Most awarded degrees are in social and medical sciences, with graduates in the former in particular facing relatively poor labour market outcomes (European Commission, 2017c). The government plans more short-cycle programmes, but Poland also needs a strategy as to how to engage with employers to develop strong vocational programmes. Current plans to integrate internships that last at least six months into study programmes can be a useful first step, but full co-financing with business should be the ultimate goal, as in the Netherlands and Germany where business partners employ students throughout their studies. Such a model would best ensure alignment of study programmes with labour market demand and fit the needs and interests of less academically minded students. Higher vocational institutions could play an important role in offering adult learning and cost-effective distance- or blended-learning models to reach students in peripheral areas and from lower socio-economic backgrounds. They could also provide training and R&D opportunities for smaller firms in the region.

Figure 33. **Short-cycle tertiary programmes should be strengthened**



1. Share of 20-34 year-old adults scoring below level 2 of the PIAAC scale of numeracy proficiency.
2. The data are based solely on Flanders for Belgium, and England and Northern Ireland for the United Kingdom.
3. Net tertiary (first-time) graduation rates representing young people's expected probability of graduation from short-cycle tertiary programmes over a lifetime if current graduation patterns are maintained.

Source: OECD (2013), *OECD Skills Outlook 2013* (database); OECD (2017), *Education at a Glance 2017*, Table C3.3, OECD Publishing, Paris.

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Promoting innovation and investment

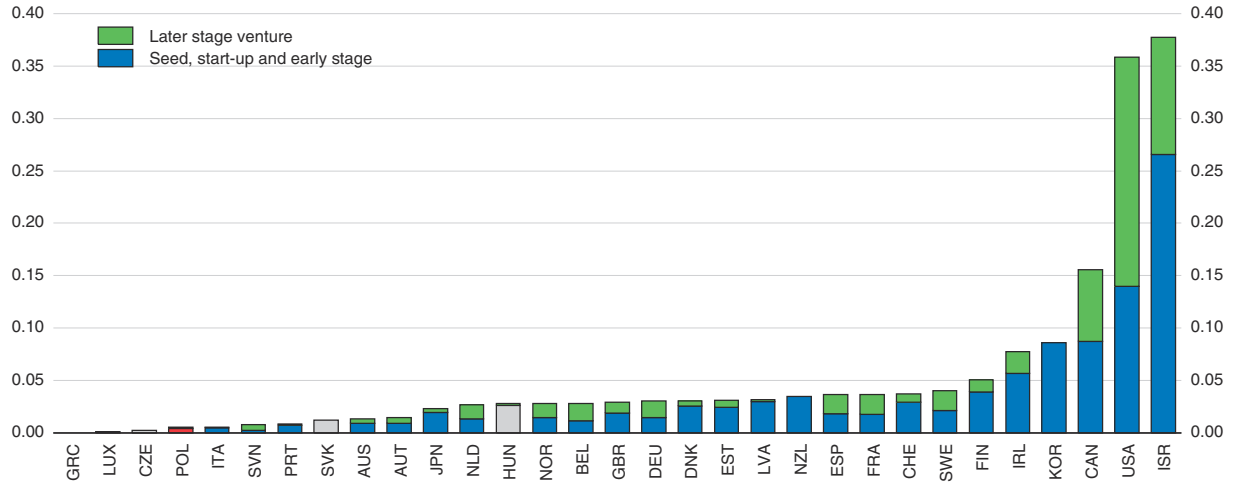
Improving the effectiveness of innovation support

The authorities are developing venture capital (VC) funding for young, innovative and risky firms, mainly through EU funds. VC funding will support innovative entrepreneurs at all stages of development. Heretofore VC funding has been rare in Poland (Figure 34). However, the sharp increase in Poland's available VC financing may not be matched by a sufficiently large pool of nascent high-tech firms. In the past much smaller VC support programmes had to be significantly scaled back owing to a lack of viable projects. Both the quality of research output (see Figure 6) and the supply of researchers (see Figure 27) are much stronger in the United States and Israel, the OECD countries with the strongest VC base, than in Poland. Thus, investing in higher education and research is a necessary prerequisite for developing the VC market. The Innovation Council, which since 2016 has brought together Ministers to coordinate innovation policies, should evaluate the effectiveness of the programme as planned and, should available funds exceed demand, consider re-assigning some to support for lower-tech innovations and small innovative firms. While a committee connected to the Innovation Council meets on a weekly basis, often inviting business representatives to discuss particular topics, getting more systematic input from the public to the Council through full membership of private sector representatives could help better inform its perspective and facilitate the development of effective policies. Productivity commissions from several OECD countries, such as Australia, Denmark and New Zealand, have private sector members (Banks, 2015).

The government has increased R&D tax allowances to 100% for all firms from 2018 (and up to 150% for research centres), up from 30-50%. This is welcome, as public support for business R&D has been low (Figure 35). The list of eligible costs, which has created much confusion leading to a low take-up, will be extended and clarified (Deloitte, 2016). To ensure effectiveness, clear information for taxpayers and consistent treatment of R&D tax

Figure 34. **Venture capital investment is very low in Poland**

As a percentage of GDP[1], 2016[2]



1. Only the value of total venture capital investments is available for Korea and New Zealand.
2. Or latest year available.

Source: OECD (2017), *OECD Entrepreneurship at a Glance 2017*, OECD Publishing, Paris.

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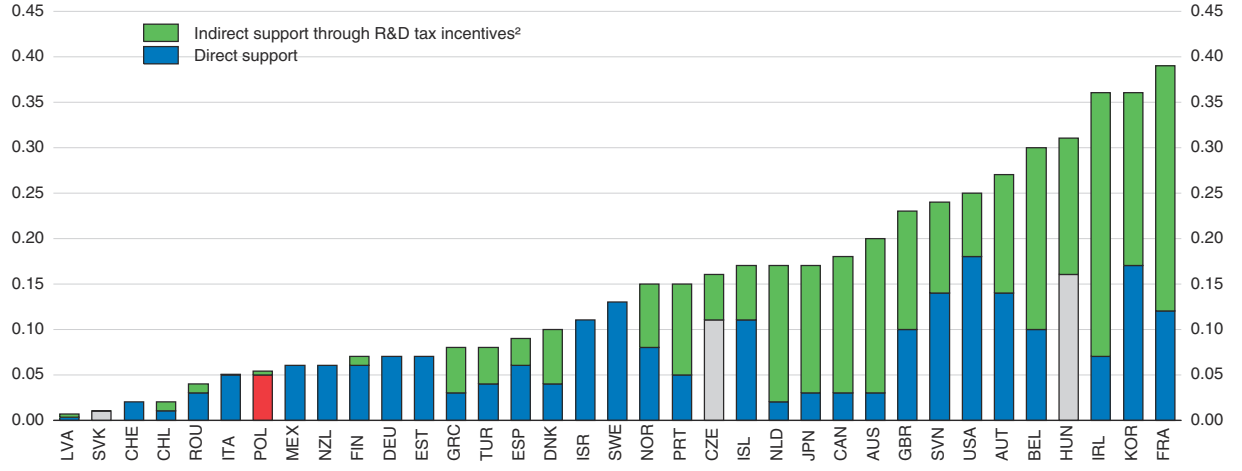
Figure 35. **Public support for business R&D is low**

As a percentage of GDP, 2014[1]



1. Or latest available year.
2. Indirect support refers to PLN 284 million CIT tax exemptions granted for innovation activities in 2014.

Source: OECD (2015), *OECD Science, Technology and Industry Scoreboard 2015* (database).

StatLink http://dx.doi.org/10.1787/888933688304

claims are needed. A centralised review of claims along with continued training of tax administration personnel would be helpful in this respect. The draft bill envisages that the tax allowances can be carried forward for up to six years. This is meant to help small and young innovative firms, which typically make losses initially and suffer from liquidity constraints. Yet, should the take-up for these firms still be low, the authorities should consider adjusting its provisions (e.g. by making cash refunds more generally available and not just to the youngest companies) to boost private R&D spending.

The grant system for innovation needs to become better at steering funds towards the most innovative projects, including in small enterprises. The system should be used to support high-risk, long-term research or specific domains where innovation leads to the development of public goods (Appelt et al., 2017). However, in the past many programmes offered grants for buying fixed assets, which typically entail little or no spillovers. Long and complicated application procedures and often confusing information about them constituted an unsurmountable barrier for many SMEs (Kapil et al., 2013; NIK, 2016). The government has reduced paperwork and moved to digital applications. To prevent promising projects from failing because of formalities it is considering completely abandoning formal criteria as an initial filter. Instead, it would work on formalities with candidates with promising projects in the substantive phase and hold more face-to-face interviews so that applicants can explain their ideas in person. These are welcome steps. It should also consider providing regions, which administer a large share of innovation support financed by EU funds, with technical help to develop clear and effective guidance for applicants. This could be through the National Centre for Research and Development (NCBiR), which has a good track record in this respect. Further developing PARP's database with certified mentoring and consulting services to help firms apply for funds and implement their ideas would also be useful. OECD experience suggests that a brokerage service bringing together SMEs and research partners could improve the take-up of the innovation voucher programmes, which would allow small firms to buy R&D services (OECD, 2010b). At the moment, firms have to publish their request for support from a research institution on a public competition database, a demanding task for SMEs, which should be re-assessed jointly with the European Commission, which set this requirement.

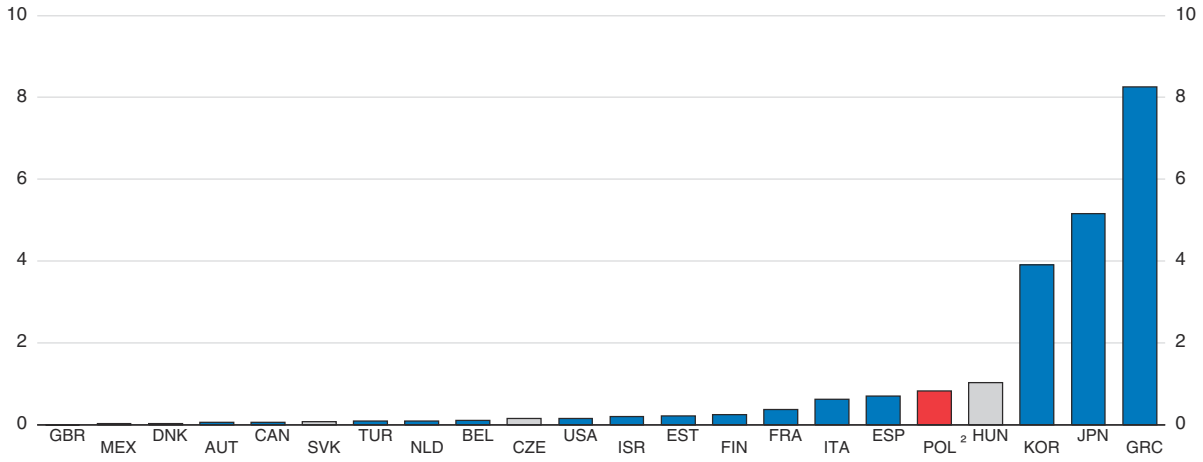
Enhancing the investment framework

SMEs' access to finance has improved in recent years, and the share of Polish SMEs citing access to finance as their most important concern stood at 7% in 2017, in line with the EU average (European Commission, 2017d). As in other OECD economies loan guarantees from the government are the most common policy tool to facilitate SMEs' access to finance. Overall, loan guarantees amounted to about 0.8% of GDP in 2016, among the highest in OECD countries (Figure 36). The biggest programme, the "*de minimis* guarantee", administered by the state-owned bank BGK, was introduced as a temporary measure in 2013 as the economy slowed down, but it is being turned into a permanent programme. A survey conducted by BGK in 2017 shows that 11% of firms would have obtained a comparable loan without the guarantee in place and 18% of the firms declared that "it's hard to say" (BGK, 2017), suggesting that the programme could be better targeted. Yet, large guarantee programmes may induce bank forbearance – which can lead to the survival of low-productivity firms with adverse effects on long-run efficiency (Adalet McGowan et al., 2017) – and crowd-out alternative financing sources. As in other OECD economies (OECD, 2017d), a rigorous evaluation of the cost effectiveness of the existing programme is lacking and should be conducted. In that respect, making data available to third parties (including external researchers), as the US Small Business Administration does, would be helpful. If needed, the eligibility criteria of the programme should then be adjusted to ensure that it targets firms that are most likely to lack external financing options, namely smaller SMEs, and service-sector and innovative companies with knowledge-based but no tangible capital as collateral.

Boosting competition would also support investment. One channel could be through foreign direct investment (FDI). It would benefit from ensuring a level-playing field in all

Figure 36. **Poland makes extensive use of government loan guarantees for SMEs**

As a percentage of GDP, 2015[1]



1. Or latest available year.
2. 2016 data for Poland. They refer to PLN 13.9 billion of outstanding *de minimis* guarantees at end-2016 and PLN 1.59 billion of guarantees from local and regional funds.

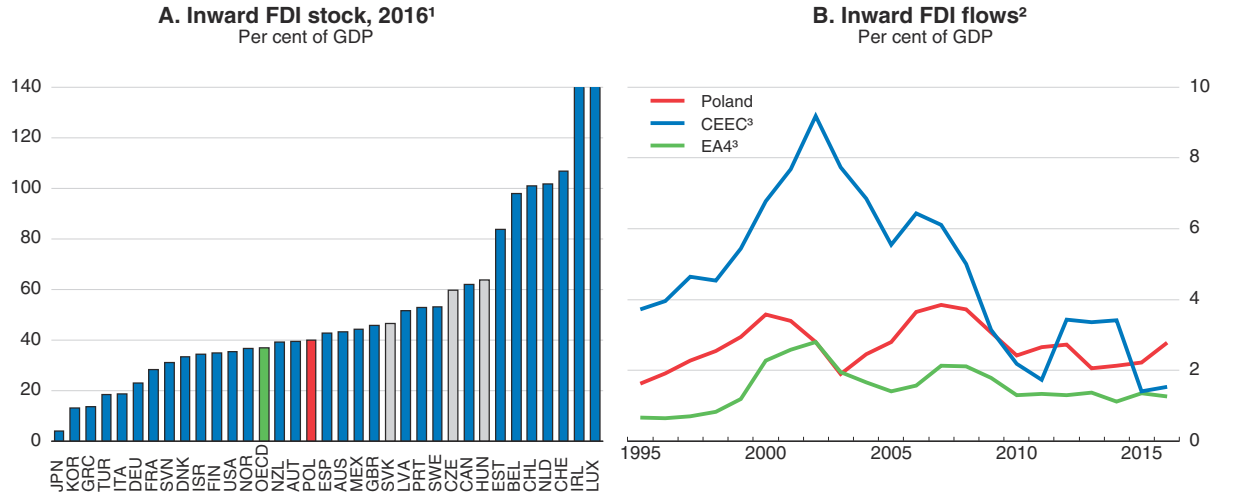
Source: OECD (2017), *Financing SMEs and entrepreneurs 2017, an OECD scoreboard*, OECD Publishing, Paris; NBP (2016), *Financial Stability Report*, December, Narodowy Bank Polski.

StatLink http://dx.doi.org/10.1787/888933688323

sectors of the economy and would strengthen technology transfers through multinational companies with potential innovation spill-overs to local firms. Until recently Poland received less FDI for its size than neighbouring countries (Figure 37), which can be partly explained by higher regulatory barriers (Figure 38). Moreover, the authorities have a wide scope for restricting mergers on public-interest grounds. Enhancing competition in services, for example by easing relatively restrictive entry requirements in legal, architecture and engineering services, which are key inputs to other sectors, would help boost exports and economic activity. The independence of the Competition Authority and sector regulators should also be strengthened (Table 9).

The government is in the process of reorganising tax relief for investments with a view to granting support depending on investment quality rather than location. Planned fiscal support includes a corporate income tax exemption for up to 15 years regardless of whether the investment is located in one of the country's special economic zones. The minimum size of investment spending required for eligibility will depend on local unemployment rates. There will also be qualitative criteria, which have yet to be defined by regulations. They may include investment in research or training and collaboration with local enterprises. The qualitative and quantitative criteria have been adapted to the capabilities of SMEs, so as to increase investment among this category of firms. If the situation of the state budget requires it, the draft bill foresees the possibility that the authorities can suspend offering tax relief for new investments. Clarifying the conditions under which support may be withdrawn would help alleviate regulatory uncertainty and maximise the investment boost from this policy. Some special economic zone management agencies have been very successful in helping investors to collaborate with local universities, vocational schools and enterprises to facilitate their investments in research, training and networking. Organising exchange of good practices among these management agencies will be crucial to attract high-quality investment to Poland. Furthermore, the government is amending the programme for

Figure 37. **Until recently Poland received less foreign direct investment than its CEEC neighbours**



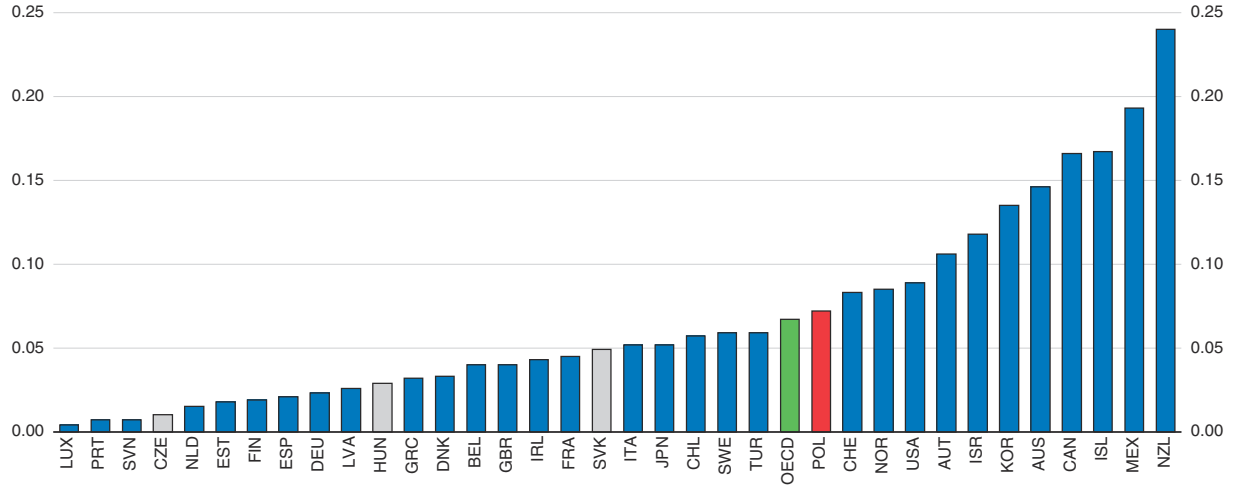
1. Or latest available year.
2. Three-year moving average; for each country considered, average annual FDI inflows measured in per cent of GDP have been by convention considered as nil in the limited cases of negative net balances (disinvestments).
3. EA4 is the average of Germany, France, Italy and Spain. CEEC is the simple average of Hungary and the Czech and Slovak Republics.

Source: OECD (2018), *OECD FDI Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933688342

Figure 38. **Regulatory restrictions on FDI could be eased further**

OECD FDI Regulatory Restrictiveness Index[1], 2016



1. Index scale of 0 to 1, from least to most restrictive.

Source: OECD (2018), *OECD FDI Statistics* (database).

StatLink http://dx.doi.org/10.1787/888933688361

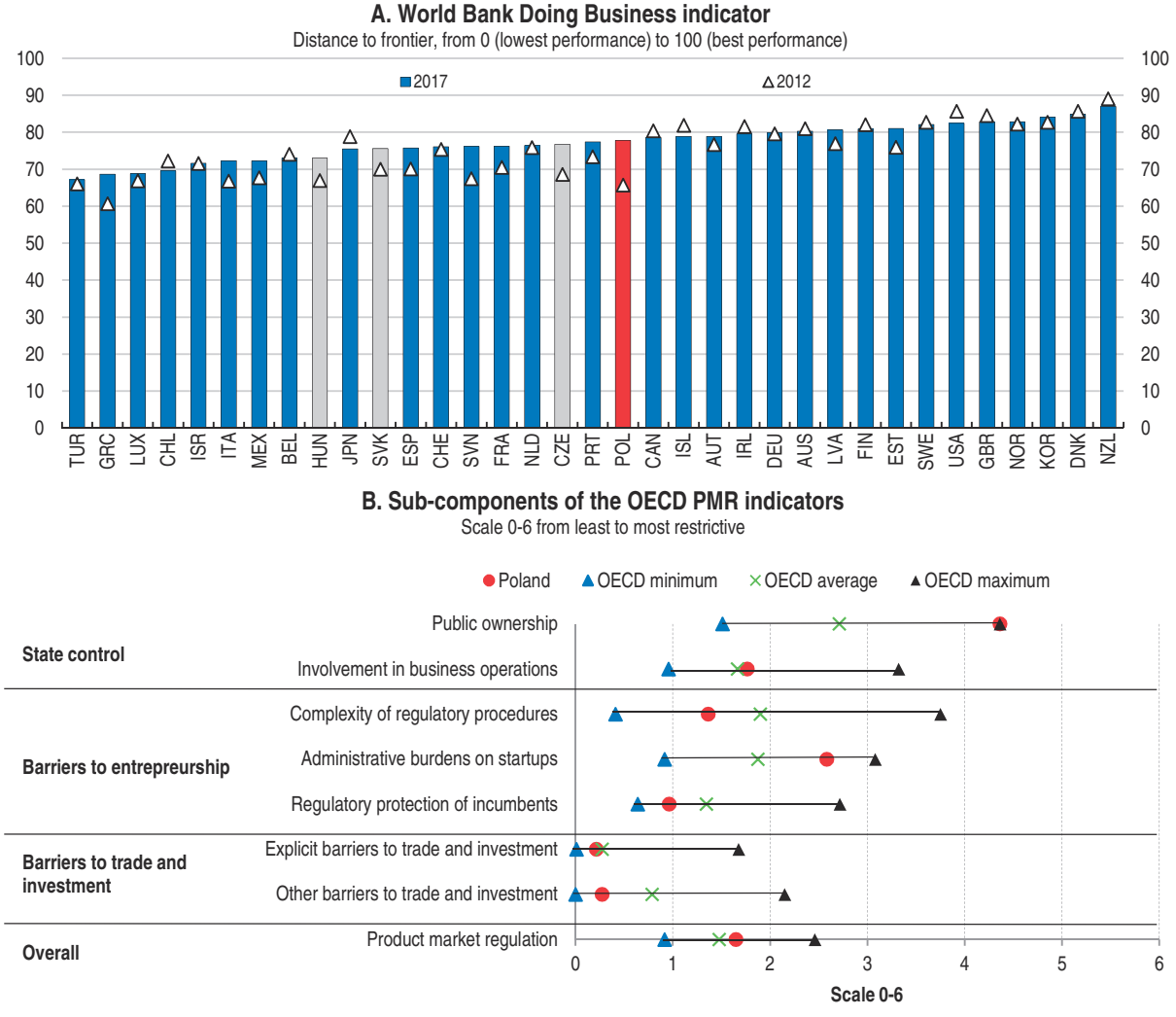
supporting investments of major importance to the Polish economy. Support will be dedicated to investments of Polish and foreign companies that will be crucial for increasing innovation and competitiveness of the economy.

Poland's performance in the World Bank's Ease of Doing Business index has improved (Figure 39, Panel A), but Poland's ranking in the OECD's product market regulation indicator is penalised by the heavy state involvement in the economy (Panel B). State-owned enterprises (SOEs) play a large role in important sectors of the economy that are subject to

Table 9. **Past OECD recommendations on improving the investment framework**

Main recent OECD recommendations	Actions taken since the 2016 *Survey*
Streamline business registration procedures, and monitor the impact of the recent reform of insolvency law.	The government is streamlining business regulations. Key measures include an increase in the annual income eligible for the status of small taxpayer to EUR 2 million (from EUR 1.2 million). Micro firms with a turnover below 50% of the minimum wage will no longer be required to register, and start-ups will be exempted from social contributions in the first six months and will benefit from lower social contributions thereafter for up to two years. Ministries will be required to publish simple explanations of administrative rules and tax laws, and observing them will be considered compliance with the law.
Introduce fixed-term, non-renewable mandates for the President of the Competition Authority and all sectoral regulators, during which they cannot be dismissed without fault, and prevent revolving-door opportunities. Pursue privatisation in competitive sectors.	The government bought stakes in two banks through the state-controlled insurance company (PZU). As a result, the share of Polish banking assets under state control has increased. Combined with the tax exemption on government bond holdings by banks, this has strengthened linkages between the sovereign and the banking sector, increasing vulnerability and potentially limiting competition.

Figure 39. **The business environment is improving, but the State's presence remains pervasive**



Source: World Bank (2017), *Doing Business 2018* (database), the World Bank Group, Washington, DC; OECD (2017), *OECD Product Market Regulation Indicators* (database).

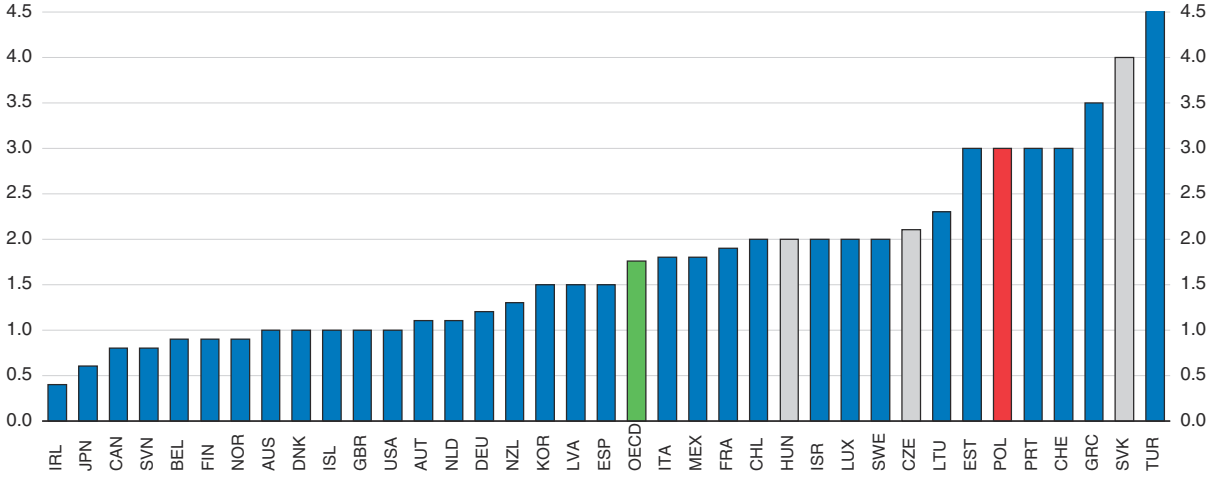
StatLink http://dx.doi.org/10.1787/888933688380

regulation, including in utilities and financial sectors. To avoid discouraging private investment in these sectors, adhering to the OECD Guidelines on Corporate Governance of State-Owned Enterprises is essential. In that respect the move to attribute SOE supervision to the ministries that are also in charge of sectoral regulation (with limited oversight from the Prime Minister's office) risks creating conflicts of interest, as limiting competition can help the government increase the earnings of the enterprises it owns. It would also be useful to assess whether state ownership is necessary in all cases. When there are no obvious market failures, privatisation would be advisable and extensions of state control inappropriate as they distort competition. For example, the share of state-controlled banks has increased following the recent purchases of stakes by the authorities in two large banks, and it now represents close to 40% of banking sector assets, which is unusually high among OECD economies.

Faster and efficient insolvency procedures could boost productivity-enhancing capital reallocation (Adalet McGowan et al., 2017). The 2016 corporate insolvency reform was a significant improvement, with new restructuring procedures helping to avoid unnecessary bankruptcies. A dedicated tribunal in charge of firm restructuring was also put in place, and a register of bankruptcies is set to operate as of 2018. However, bankruptcy procedures remain lengthy and complex (Figure 40), slowing down resource reallocation. The objective set out in the government's Strategy for Responsible Development to lower the duration to two years by 2030 is not sufficiently ambitious. Court clerks (*referendarz*) could be allowed to tackle small non-litigious cases to free up judges' time (World Bank, 2013). Promoting out-of-court settlements, possibly by developing mediation, could also speed up the court system. Developing special insolvency procedures for SMEs, akin to those found in other OECD countries, is warranted, as they are frequently unable to cover the costs of formal insolvency proceedings.

Figure 40. **Bankruptcy procedures are lengthy**[1]

Number of years, as of June 2017



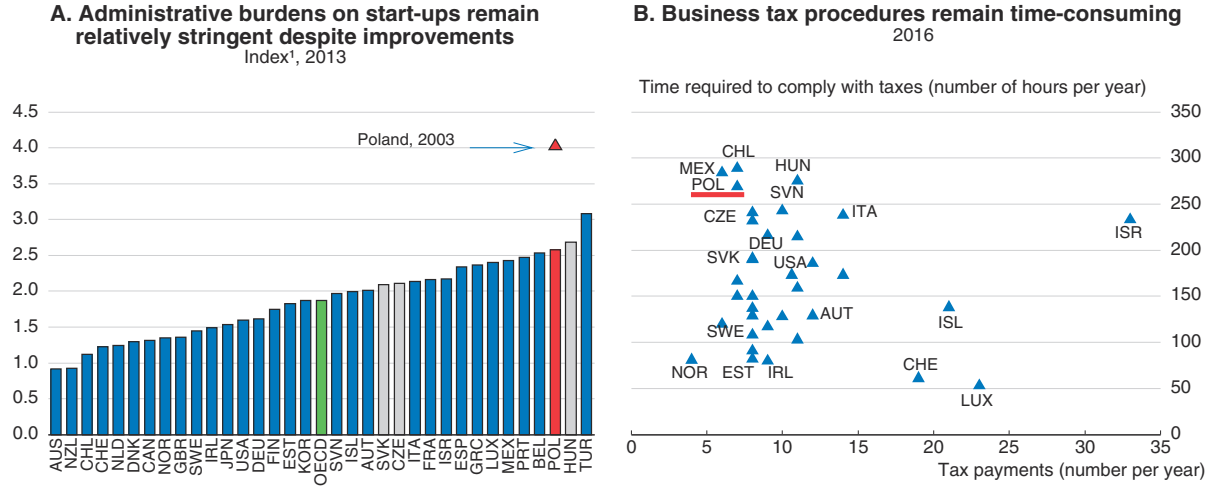
1. Period from the company's default until the payment of some or all of the money owed to the bank.

Source: World Bank (2017), *Doing Business 2018: Reforming to Create Jobs* (database), the World Bank Group, Washington, DC.

StatLink http://dx.doi.org/10.1787/888933688399

Administrative barriers to firm entry are high despite improvements, and tax procedures remain time consuming (Figure 41). The government's "100 changes for business" and "business constitution" programmes introduce business simplification measures and aim

Figure 41. **Setting up a business and paying taxes remain onerous**



1. Index scale from 0 to 6, from least to most restrictive.

Source: OECD (2017), *OECD Product Market Regulation Indicators* (database); World Bank (2016), *Paying Taxes 2017* (database), the World Bank Group, Washington, DC.

StatLink http://dx.doi.org/10.1787/888933688418

to improve the clarity of tax regulations (Table 9). The authorities are also, however, in the process of gradually implementing a ban on Sunday trading. This should be carefully weighed against its possible negative employment effects (Genakos and Danchev, 2015). Further simplification efforts should concentrate on eliminating remaining hurdles to opening a business and facilitating paying taxes, including through better collaboration between the tax authorities and small businesses as the time required to pay taxes for Polish SMEs is the third highest in the European Union (European Commission, 2017e). But simplification should also take into account environmental and social effects. Eliminating the need for building permits for one-storey outbuildings and sheds is questionable in that respect, as Poland already suffers from substantial urban sprawl.

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ANNEX

Progress in structural reform

This Annex reviews actions taken on recommendations from previous Surveys *that are not covered in tables within the main body of the Assessment and Recommendations. Recommendations that are new in this Survey are listed at the end of the relevant chapter.*

Product and financial market competition

Recommendations	Action taken since previous *Survey* (March 2016)
Modify public procurement practices to select the contractors offering the best value for money rather than the lowest price. Focus procurement decisions on a mix of prices and technical bid details, including environmental impact assessments. Enhance staff skills to deal with complex selection criteria.	The Public Procurement Office is collecting data to assess the environmental, social and to some extent innovative aspects of public procurement, but without performing impact evaluation analyses.
Make the judicial environment friendlier to class actions in cases of competition breaches. Accelerate the functioning of the judicial system to shorten the time between the Competition Authority's decisions and a final court decision in antitrust cases.	Two laws passed in 2017 facilitate the use of class actions. First, a law passed on 21 April 2017 regulates the liability in case of infringement of competition in civil proceedings. Second, a law passed on 7 April 2017 amended previous acts to facilitate debt enforcement so as to make class actions more available and efficient.
Reduce anti-competitive pressures resulting from the participation of Polish Airports State Enterprise (PPL) in many airport entities, and consider long-term concession agreements or privatisation for airport entities. Privatise the national air carrier (LOT).	No action taken.
Deepen financial development through a consolidation of co-operative banks and an improved legal framework for collateral.	The Polish Financial Supervision Authority recommends a consolidation of cooperative banks.

Fiscal policy and the budgetary framework

Recommendations	Action taken since previous *Survey* (March 2016)
Improve tax compliance, and cut tax expenditures. Simplify tax regulations. Reinforce the monitoring and enforcement of the tax system. Eliminate the preferential regimes for the self-employed, and link their social security contributions to their actual earnings. Broaden tax bases by introducing cash registers for all professional services to improve VAT collection and by significantly tightening eligibility for the lump-sum income tax. Extend the social insurance contribution base to uncovered earnings. To improve tax compliance set up strong central management for the tax authority, improve coordination, invest in ICTs and focus more resources on auditing large taxpayers.	Additional revenues are being generated through better tax compliance from VAT and CIT. This reflects a set of measures designed at preventing tax fraud in intra-EU fuel trade, a new system for monitoring of the road freight transport of specific goods (e.g. fuel and tobacco), and a detailed automated analysis of tax accounts. The tax and customs administrations were merged into the National Revenue Administration. Poland is gradually broadening the use of cash registers to cover more and more goods and services and is also working on an online cash register system.

Labour market

Recommendations	Action taken since previous *Survey* (March 2016)
Allow the public employment services to hire more skilled staff, and ensure that overall resources are better allocated to front-line placement tasks. Promote the adoption of best practices through performance management and benchmarking of providers.	No action taken.
Rationalise ALMPs by focusing more on job-search assistance, career guidance and work schemes having a high training content. Improve job-seeker profiling. Reduce passive social assistance by making more transfers (such as childcare subsidies) conditional in part on being employed or seeking work. Expand the scope of private employment services.	Under EU-funded operations, social assistance institutions are setting up monitoring tools for their programmes to improve job seekers situation on the labour market and their social situation.
Consider merging local labour offices with unemployment benefits and social assistance administration to create a one-stop shop and more fundamentally to integrate the management of those activities. Enhance coordination and automatic exchange of information between local labour offices, firms, assistance centres and education institutions.	Under EU-funded programmes, the social assistance administration and local labour offices are obliged to cooperate to better address their clients' needs and potential.
Refrain from increasing the minimum-to-average wage ratio. Consider differentiating the minimum wage across regions depending on local labour-market conditions. Reduce wage rigidities by bringing the effects of age and education on public-sector wages closer to private-sector standards.	The minimum wage increased by 8.1% in January 2017 and 5% in January 2018 so that the projected minimum-to-average wage ratio is expected to be broadly stable in 2017-18.
Consider introducing an earned-income tax credit to marginal groups' work incentives.	No action taken
Eliminate pre-retirement schemes, and prevent disability pensions from becoming attractive relative to old-age pensions. Remove the prohibition to lay off workers less than four years before retirement. Scale back survivors' pensions to reduce the labour tax wedge.	The possibility to obtain disability pension after reaching pension age was abolished since 1 December 2017.

Recommendations	Action taken since previous *Survey* (March 2016)
Promote the employment of people with disability by: reducing the employment quota of 6% and raising the penalty for firms failing to reach the revised level; and better training and activating workers with disabilities.	No action taken.

Health care

Recommendations	Action taken since previous *Survey* (March 2016)
Broaden access to care and reduce inequality by: targeting extra resources at shortening waiting lists; extending dental services covered by public insurance; introducing co-payments on medical services while imposing a means-tested cap on the level of out-of-pocket payments; and increasing transparency of dual physician employment in the public and private sectors.	The government adopted a law that came into effect on 1 January 2018 to increase public healthcare spending by 2025 to 6% relative to GDP two years earlier. From 2016, the programme Medicines 75+ has provided access to free medicines for patients over 75 years old.
Improve the allocation and use of current resources by: shifting resources from hospitals to primary and long-term care, potentially by integrated health-care delivery models; strengthening the gate-keeping role of primary medicine; providing clearer incentives to hospitals to make them respect their financial commitments and rationalise the use of their resources; promoting the development of hospital management skills; and streamlining the responsibilities of the NFZ and central and local governments.	Key measure amending the health care system include: ● Change in the primary healthcare organization system (POZ) based on the Act on primary health care (POZ) which entered into force in December 2017; ● Introduction of hospitals network (HN) operating since October 2017; ● Introduction of the Healthcare Needs Maps for hospital care (in April 2016) and for 30 disease groups (December 2016 and December 2017).
Develop a comprehensive strategy to address growing long-term care needs. Avoid labour shortages in the health-care sector by: training more staff; improving retention, particularly through better management policies and delaying retirement; enhancing re-integration in the health workforce of those who have left it; adopting a more efficient skills mix by enhancing the role of advanced practice nurses and physicians' assistants; improving productivity, in particular by linking pay to performance; and developing targeted immigration policies.	Solutions implemented to tackle labour shortages in the healthcare sector include an increase in the number of places available for medical students by nearly 1500 and the adoption of the Act on the minimum salaries for health-care employees. Moreover, as of 2017 a dialogue between the Minister of Health, graduates of medical studies, nurses and midwives as well as trade unions is conducted to improve the effectiveness of healthcare personnel management.

Thematic chapters

Chapter 1

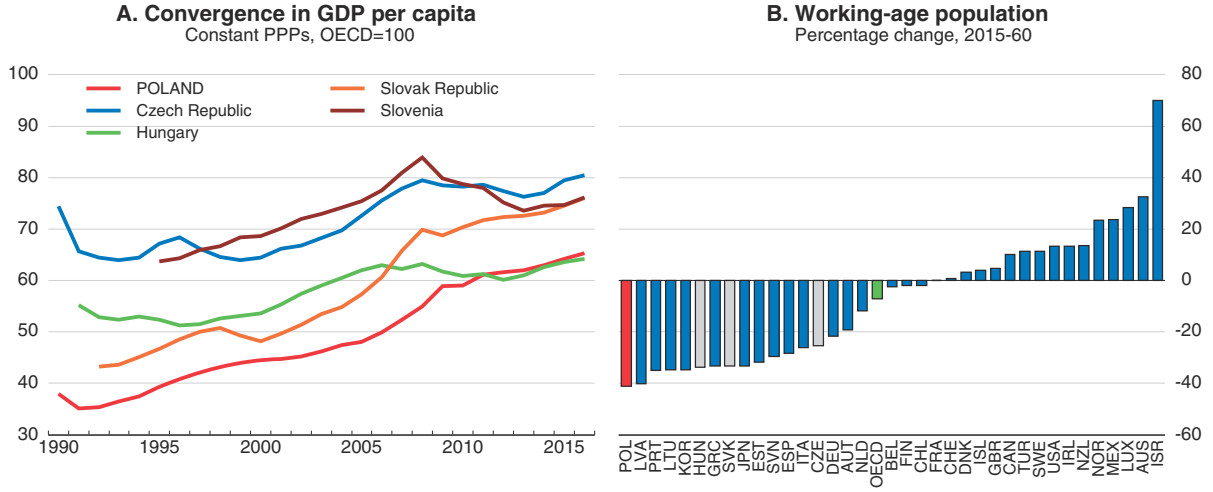
Strengthening innovation in Poland

Poland's catch up with other OECD country has been largely based on productivity growth resulting from restructuring towards more productive sectors and foreign technology absorption. The economy's own innovation capacity is relatively weak, with low investment in research and development, no tradition of commercialising research and very limited innovation activity within firms. The government plans a higher education reform to strengthen the quality of research output, science-industry cooperation and international collaboration, which are all weak. Considerable EU funding is available to support innovation. Most of it is conditioned on science-industry co-operation, which is showing initial benefits. A lively start-up scene is gradually emerging, and the government foresees considerable public support for venture capital financing. Yet, investment in higher education and research trails behind economies that have been able to build strong science and high-tech start-up activity. Poland's many small and medium-sized enterprises have particularly low productivity, partly related to weaknesses in vocational training and adult education, as too many workers have weak basic and digital skills. The government's education reform and digital strategy address some of these issues.

Introduction

Poland is experiencing robust economic growth, and the catch-up with average living standards in OECD countries over the past 25 years has been impressive (Figure 1.1, Panel A). However, strong economic performance has been largely based on the production and export of relatively low-technology goods. GDP per capita still stood around 30% below the EU28 average in 2016. The working-age population is falling, and a recent decision to lower the retirement age will exacerbate the resulting pressure on the labour force (Panel B). Strong productivity gains are therefore needed to sustain increases in living standards.

Figure 1.1. **Poland's per capita income is converging, but a challenging demographic decline lies ahead**



Source: OECD (2017), *OECD National Accounts Statistics* (database); United Nations (2017), "World Population Prospects: The 2017 Revision", Department of Economic and Social Affairs, United Nations, New York.

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Over the past 25 years, productivity gains were achieved mainly by moving workers from agriculture to more productive sectors and by adopting foreign technologies. To strengthen productivity gains Poland now needs to invest more in its own capacity to innovate, allowing firms to modernise their organisation and production procedures, adopt new technologies and products and adapt them to the local market. This will require investment in higher education and research along with efforts to strengthen weak industry-science cooperation, but also engagement of higher education institutions with the wider society. High-quality science will be essential to lift currently low business research and development (R&D) spending and promote the creation and growth of more innovative enterprises. Enhanced basic-skills training and more business engagement in vocational education is also needed, as it would allow Poland's numerous low-productivity micro-enterprises to improve their performance.

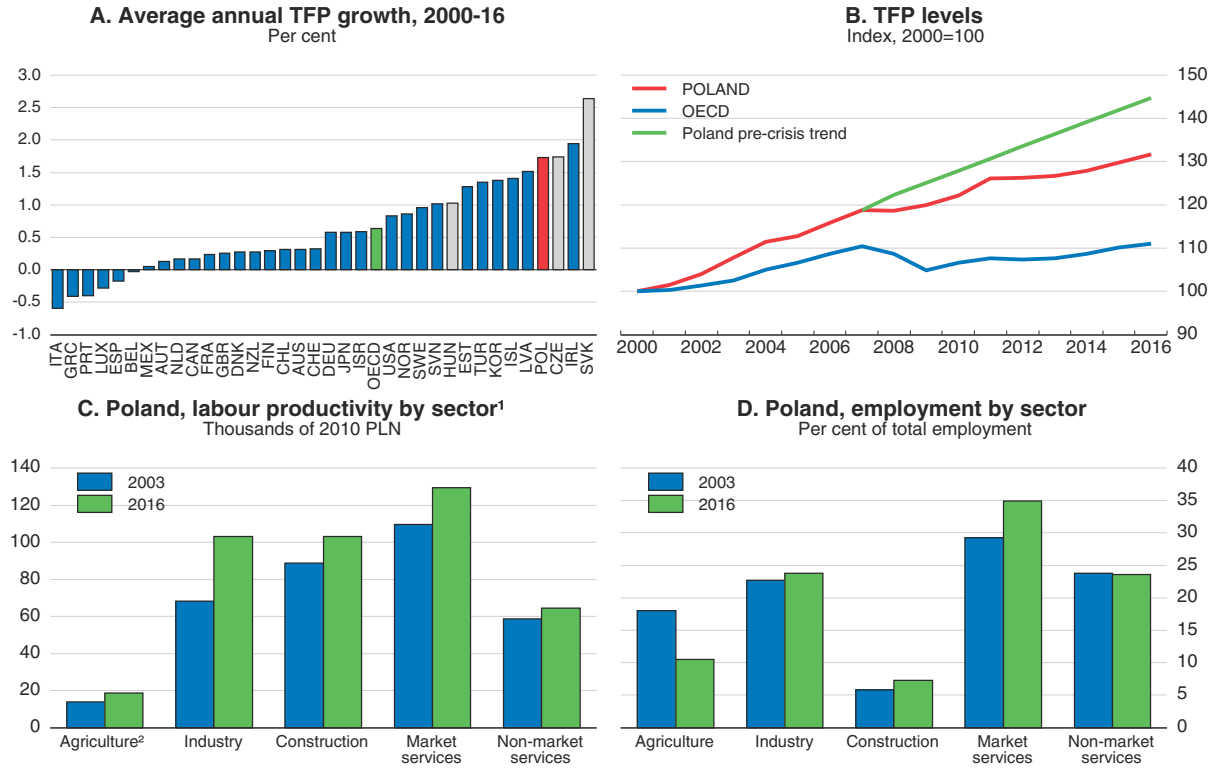
This chapter is organised as follows. The next section discusses Poland's innovation system, productivity and innovation outcomes. Thereafter, policies to strengthen higher education, research and its commercialisation are discussed. The final section reviews policies to strengthen entrepreneurship, ranging from foreign direct investment over high-tech start-up activity to policies promoting productivity in more mature small and medium enterprises (SMEs), notably through vocational education and training.

Poland's capacity to innovate needs to be strengthened

Productivity growth has slowed down

As in other central and Eastern European countries (CEECs), total factor productivity has grown more rapidly than in other OECD economies since 2000. Yet, there has been a slowdown that started before the 2008 financial crisis (Figure 1.2, Panels A and B). Flows of labour and capital from low-productivity sectors, mainly agriculture, to higher-productivity market services and industrial sectors has contributed to aggregate productivity growth (Panels C and D). A favourable tax and social security regime for the agricultural sector continues to retain too many workers in small, low-productivity farms, while the employment share in high-tech sectors and ICT-intensive industries remains relatively low (Figure 1.3, Panel A and B). So there is still potential to shift labour and capital to more productive activities. Yet, to strengthen productivity growth in the long term, allowing for higher living standards, efforts to improve efficiency within companies and sectors are needed, as well.

Figure 1.2. **Productivity growth has been strong, with industrial restructuring as a key factor**



1. Labour productivity is defined as value added per worker.
2. Latest observation refers to 2015.

Source: OECD (2017), *Economic Outlook: Statistics and Projections* and OECD *National Accounts Statistics* (databases).

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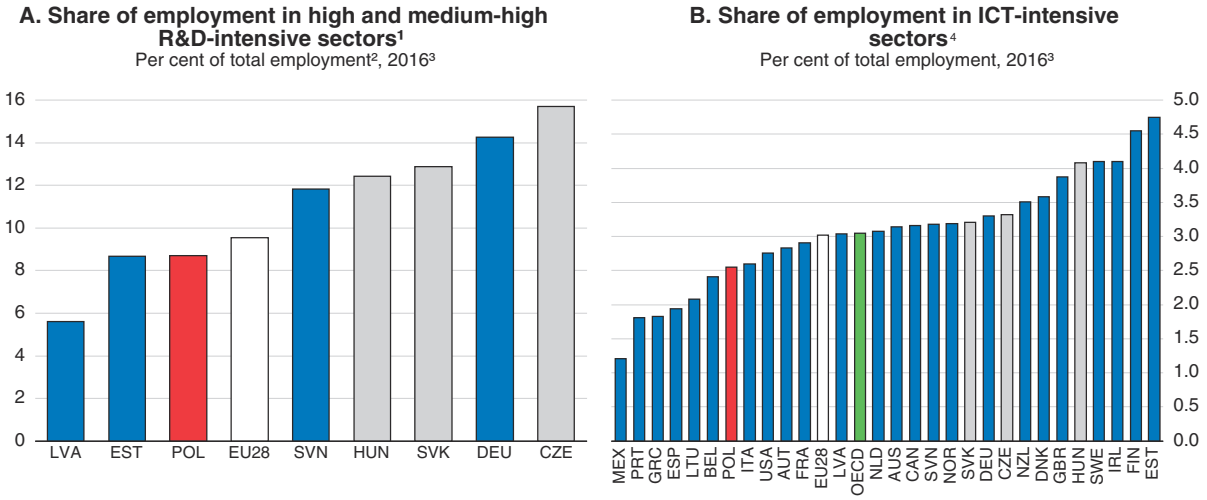
Figure 1.3. **The employment share in more innovative industries is relatively weak**



1. R&D intensity is measured as the ratio of ISIC Rev.4 industries' intramural R&D expenditure to industries' gross value added; high and medium-high R&D-intensive sectors are identified based on the taxonomy proposed in F. Galindo-Rueda and F. Verger (2016), "OECD Taxonomy of Economic Activities Based on R&D Intensity", *OECD Science, Technology and Industry Working Papers*, 2016/04, OECD Publishing, Paris.
2. Excluding public administration, defence and compulsory social security, education, human health and social work activities.
3. Or most recent year available.
4. The ICT-intensive sector is defined as the sum of ISIC Rev.4 industries 26, 58, 61 and 62-63.

Source: OECD (2017), *OECD Research and Development Statistics* and *National Accounts Statistics* (databases).

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The productivity gap with other OECD countries is considerable, particularly so for the smallest enterprises (Figure 1.4, Panel A). Only in manufacturing is there some catching up with larger firms whose productivity growth has been relatively slow (Panels B and C). Enterprises with less than 10 employees make up 95% of all firms in Poland and employ more than a third of all workers. Boosting their efficiency and promoting their growth is key to strengthening the economy overall.

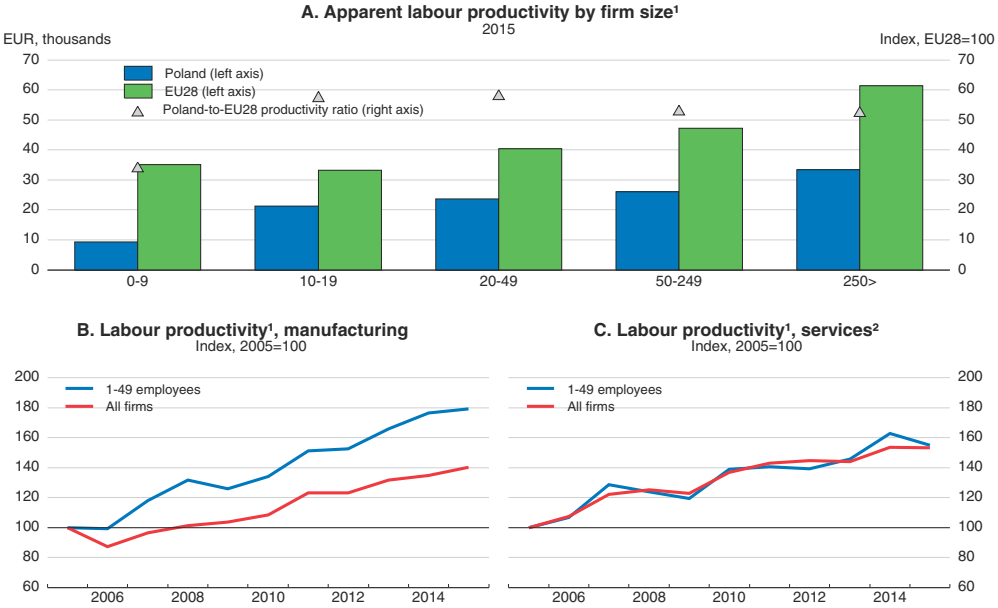
Innovation investment, output and demand are weak

In line with Poland's position as a technology follower spending on innovation has been dominated by investment in existing technologies rather than genuine inventions. The share of innovation expenditure for acquiring existing machinery, equipment or software is high, although even here the level is relatively low. Investment in R&D overall remains relatively low in relation to GDP, but business R&D has increased rapidly lately. The share of innovative firms is comparatively low, and unlike in other CEECs, this also holds for the largest firms (Figure 1.5).

Low business R&D spending is pervasive. Poland specialises in sectors where firms tend to do relatively little R&D. The value added shares of construction, trade and the food and beverages industries, where R&D investment is low, are significantly higher than in other European countries. In turn, the value added share in most manufacturing industries with high R&D intensity is relatively low. But sector-specific R&D intensities are also comparatively low, both in high- and in low-tech industries (Figure 1.6).

Foreign companies contribute less to R&D-spending than in neighbouring countries. Foreign direct investment is reasonably high in R&D-intensive sectors, but less so than in a number of neighbouring countries with similar GDP per capita. In the R&D sector itself it is

Figure 1.4. **Labour productivity is relatively low, particularly among microenterprises**



1. Gross value added per person employed.
2. Refers to 2-digit items from 45 to 82 of the ISIC-Rev.4 classification.

Source: Eurostat (2017), "Annual enterprise statistics by size class for special aggregates of activities", *Eurostat Database*; OECD (2017), *OECD Structural and Demographic Business Statistics – SDBA* (database).

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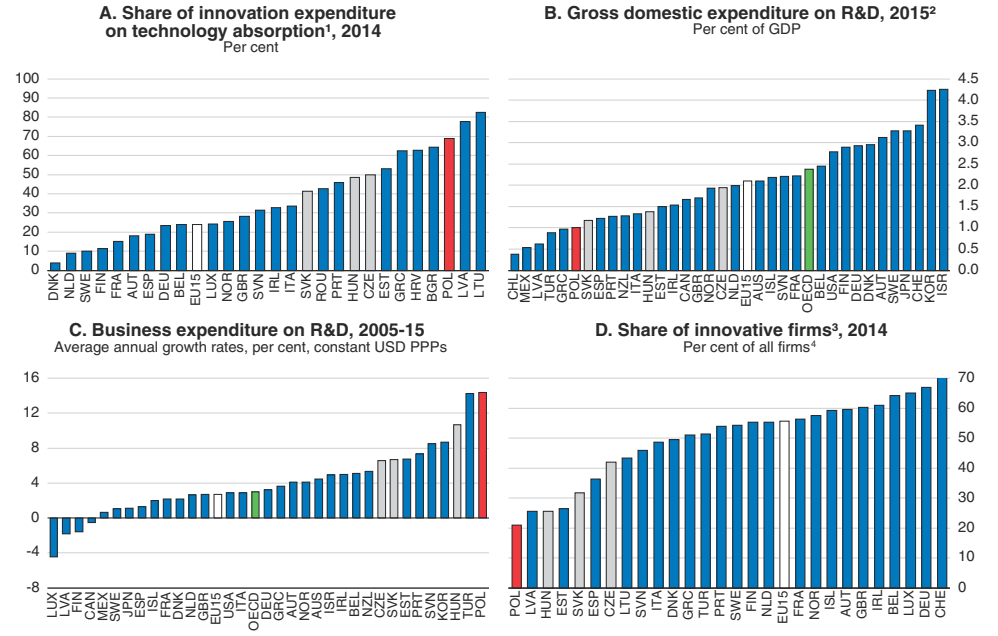
Figure 1.5. **Spending on innovation is low and mainly aimed at existing technologies**



1. Share of machinery, equipment and software acquisition in total innovation expenditure.
2. Or latest year available.
3. Firms having implemented a new or significantly improved product (good or service), process, new marketing or organisational method in business practices, workplace organisation or external relations.
4. Excluding agriculture and non-market services.

Source: Eurostat (2016), "Community Innovation Survey (CIS) 2014", *Eurostat Database; OECD (2017), Research and Development Statistics* (database).

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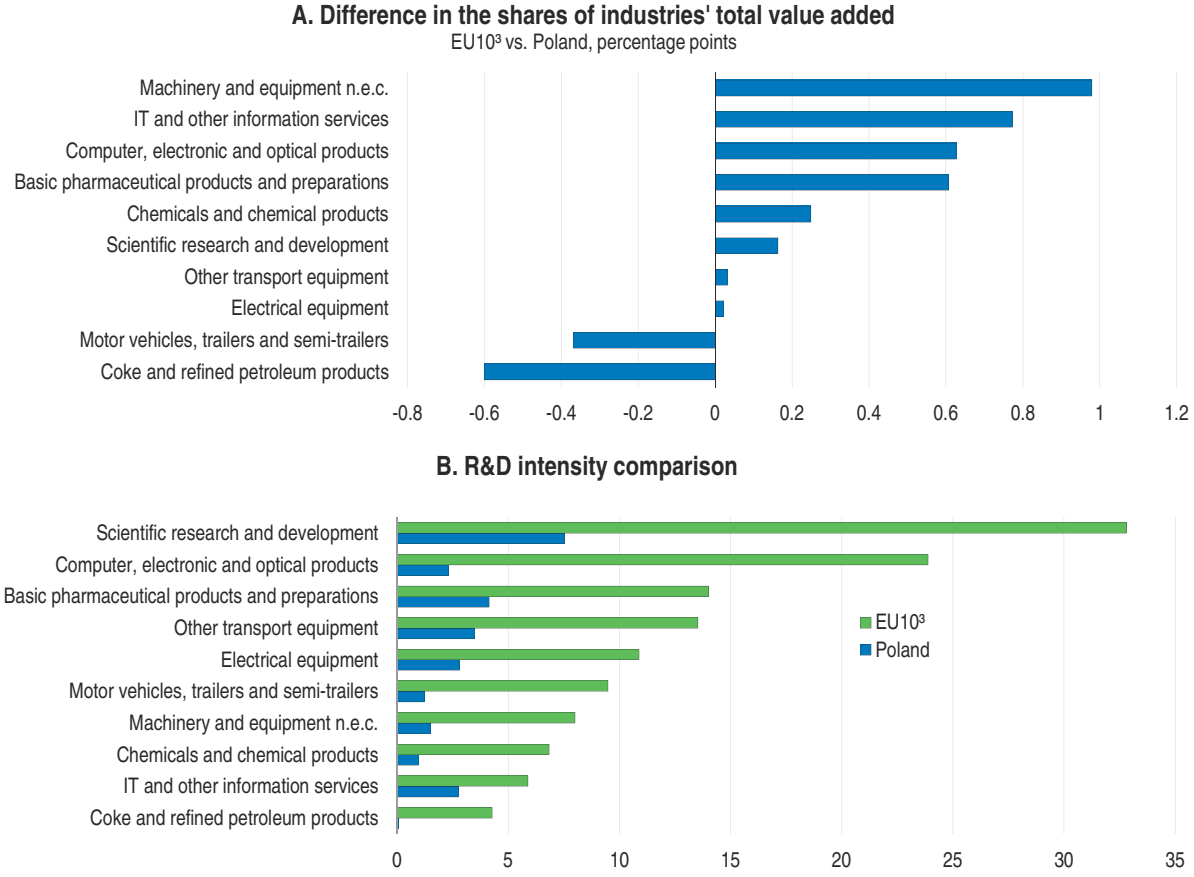
Figure 1.6. **The gap in R&D intensity with more advanced economies is pervasive**[1]

Top 10 most R&D-intensive industries[2] in EU10[3], average 2010-13



1. R&D intensity by industry is defined as the ratio of industry's R&D expenditure to the industry's gross value added.
2. Divisions of the ISIC-Rev. 4 classification.
3. EU10 refers to the simple average of sectoral shares across Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain and Sweden.

Source: OECD (2017), *OECD Research and Development Statistics* and *National Accounts Statistics* (databases).

StatLink http://dx.doi.org/10.1787/888933688532

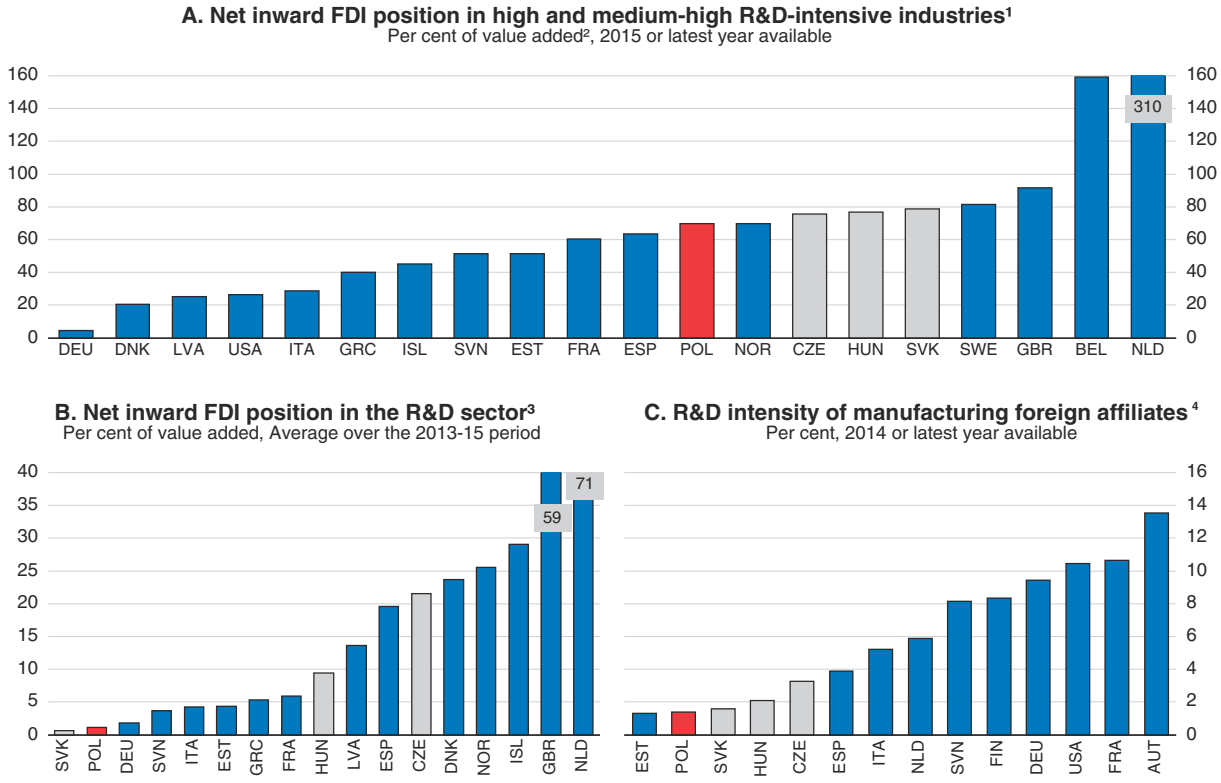
relatively low. Overall, R&D spending by the affiliates of foreign companies in manufacturing remains comparatively low, although it has been increasing (Figure 1.7).

Innovation output is weak. This is evidenced by the paucity of patent applications. The number of trademark applications abroad is also low (Figure 1.8). The share of Polish patents owned by foreign residents is relatively high, although less so than in some neighbouring countries.

The innovation system has been streamlined and coordination improved

Poland has moved to better coordinate its innovation policies, which should help improve efficiency. The bulk of support for innovation, entrepreneurship and SMEs is financed by EU funds; around 20 billion euros are foreseen in the 2014-20 financing period for regional and central government programmes focussing mainly on stimulating innovation. In the past responsibility for innovation was spread across many different ministries and public agencies with little coordination (Kapil et al., 2013). But in 2016 the government created a Ministerial Council for Innovation, which meets regularly to coordinate innovation

Figure 1.7. **Stock of inward FDIs in R&D-intensive industries**



1. High and medium-high R&D intensive sectors do not include electrical equipment (division 27 of ISIC's Rev.4 classification), for which data on net inward FDI positions are not available.
2. For Czech Republic and the Netherlands, industry coverage excludes pharmaceuticals (21); net inward FDI positions exclude those in chemicals and pharmaceuticals (20, 21) for Norway and Sweden, with the latter also excluding scientific research and development (72); data for the United States are based on manufacturing activities, excluding scientific R&D, publishing activities and IT services (72, 58, 62-63).
3. Division 72 of ISIC's Rev.4 classification, i.e. scientific research and development.
4. R&D intensity is defined as foreign affiliates' intramural R&D spending as a percentage of their gross value added.

Source: OECD (2017), *OECD FDI Statistics*; *OECD National Accounts Statistics* and *OECD Activity of Multinational Enterprises* – AMNE (databases).

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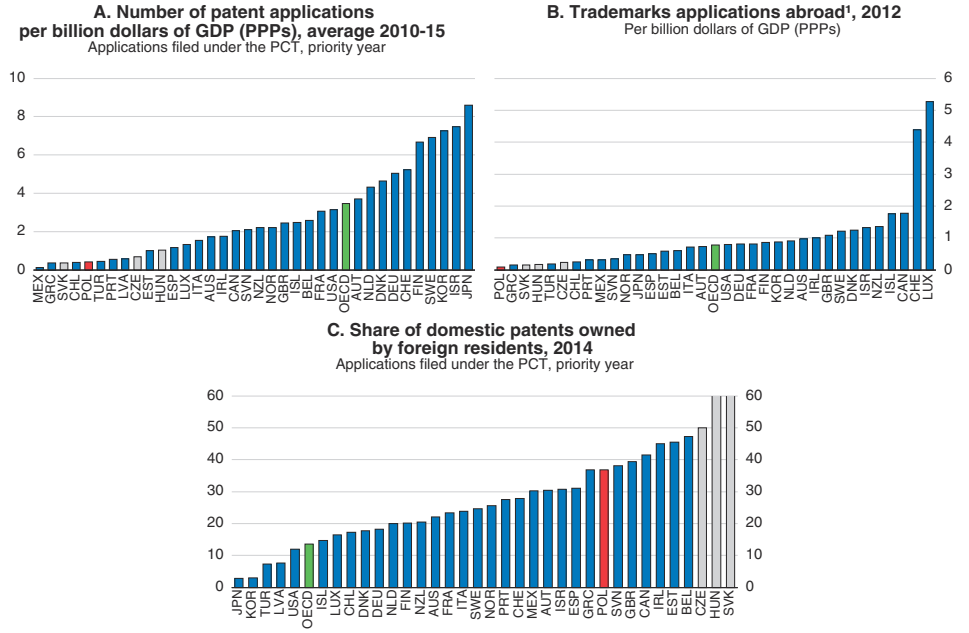
policy across ministries (see Table 1.1). The Polish Development Fund (Polski Fundusz Rozwoju, PFR) was remodelled in 2016 to become an umbrella organisation for the development bank (Bank Gospodarstwa Krajowego, BGK) and a number of government agencies responsible for SMEs (Polish Agency for Enterprise Development, PARP), export credits, investment promotion and industrial development. They now share a common logo and a single contact point. Their key innovation and investment support measures are bundled together in a few packages, each fit for a different stage of enterprise development. This should make it easier for firms to find support adapted to their needs, reduce administrative costs and enhance effectiveness.

There is now a clear assignment of responsibilities for research and development support. The National Science Centre (Narodowe Centrum Nauki, NCN) supports basic research, while the National Centre for Research and Development (Narodowy Centrum Badań i Rozwoju, NCBiR), specialises in applied research. Both are overseen by the Ministry of Higher Education and Research. The NCN mainly supports research at public Higher Education Institutions (HEIs) and the Polish Academy of Sciences (PAN), a large national institution with a focus on fundamental research. Private HEIs concentrate mostly on

Figure 1.8. **Patents counts and trademark applications are low**



1. Trademarks abroad correspond to the number of applications filed at the USPTO, the OHIM and the JPO, by application date and country of residence of the applicant.

Source: OECD (2017), *OECD Patent Statistics* (database); OECD (2016), *Science, Technology and Industry Outlook* (database).

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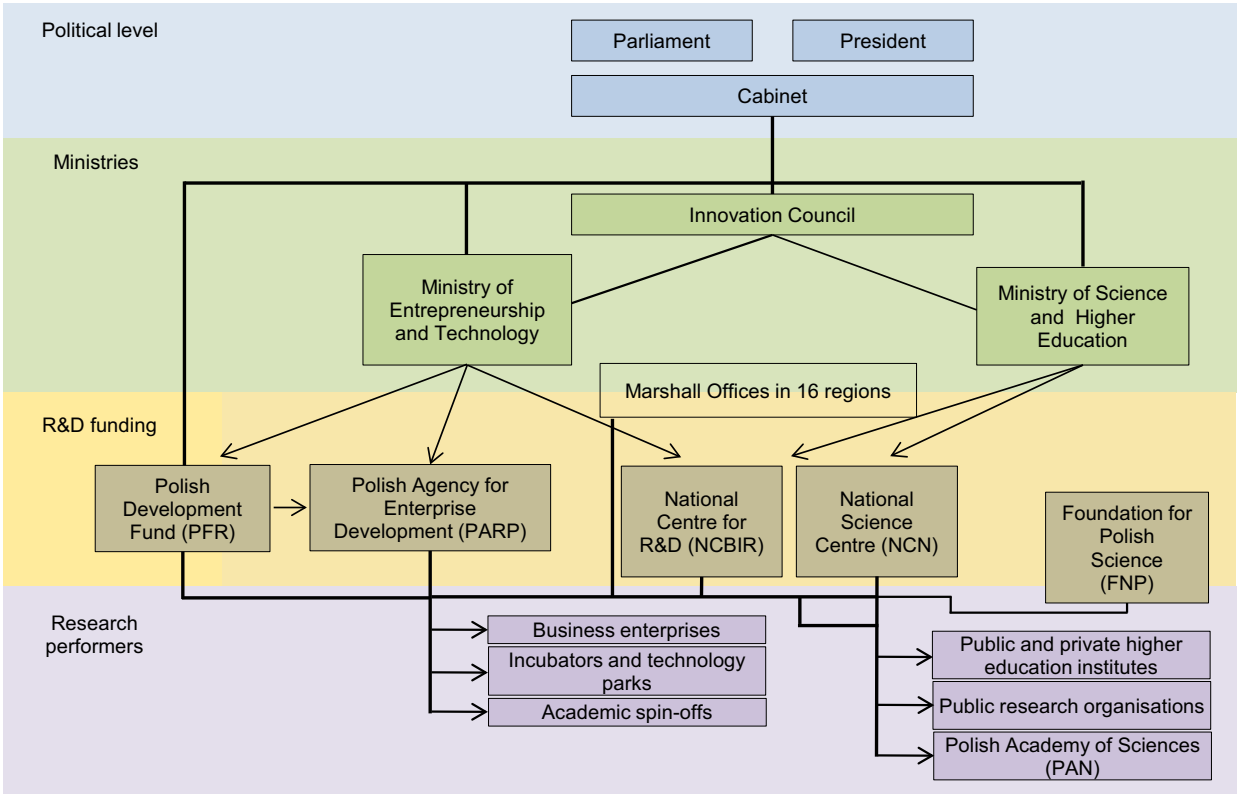
Table 1.1. **Poland's research and innovation system**



Source: Klincewicz, K. and K. Szkuta (2015), *RIO Country Report: Poland*, Joint Research Centre, Sevilla.

teaching, the majority in social sciences and humanities. NCBiR support goes largely to business enterprises or industry-science consortia and Public Research Organisations (PROs), which specialise in different areas of applied research, but also to universities. Many public HEIs have technology transfer offices and some have special purpose vehicles that act as holding companies for academic spin-offs to foster research commercialisation, and these can also receive support from the NCBiR. In recent years the government has used EU funds to set up clusters, business incubators and technology parks in an effort to support innovation through co-location of firms and sometimes research institutions (Table 1.1). The government also plans to set up a Foundation of the Industry of the Future to facilitate digitalisation and process innovation in the industrial sector.

Thanks to the EU smart specialisation strategy there now seems to be better coordination between the national and regional innovation policies and a closer dialogue with stakeholders. In the current EU financing period both the regions and the national government are required to focus EU-financed innovation support on so-called smart specialisations. These are areas where the economy is believed to have a comparative advantage or potentially strong innovation capacity. They were chosen in a so-called entrepreneurial discovery process involving intense consultations with enterprises and research institutions. The smart specialisation concept goes back to Foray (2013) building on work by Hausmann and Rodrik (2003) on industrial policies in Korea, Chinese Taipei and Japan. While national and regional innovation programmes were poorly coordinated in the past (Kapil et al., 2013), the selection, monitoring and evaluation of smart specialisations have involved regular consultations between the regions and the central government. The government is working with the regions to develop quantitative indicators to evaluate smart specialisations, there are monitoring committees comprising policy makers and stakeholders to review performance, and both the central government and some regions plan to set up an observatory to monitor and update the specialisations. The challenge is now to move from a list of targeted technologies to a learning process allowing for updates, should some of the chosen activities turn out not to have the anticipated potential. Government officials are enthusiastic about their experience with bringing together different enterprises, research and financing institutions often for the first time, as cooperation between industry and science and networking among enterprises is generally thought to be weak in Poland. They are hopeful that the process by itself could yield benefits through better information exchange, networking and cooperation.

Evaluation of innovation policies needs to be strengthened. In the past, many programmes have been evaluated *ex post*, often through external consultancies, and the government commissioned a review of its innovation programme under the previous EU financing period. With few exceptions it is qualitative and descriptive in nature rather than attempting to quantify economic effects of innovation support. There are now methodologically more sophisticated evaluations, but this needs to become more systematic. An inbuilt learning mechanism based on systematic evaluation of economic effects is needed to continuously improve the effectiveness of innovation policy. Systematically collecting hard indicators to evaluate effects is crucial, but an experimental design will often be necessary to identify these effects in a reliable way. For example, in oversubscribed clusters or technology parks places could be assigned through a lottery to later compare winners and losers. While this can be very costly, setting aside some money to ensure that programmes are continuously improved is worthwhile, given the amount of money involved. To provide financing for evaluation of programmes targeting youngsters

the French government set up an "experimentation fund for youngsters". This can serve as an inspiration. Both PARP and evaluation units in ministries have the capacity to run and oversee complex evaluation. There are also good examples at NCBiR, which accompanies its programmes with evaluation of economic effects at regular intervals.

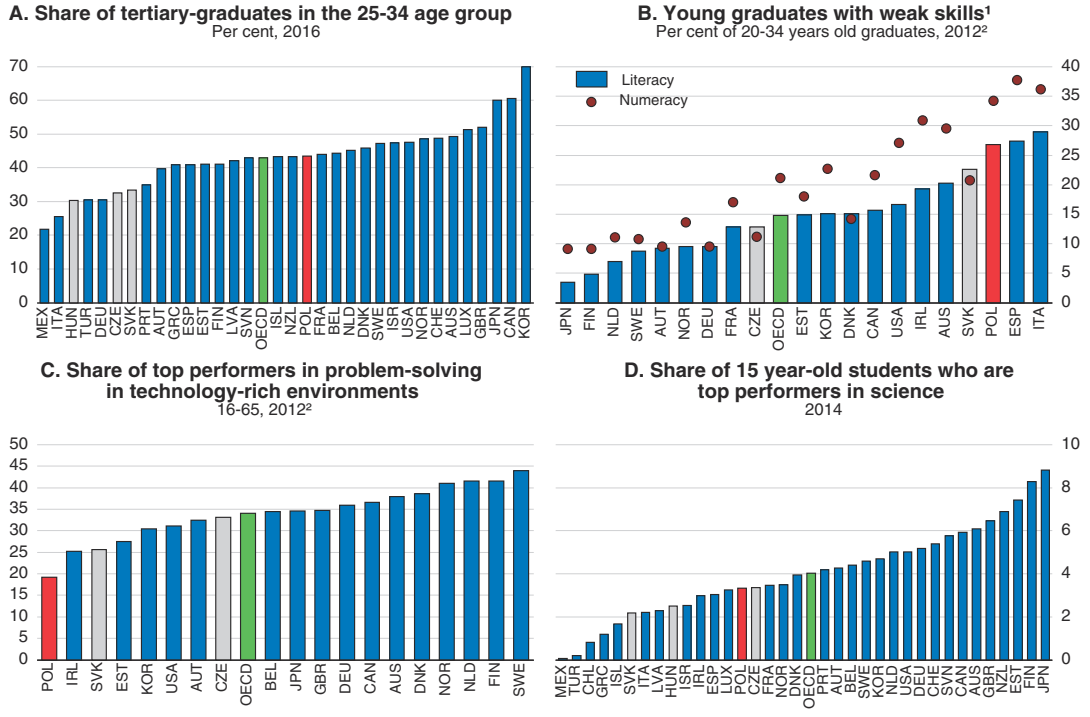
Strengthening the quality of higher education and research

The importance of research and the supply of graduates for innovation

Academic research excellence has been shown to stimulate the growth of local industrial R&D and the set-up of new research intensive ventures in the region. As an example, Abramovsky et al. (2007) show that private-sector research labs in the United Kingdom locate close to highly rated university departments in chemicals and pharmaceuticals, with a stronger effect for foreign-owned labs, consistent with the notion that multinationals source technology globally. But there is also evidence of co-location with some lower-rated university departments, for example in machinery and communications, suggesting that more applied public research may also have a positive impact on private-sector research and business creation. Harhoff (1999) shows that high-technology firm entry is positively related to a large employment share of scientists in universities and extra-university research laboratories, in addition to the presence of business services and a diverse industry structure.

The location decisions of multinational research and development projects, as well, are driven by academic research excellence and agglomeration economies. Belderbos et al.

Figure 1.9. **Quality in tertiary education has improved, but some weaknesses persist**



1. Share of adults scoring at or below level 1 of the PIAAC scale of literacy and numeracy proficiency.
2. The data are based solely on Flanders for Belgium, and England and Northern Ireland for the United Kingdom.

Source: OECD (2017), *OECD Education at a Glance 2017* (database); OECD (2013), *OECD Skills Outlook 2013* (database); OECD (2016), *PISA 2015 Results: Excellence and Equity in Education*, OECD Publishing, Paris.

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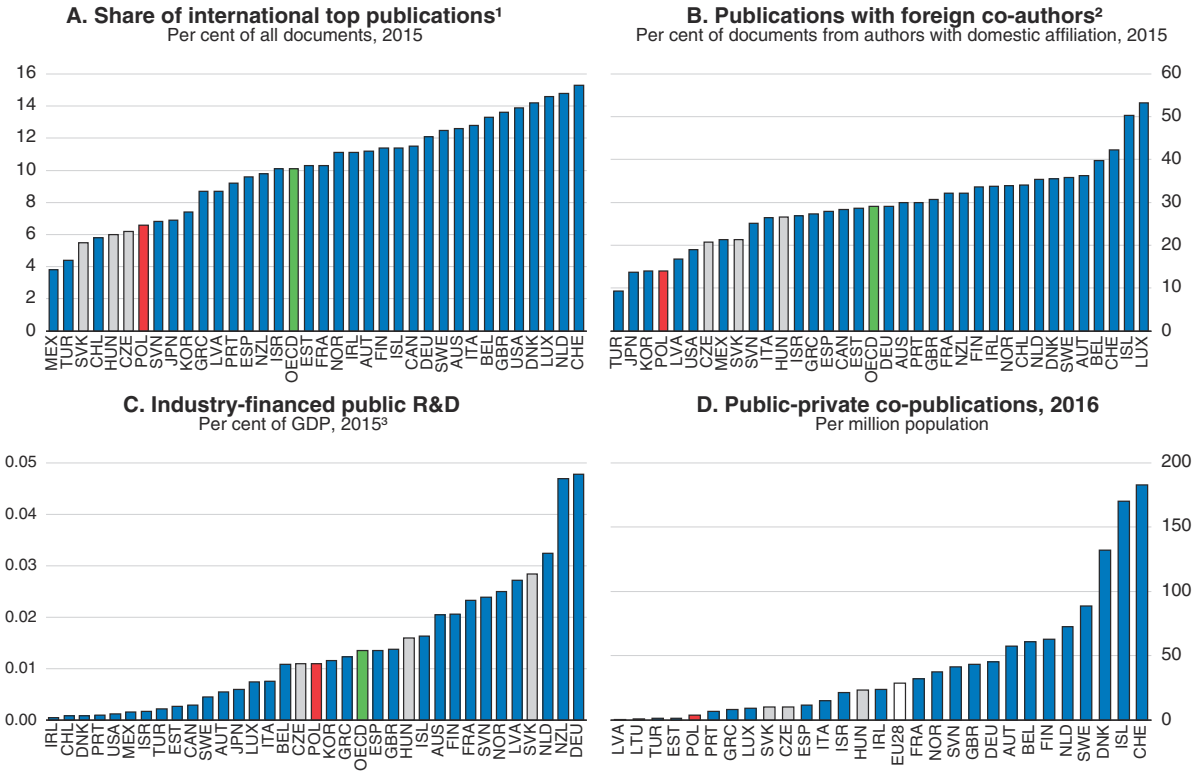
(2014) find that high quality of relevant academic publications from universities in the region increases the likelihood of foreign R&D investment, as does the supply of doctoral graduates. Siedschlag et al.'s (2013) results suggest that the probability of R&D-intensive foreign firms locating in an EU region increases with local human capital, proximity to centres of research excellence, as well as business and government R&D and patent intensity. The probability is also higher in regions where there is already intensive foreign R&D activity, pointing to agglomeration economies. Thus, promoting the excellence of local universities and research centres, along with encouraging the supply of science graduates is the best strategy to promote private R&D, whether domestic or foreign.

Poland has experienced a tertiary education boom, but there is considerable potential to raise quality. The share of tertiary graduates has increased substantially and is now above the OECD average for younger age cohorts (Figure 1.9, Panel A). However, the share of young tertiary graduates with very weak literacy and numeracy skills at the border of illiteracy is sizeable (Panel B). Among adults there are few top performers in technology problem-solving (Panel C), although this looks a bit better in the younger generation (Panel D). The government has started to address quality issues in tertiary education by strengthening

Figure 1.10. **Research output is relatively weak and poorly integrated within international research networks**



1. Share of the scientific output of domestic research institutions that is included in the set of the 10% most cited papers in their respective scientific fields, fractional counts.
2. Scientific documents involving institutional affiliations with research units of other countries as a percentage of scientific documents attributed to authors with a domestic affiliation, fractional counts.
3. Or latest year available.

Source: OECD (2017), *OECD Science, Technology and Industry Scoreboard 2017*, *OECD Research and Development Statistics* and *OECD Economic Outlook: Statistics and Projections* (databases); Eurostat (2017), *European Innovation Scoreboard 2017*, *http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en*.

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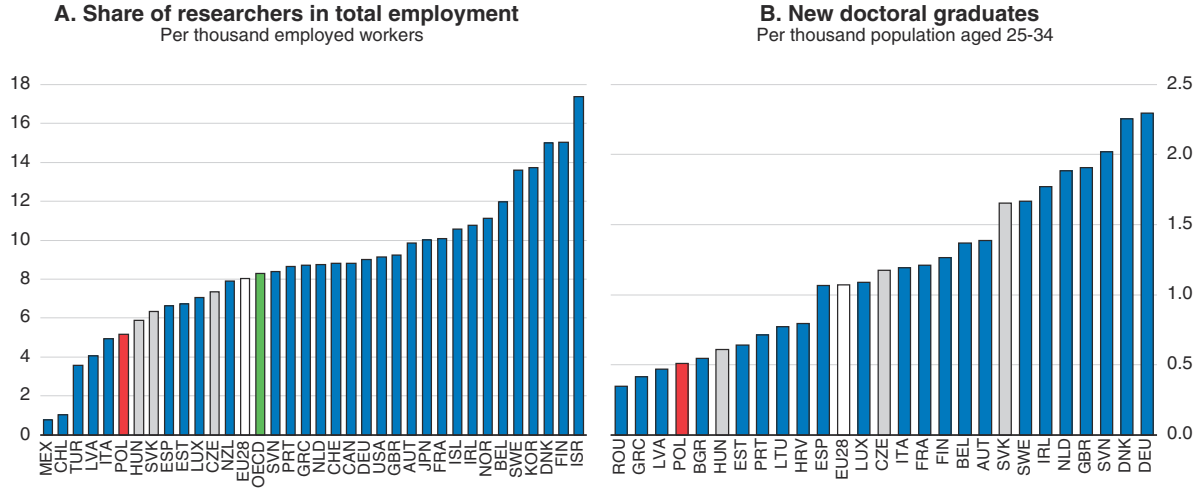
accreditation, but more needs to be done to improve the quality of teaching in general and the training of researchers in particular. The government supports the development of research human capital with EU Funds. Beyond that, better guidance services are needed to identify students with basic-skills issues and refer them to education programmes that are better adapted to their abilities, such as vocational education with a strong focus on practical education and a basic-skills training component.

Research output of Polish higher education and research institutions is well below the European average. Both the quantity and the quality of publications are comparatively low by bibliographic measures. International collaboration is weak, as is the cooperation of science with industry (Figure 1.10). Both need to be strengthened to improve the quality of research and opportunities to commercialise results.

Strengthening university education and research

More needs to be done to improve the quality and attractiveness of researchers' training along with their career paths. Universities have an incentive to take on doctoral students, as their numbers count as a basis for funding, but with little regard to quality. Half of Poland's 40 000 doctoral students do not actually work on their thesis, the graduation age is high, and the graduation rate is rather low (Figure 1.11). Training is based on the apprentice model whereby a habilitated professor oversees the student, but given that many Polish professors do not produce internationally competitive research themselves, their supervision is unlikely in many cases to guide students effectively towards high-quality research. After doctoral studies Polish researchers have to obtain a second degree, habilitation, among other hurdles to becoming a full professor, for which the average age is well above 50. During the habilitation, which typically coincides with the most productive and creative years for research, they have very little independence to set up their own research groups and supervise doctoral students. The government intends to grant a fast-track habilitation to winners of competitive international grants, especially European Research Council grants. But for now the link between research quality and career progression is weak. Repatriation of

Figure 1.11. **The supply of researchers is weak, 2015**[1]



1. Or latest year available.

Source: OECD (2017), *OECD Research and Development Statistics* (database); European Commission (2017), *Research and Innovation Observatory – Horizon 2020 Policy Support Facility*, *https://rio.jrc.ec.europa.eu/en/stats*.

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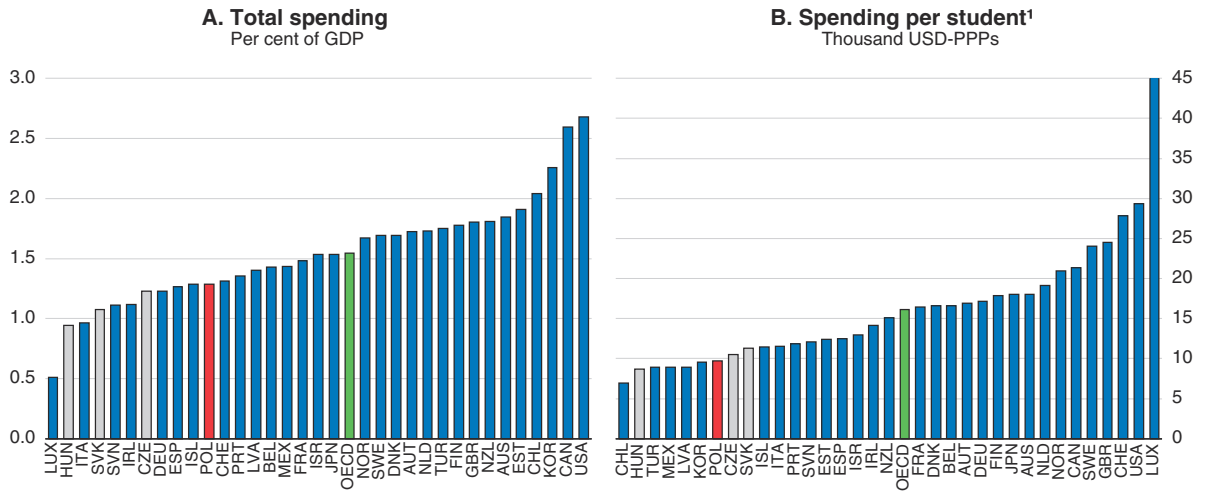
Polish researchers from abroad, like international academic exchange in general, is limited, although both NCN and the Polish Science Foundation offer a range of interesting grants for researchers from abroad who want to come to set up teams or do individual research in Poland. Academics' job situation is often very unstable, in particular in the early years, while more senior researchers enjoy job stability with little scrutiny (European Commission, 2017).

Building structured training in doctoral schools, as planned, while fostering mobility and collaboration across Polish and international universities would therefore be very welcome. Entry criteria to doctoral training should be tightened, and there should be training and guidance in both disciplinary knowledge and transversal skills provided by multiple senior researchers. These programmes could be linked to doctoral fellowships that should be awarded on a competitive basis. The Higher Education reform includes welcome plans to build doctoral schools with demanding entry requirements and mandatory remuneration for candidates along with broader access to grants and project-oriented funding. The reform should make sure that young researchers with a doctoral degree have full independence to set up research teams and obtain grants and that their further career development depends on their research and teaching performance. Reforms are needed to enable universities to offer well-remunerated entry-level positions for a limited but sufficiently long time to allow researchers to develop their work. This should be followed by a possibility to obtain a full professorship at the same university or elsewhere conditional on an evaluation of teaching performance and of research quality and impact by both faculty members and independent experts, possibly including from other countries. Further pay and career progression should depend on similar review mechanisms. Providing sufficient flexibility to combine a career in research with family life will be particularly important to attract women, who are relatively well-represented in lower-ranking positions, but become rarer at every step in the hierarchy. Female-headed teams also have lower chances to obtain grants. Developing a strategy to fight gender biases in science would help Poland use the full potential of females in research (European Commission, 2017).

Efforts to make recruitment procedures more open and merit-based should continue. Job offers at higher education institutions now have to be published online, and recruitments have had to follow clear procedures since 2011. However, higher education institutions are not obliged to inform candidates about eligibility and selection criteria or the composition of the selection panel, which rarely comprises external experts. There are no regulations defining minimum time periods between vacancy publication and the deadline for applications, the scope of feedback that unsuccessful applicants can receive or rights to appeal the decision. The common practice at universities is still to hire the initially preferred candidate, for example a former doctoral student, and the vast majority of researchers, more than 85%, are employed at institutions where they have completed their doctoral degrees (Klincewicz and Szkuta, 2016). But mobility can have a positive effect on research productivity (Dubois et al., 2014). Strengthening recruitment procedures, by clearly defining the rights of candidates and appeal procedures, and requiring Panel interviews with at least one external expert to hire academic staff would better ensure that positions are awarded to the best rather than internal candidates. Mobility should be an important quality criterion.

A multi-year plan is needed to increase funding for higher education and science while improving its efficiency. While spending per tertiary student increased by 43% between 2008 and 2013, it is still among the lowest in the OECD (Figure 1.12). The sector is very fragmented with many small, specialised institutions, although some consolidation is ongoing. Among more than 130 public higher education institutions, there are only 17 comprehensive

Figure 1.12. **Spending on tertiary education should be increased further, 2014**



1. Spending for core educational services, ancillary services and R&D.
Source: OECD (2017), *OECD Education at a Glance 2017* (database).

StatLink http://dx.doi.org/10.1787/888933688646

universities and some 50 institutions that have less than 2000 students (European Commission, 2017). Building larger, more diversified universities, in particular in bigger cities, would ensure a more efficient use of infrastructure and staff. This could be done via voluntary, financially supported mergers. Integrating the best applied public research organisations and basic research-oriented institutes of the Polish Academy of Sciences into universities would also help to make better use of experienced research staff and infrastructure. It would help to expose students to excellent research capacity and to build a small number of high performing research universities, facilitating international visibility. The best performing universities could receive extra funding for a multi-annual period awarded in a competition, as planned by the government. However, it is important to ensure that this does not involve less money for other higher education institutions, as sufficient breadth of good universities will be needed to provide the labour market and top research institutions with a wide pool of candidates with strong skills. Stronger mechanisms are needed to ensure that poor-quality higher education and research institutions are closed if they do not improve over time after receiving poor evaluations from the independent accreditation agency. Well performing universities need sufficient flexibility to use their funding to offer researchers attractive wage packages and career opportunities based on proven ability to build strong and stable teams.

The effectiveness of funding allocation for research and higher education as a steering mechanism can be improved further. The Ministry foresees integrating many of the currently roughly 20 funding streams based on different criteria and allocating funding at the university rather than the faculty-level. This would reduce administrative costs and facilitate interdisciplinary work and universities' management flexibility. Moreover, moving from annual to multi-annual funding would further improve their scope for strategic planning. The share of competitive funding in the government science budget distributed through grants has gradually increased from around 45% in 2009 to 60% in 2015 (Klincewicz and Szkuta, 2016). Yet, the current formulae and indicators for allocating institutional funding are too complex and often tied to inputs rather than outputs, promoting research quantity

rather than quality and impact. The Ministry's decision to stop rewarding points for publishing in journals with low impact is welcome in that respect. Ideally, there should be only a few indicators tied to outputs in a transparent manner, but they have to be known early enough to influence behaviour, unlike changes introduced towards the end of the 2013-16 evaluation period. There is also considerable room to increase universities' fundraising through collaboration with business and the wider community, adult education and voluntary giving. One way to stimulate this would be through a national competitive funding stream, akin to the Higher Education and Innovation Fund for England (European Commission, 2017).

Despite efforts to better engage business in vocational higher education, progress has been insufficient. Public higher vocational schools are sparsely spread over the territory and mainly present in former regional capitals. They suffer from low and declining student enrolment, a lack of short-cycle programmes and work-based learning opportunities as well as weak alignment with regional labour market needs. Most degrees are in social and medical sciences, with social science graduates in particular facing relatively poor labour market outcomes (European Commission, 2017). Poland needs a strategy how to engage with employers to develop strong vocational programmes throughout the country with a presence in all regions and major cities. In bigger cities these can be integrated into larger higher education institutions that also offer less occupation-specific programmes. In high performing systems, such as Germany or the Netherlands, the costs of study programmes are typically covered by the state, while the business partner pays a monthly salary or grant to the student-employee. Such a co-financed model would better ensure alignment of study programmes with labour market needs than the current system and fit the needs and interests of less academically minded students. Current plans to integrate internships that last at least six months would be a first step, but a more systematic integration of work and study throughout the programme and full co-financing with business should be the ultimate goal. Building such a system would require dedicated financing for an extended period and active engagement with employers. Vocational higher education institutions could play an important role in offering adult learning and cost-effective distance- or blended-learning models to reach students in peripheral areas and from lower socio-economic backgrounds (European Commission, 2017). They could contribute to training and R&D opportunities for smaller companies corresponding to regional industry and labour market needs.

The government wants to improve international collaboration and significantly support international academic exchange as well as the process of internationalisation of Polish higher education and research institutes. It set up in October 2017 the National Agency for Academic Exchange (NAWA) to manage international academic exchange and attract foreign students and researchers to Poland, akin to institutions such as Campus France and the German Academic Exchange Service. It also wants to reach out to the Polish research diaspora to engage them in joint projects with researchers in Poland and motivate some of them to join Polish research institutions. Creating attractive career paths for researchers in Poland that are compatible with those in other countries and offering interesting grants for short stays in Poland will be crucial for success. Sending Polish researchers to foreign institutes will also be important. Both NCN and the Polish Science Foundation, FNP, have grants for international project teams and programmes to attract foreign researchers to Poland or entice Polish researchers abroad to return. Furthermore, there are plans to create a number of research groups in Poland jointly financed with the German government, which will cooperate with German researchers.

A reform is underway to improve the management of some public research institutes. The Ministry of Science is set to build a network for 35 applied research centres, by centralising their investments in research infrastructure, human resources and intellectual property management. This could help improve efficiency. The Łukasiewicz Network will be responsible for managing research quality, commercialisation and international cooperation.

Commercialisation of research results

The government wants to focus on creating better incentives to commercialise research results. Researchers are mainly evaluated based on their publications, giving them little incentive to cooperate with industry or commercialise their research results. Enterprises, on the other hand, need secrecy until their inventions are marketable, and publishing results early is thus not always in their best interest. The government wants to give more weight to successful commercialisation in institutional and individual evaluations that determine public funding for Higher Education and Public Research Institutions and made first steps in this direction in 2017. There are also plans to allow doctoral students to use research results that they obtained while working for enterprises for completing their thesis. Professors and other experienced researchers should also be allowed to work part-time on commercial projects.

Technology transfer offices have gradually been set up in most Polish universities, but they are often underfunded and find it difficult to attract and retain qualified personnel. Some university technology transfer offices are very active in reaching out to local business and giving them advice on how to use the universities' know-how and research potential. Technology transfer centres throughout the country also collaborate to exchange ideas and good practices. However, many centres suffer from weak financing and have therefore trouble attracting and retaining qualified staff. A law passed in late 2016 stipulates that 2% of higher education funding has to be set aside for commercialisation of research results, some of which may benefit technology transfer offices. Merging technology transfer offices for universities that are nearby would help them reap economies of scale and organise research collaboration across institutions. Making it easier for higher education and public research institutions to commercialise research results could be an incentive in and by itself. But this requires easing administrative procedures and lifting important legal barriers.

One important issue is that assets of universities, including intangibles, remain under public finance law. To some extent this also holds for special purpose vehicles that many universities have created to commercialise some of their research results. Public finance law lengthens and complicates procedures. As an example: the value of patents or other types of know-how has to be established by external expertise. The university has to maintain an offer at this price for several months and can only reduce it after a full-fledged public procurement procedure. Since the market for innovations moves fast this can severely impinge on chances for successful commercialisation. It also reduces flexibility, as research institutions cannot accept a lower price for their know-how in return for their business partner renting some of their laboratory infrastructure, as an example. The system has held back universities' cooperation with small and medium-sized enterprises (SMEs), in particular, as they often cannot pay the price for university know-how that was established through external expertise. They also need simpler procedures. Relatively simple transactions, such as hiring a patent attorney can require a public tender, although the 2014 public procurement reform brought some improvement by freeing universities and

research institutes from standard public procurement routes if the order value is lower than 221 000 euros. In many OECD countries higher education and research institutions' intangible assets do not belong to the public finance sphere, offering more freedom of operations.

Case studies underline the importance of openness to foreign capital and expertise to successfully commercialise research results. Politicians' and government officials' main aim is to develop domestic companies and employment through research commercialisation. Yet, success often requires speedy access to sufficient funding and specialised expertise and looking for the right partners worldwide can be essential (Box 1.1). Earning and newly won expertise will be highest when choosing a strong partner, whether domestic or foreign. This is especially relevant in a country like Poland with little domestic experience and expertise in research commercialisation.

Box 1.1. **A tale of two high-tech inventions**

Openness to partnering with specialist researchers and companies worldwide can be essential to commercialise scientific research successfully. Comparing Polish efforts to develop blue laser technology with the search for therapeutic applications of modified DNA particles provides suggestive evidence in this respect.

Polish researchers on the road towards a cure for cancer. In late 2010 researchers from the University of Warsaw were able to present breakthrough findings that have a good chance of making a significant contribution to the development of cancer vaccines. In essence, the researchers found a way to prolong the life of DNA particles, known as mRNA, helping to produce proteins and emulate the behaviour of healthy cells. The research, which started in the early 1980s, benefitted from partnerships with US universities. The findings were so significant that they led to the largest technology-licensing transaction involving university research in Poland to date. So far, German and French pharmaceutical companies invested altogether over USD 600 million. Importantly, they also provided expertise, e.g. with clinical trials. These industrial partners are highly specialised in the field, and no such expertise would have been available in Poland. Neither would Polish companies have been available to provide the necessary funding.

Poland in the race towards developing the blue laser. Compared to other colours blue lasers have a particularly high precision in pointing, cutting and burning, leading to a fierce international race towards the development of this technology. Thanks to breakthrough inventions in the 1990s Japanese researchers and companies were ahead of the game, and the US government invested considerable funds to avoid falling further behind. In the 1990s, in the midst of this race, researchers from the University of Warsaw pioneered a particularly effective method to grow Gallium nitride (GaN) crystals, a semi-conductor material that turned out to be superior to others for mass production of high-quality blue lasers. One strategy would have been to directly commercialise this method, which was unique, patented and internationally renowned, and partner with Japanese companies and researchers to develop the method further. In fact, another researcher from the University of Warsaw, who later developed a commercially attractive alternative method to grow GaN mono-crystals, did partner with the leading Japanese company and was able to earn a significant amount with his academic spin-off for a number of years. Instead, the original Polish research team abstained from commercialising intermediate inventions, aiming for developing the blue laser technology by themselves with government funds of the order of PLN 30 million over 2000-04, but no help from leading researchers in the field or entrepreneurs familiar with commercialising research. In the end, their GaN crystal growth

Box 1.1. **A tale of two high-tech inventions** *(cont.)*

method turned out to be relatively easy to substitute and foreign competitors were soon able to reduce manufacturing costs with mass-production. The Polish team never managed to attract private funds at the necessary scale or be competitive with its cost structure and small-scale production. While it did develop a blue laser in the end, it is used for niche applications and never managed to gain significant market share. To this date it continues to produce on a laboratory scale.

Source: Kołodzjei, A. (2016), "Przełomowe odkrycie naukowców z UW. Koncerny już zapłaciły za nie ponad 600 mln dol" in money.pl *www.money.pl/gospodarka/wiadomosci/artykul/szczepionka-na-raka-przelom-w-medycynie-mrna,207,0,2205647.html;* University of Warsaw Faculty of Physics (2016), "Towards therapeutic applications of mRNA – New Insights into translation and decapping", in eurekalert *www.eurekalert.org/pub_releases/2016-11/fopu-tta113016.php*; K. Klincewicz (2010), "The Blue Laser Project: Challenges for Technology Transfer in Poland" in: A.H. Jasiński (ed.), *Innovation in the Polish Economy in Transition: Selected economic and managerial issues*, Publishing House of the University of Białystok, Białystok, pp. 101-17.

Developing enterprise and innovative activity

Stimulating innovative start-ups

The government focusses a lot on financing high-tech start-ups, but more support for improving higher education and research may be a pre-requisite for success. It plans to develop venture capital financing for various stages of early firm development by providing almost PLN 3 billion of public funds (see Chapter 2). While earlier venture capital policy programmes have helped to develop the market, they had to be downscaled significantly because of a lack of viable projects. In fact, while financing is important and should be developed further, it is unlikely to be the immediate bottleneck. Support for venture capital has to come with a strong focus on basic and applied research as well as technology transfer and increased funding for that.

Institutions to support researchers and other entrepreneurs setting up their own companies are gradually emerging thanks to public funding. The government had trained so-called innovation brokers during the last EU Structural Fund financing period to build capacity at universities in research commercialisation. Candidates were sent to US universities where top-quality business incubators and seed accelerators develop scientific start-ups through mentoring, coaching and provision of financing and networking opportunities. Yet, the programme was interrupted during the switch-over of EU budget periods, which is symptomatic of a lack of a strategy ensuring continuity when external funds are abating. Nevertheless, an overall well-functioning business incubator landscape has developed in Poland thanks mainly to public support. A competition set up in late 2016 aimed at building more seed accelerator institutions that provide would-be entrepreneurs with training and support to develop a business strategy, network with larger enterprises to seek clients, access financing and eventually commercialise their products. The accelerators also make a small seed investment in participants' firms in return for an equity stake in the company. These initiatives are welcome, as expertise in supporting and mentoring start-ups remains scarce.

There are promising projects, including at smaller, less renowned research institutions, but capacity building is necessary to bring more of them to the market. Many inventions that have a potential to be commercialised successfully are shelved, because there is no tradition or expertise in industry-science cooperation to bring innovations to the market. The

government plans to set up an Innovation Manager Academy to build expertise in companies how to set up and develop an innovation project. This is welcome, as there is still ample room for improvement regarding management practices in Polish firms, particularly domestic ones (Figure 1.13). More specifically, managing innovation and seeking out partners in the research community is a blind spot. Many business programmes financed by EU funds are now conditioned on collaboration with science, and this is showing first results. Training for managing innovation and science-industry cooperation will be a useful complement.

Figure 1.13. **The quality of management is relatively low in domestic firms**

1. Scores are a measure of management practices across 5 key areas of management: operations management, performance monitoring, target setting, leadership management and talent management. Scores are scaled from 1 (worst practice) to 5 (best practice).

Source: N. Bloom, C. Genakos, R. Sadun and J. Van Reenen (2012), "Management practices across firms and countries", *NBER Working Paper*, No. 17850.

StatLink http://dx.doi.org/10.1787/888933688665

More modern and systematic entrepreneurship training in universities is needed. Entrepreneurship training in higher education institutions has become more widespread. Examples of innovative learning methods do exist, including problem-based learning, business plan writing and even some degree programmes where the creation of a start-up is an integral part. Yet, classical lecturing remains the dominant method in most institutions. Entrepreneurship teachers would benefit from dedicated training to learn modern teaching techniques, including at leading universities abroad and through national and international networks and conferences. Promoting entrepreneurship research, which is largely absent from Polish universities, is also necessary. All Polish universities should appoint a senior manager responsible for entrepreneurship training and research commercialisation. The Innovation Council should work with higher education institutions to build a strategy for entrepreneurship training and support, which should become a part of the envisaged higher education reform (OECD, 2017).

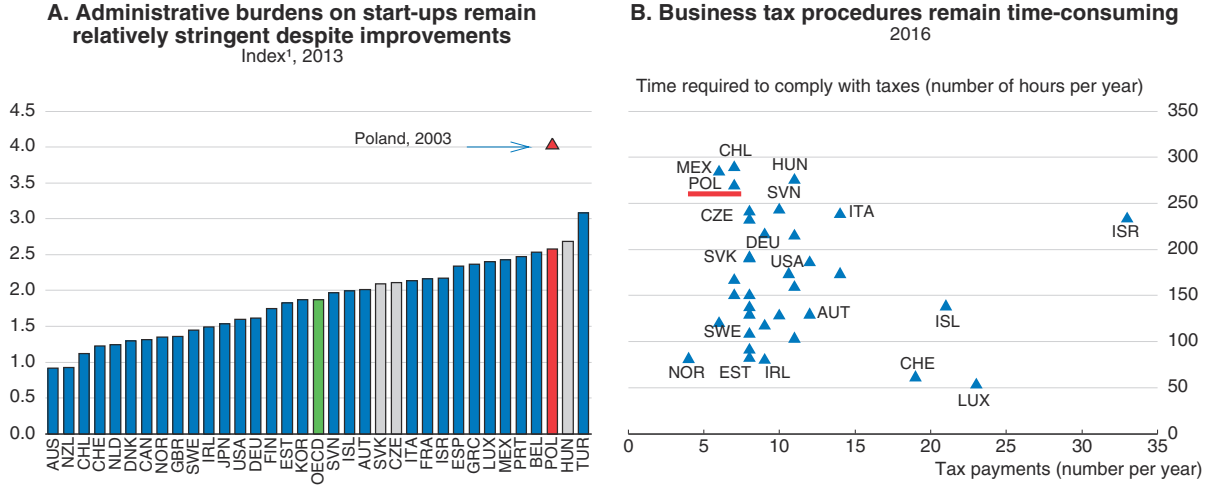
Promoting firm entry, growth and innovation through regulatory reform

The government foresees the introduction of a simplified joint stock company to facilitate starting up a business. The idea would be to have very low capital requirements, possibly only 1 PLN, simplified registration online within 24 hours and light procedures to

dissolve the company. Capital contributions would be possible in kind or in the form of labour. Shareholders would have contractual flexibility to define governing structures and rights attached to different types of shares, which would be easy to buy and sell. There would also be a provision to allow companies to issue stock options to employees. The hope is that this would be better adapted for start-ups than existing legal forms, which have higher capital requirements, are more cumbersome to build and wind up and less flexible in terms of shareholder rights, contributions and governance. However, very low capital contributions can impinge on investor confidence and access to financing. To partly address these issues, the company would be required to build reserves in the first years of operation, and payments to shareholders would be subject to a company solvency test.

Easing compliance with tax law and general regulations should also be helpful, but this should be weighed against the social and environmental goals pursued with regulation. Barriers to entry are still relatively high in Poland and paying taxes remains cumbersome, despite important improvements (Figure 1.14). The "100 changes for business" programme and the "business constitution" law foresee more legal certainty for firms when it comes to paying taxes and audits and a reduction of paperwork. The threshold for full accounting obligations will be lifted from 1.2 million euros turnover annually to 2 million euros, and enterprises with a turnover below 50% of the minimum wage do not even have to register. Start-ups will be exempt from social contributions for the first six months and after that will benefit from reduced contributions for two years. Companies will need to keep financial statements only for five years now rather than indefinitely. Ministries have to publish simple explanations of administrative rules and tax laws, whose observance will be sufficient to comply with the law. Further simplifications are set to follow. The challenge will be to simplify compliance with the law without giving up regulations that are crucial for good environmental, social and economic outcomes. As an example, the simplification programme foresees abandoning the need for a building permit for one-storey outbuildings and sheds up to 35 square meters. Given that weaknesses in the Polish land planning system have led to substantial urban sprawl, this measure is questionable.

Figure 1.14. **Setting up a business and paying taxes remain onerous**



1. Index scale from 0 to 6, from least to most restrictive.

Source: OECD (2017), *OECD Product Market Regulations Indicators* (database); World Bank (2016), *Paying Taxes 2017* (database), the World Bank Group, Washington, DC.

StatLink http://dx.doi.org/10.1787/888933688684

Simplifying procedures to apply for national and EU funds for innovation support would enhance take-up, in particular among SMEs. Procedures have been too complex, and a large share of applicants for EU funds administered by regions fails to comply with formal requirements. This is a particular concern for SMEs, and in the past a significant share of support from EU funds went to larger companies to absorb mature technologies (Kapil et al., 2013). There are improvements, though, as the central government has reduced paperwork and has moved largely to digital applications. It is also considering abandoning formal requirements as an initial filter. Instead, it would work with applicants on formalities in the substantive evaluation phase. There are now more face-to-face interviews in front of an evaluation Panel to allow candidates to present their ideas in person. It would be useful to use the Panel interviews as an opportunity to direct applicants with promising ideas towards consulting services, in case their projects need further work to ensure successful implementation. NCBiR has a reputation of providing relatively clear and straightforward information on its website and offers conferences to inform enterprises about the modalities of receiving support from EU funds. In contrast, information provided by some regions is complex, confusing and sometimes contains mistakes. The central government should consider providing regions with technical help to ensure clear and effective information and guidance for applicants. Regions have framework agreements for their R&D programmes with NCBiR, and this cooperation could include support for re-organising procedures to improve success rates for promising SME projects.

A more transparent market for brokerage, consulting and mentoring services would help SMEs make better use of technology transfer. The government plans to simplify procedures to access the innovation voucher, which allows smaller companies to buy R&D from universities, and make it easier to find the right partners. In fact, OECD experience shows that strong brokerage bringing together SMEs and research partners is key for the success of innovation voucher-type programmes (OECD, 2010). Many companies hire expensive consultants to cope with the complex application procedures for EU funds. It would be useful to provide them with a register of innovation brokers, mentors and consulting companies describing areas of expertise and quality, for example through feedback from former clients or more formal certification. This would help companies find the services that are adapted to their needs and make the market more transparent, possibly helping to lower prices. Hands-on support from PARP or another government institution to clarify their needs and find the right partner would also be helpful. Currently, firms have to publish their demand for support from a research institution on a public competition database, a requirement set by the European Commission. But this will be too complex for many SMEs. In fact, universities and technology transfer offices reported that small firms often need direct counselling to understand how research institutions could help them. The requirement for SMEs to hold a public tender should be re-assessed, jointly with the European Commission.

Better supporting start-ups with risky projects requires more flexibility in evaluating and adjusting public programmes. In the past EU financing period funds were assigned to technology absorption, and mature projects close to commercialisation, mainly owing to risk-aversion of public officials granting support (Kapil et al., 2013). Research and development, in particular at earlier stages of the innovation process has a high probability of failure, while public finance law follows strict, often very inflexible criteria and can imply severe consequences, including in extreme cases jail sentences for public officials. This favours risk-aversion. In audits of innovation support the possibility of failure should

be recognised as inherent to the process, and the assessment should use average success rates of R&D at a similar stage of the innovation process as the yardstick.

Agglomerations with strong firm networks, training and coaching services support innovation

Research suggests that the presence of foreign firms benefits their Polish suppliers and competitors. Positive effects of foreign direct investment (FDI) on local firms may come from a variety of mechanisms. For instance, local firms may learn to imitate a new process or improve their product quality through observation or interaction with managers and former employees of foreign firms. They may also benefit from the entry of new professional services or suppliers from abroad. Several empirical studies find that the presence of foreign firms has positive effects on their Polish suppliers and competitors (Kolasa, 2008; Gorodnichenko et al., 2014; Hagemejer and Kolasa, 2011; Hagemejer and Tyrowicz, 2012). These effects are stronger in firms that invest in R&D and other intangible assets, such as patents, licenses and software (Kolasa, 2008), underlining the importance of building knowledge to be able to absorb efficient technologies brought in by foreign companies. Hagemejer and Kolasa (2011) also show that Polish firms that export, have benefitted from FDI or have imported capital goods are larger, more productive, have higher capital intensity and pay higher wages. They also experience faster productivity growth.

Internationalisation induces firms to invest in R&D and innovate, which reinforces the positive impact on productivity. Boermans and Roelfsema (2015) show with data from Central and Eastern European countries that outsourcing is connected to product innovation, whereas exporting and FDI are associated with higher R&D spending and more patenting. Similar results have been found in other regions. As an example, Aw et al. (2011) show that exporters from Chinese Taipei have a tendency to make complementary investments in R&D and invest more in training workers to increase innovative capabilities, reinforcing the positive effect on productivity.

The government plans to strengthen its investment promotion services, while providing Polish companies with more help to expand into foreign markets. The government has extended the mandate of its investment promotion agency to export promotion and bolstered its resources significantly. The plan is to set up centres abroad, which will support Polish firms expanding into foreign markets. A second aim is to strengthen its support for investors, including through a network of regional investment promotion offices that would assist investors in finding real estate, comply with regulations and obtain subsidies. This strategy is welcome, as coherent export support services have been lacking so far, and evidence suggests that high-quality investment promotion services tend to translate into stronger FDI inflows (Harding and Javorcik, 2013) with potential benefits for innovation and productivity.

The government foresees attracting foreign direct investments through various tax incentives and subsidies along with access to EU grants. This is part of the Strategy for Responsible Development developed in 2016, which intends to give preference to investments that involve R&D, know-how transfer or local cooperation and supply networks. While targeting support on projects with such desirable features seems sensible, the risk is that tax incentives may involve considerable waste when investment would have taken place even without such costly incentives. In fact, Rodriguez-Pose and Wilkie (2016) find that direct public support for R&D is effective in attracting foreign R&D. However, this effect is positively related to GDP per capita, aggregate R&D spending and a

quality of government index, suggesting that financial support cannot make up for otherwise unfavourable conditions (see also OECD, 2011). Public officials involved in investment promotion in Poland argue that while investment incentives are unlikely to be the main factor attracting foreign direct investment, it is difficult to do without them as long as they are offered in neighbouring countries. This suggests that coordinating with neighbours to reduce investment incentives could be beneficial for everybody.

While the evidence is mixed, some studies suggest that special economic zones have a positive impact on economic activity. Research on location decisions finds that the quality of infrastructure and service and industry agglomeration are the main factor attracting foreign firms, while special economic zones have no effect (Cieślik, 2005). Jensen and Winiarczyk (2014), on the other hand, find a positive effect of special economic zones on business creation that comes mainly from FDI, while the effects on employment, investment and income generation are small or insignificant, suggesting that the policy has not been successful in creating a sustainable, positive dynamic, helping poorer regions to catch up. This finding is in contrast to Cizkowicz et al.'s (2015) work. Exploring direct as well as second-round effects of special economic zones, their study suggests that they have a positive impact on employment and investment and, in the case of employment, there are positive spillovers on surrounding areas in the same county and on neighbouring regions.

The logistical support offered by special economic zones, which reduces investment costs, is a key factor determining their success. Such zones offer exemptions from taxes on income earned from the business activity, along with fully equipped plots on preferential conditions and in some communities real estate tax exemptions. The policy has recently been extended to 2026 and the government plans to allow for such tax exemptions also outside of the special economic zones subject to some quality criteria, which are yet to be defined. But beyond that some zones offer support with establishing links to local suppliers as well as tailoring educational programmes and training to the needs of investors. Given the importance of training and knowledge spillovers for innovation and productivity growth, this role is likely to be the key factor determining the zones' success. One example in this respect is the zone of Łódź, which was involved in developing vocational training with foreign investors and higher education programmes at local universities (Box 1.2). It is one of the best performing zones in terms of investment and employment volume and growth (Figure 1.15) and has won prizes for its education programmes.

The example of Łódź suggests that proximity to high-quality education and research centres is key for attracting investment and creating employment. While the management of the special economic zone of Łódź is particularly active, its location at a crossroads of key transport routes is certainly another plus. Unlike other special economic zones it is close to universities and research centres. The regional vocational school also has a reputation for being particularly well managed and open for new partnerships with enterprises. Creating a good vocational school with strong business partnerships may be possible to replicate in more remote areas and can serve as an inspiration for other regions. It would be useful to create a systematic exchange of good practices among special economic zone management agencies.

To promote knowledge exchange and productivity in firm agglomerations, Poland like other countries, tries to develop clusters. The implicit hope is often to create the next Silicon Valley by promoting a local concentration of interconnected firms, suppliers and research institutions. Yet, while there is evidence for positive agglomeration effects on

Box 1.2. **Aligning education better with business needs – examples from the Łódź region**

The management of the special economic zone in Łódź, its companies and local universities with their business partners have been very active in organising training and education programmes tailored to the needs of employers along with opportunities to network amongst each other.

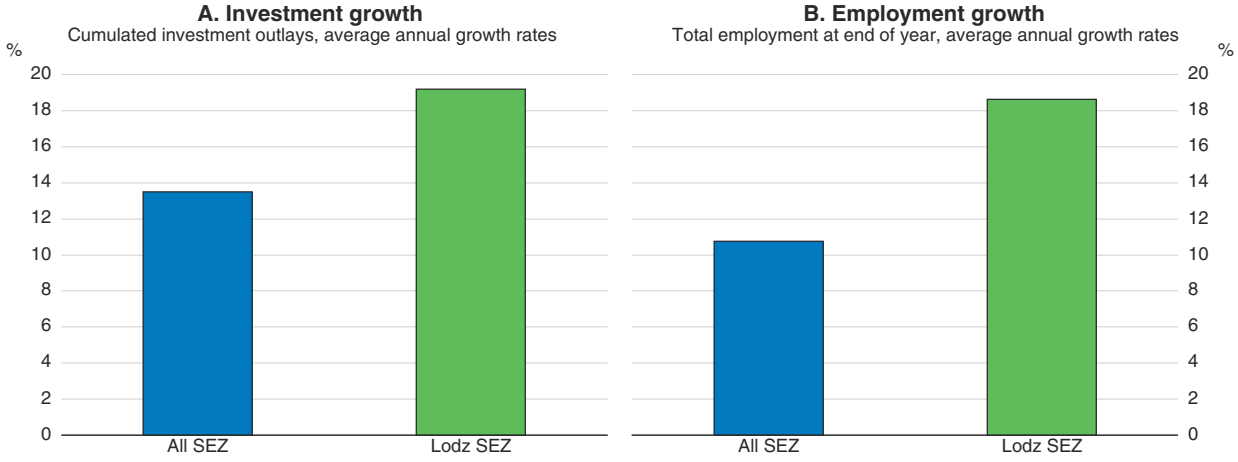
Apprenticeships for youngsters and experienced workers: Jointly with one of its investors, Haering Polska, a precision components supplier for car companies, and with the Polish-German Chamber of Commerce the management of the special economic zone set up apprenticeship programmes both for youngsters and for experienced workers designed to fit the companies' specific skill needs. The programmes offer practical training at Haering combined with school-based training at the Lifelong Learning Centre of New Technologies in Łódź, and chances to find permanent employment there upon graduation are very good. The company has also invested in its own centre for practical training at its Polish headquarters to provide both theoretical and practical training to its workers based on modern technologies.

University programmes preparing workers for logistics service centres and business process: outsourcing centres. At the demand of some of its foreign investors the special economic zone worked with the local university to develop a study programme, called linguistics for business, that prepares students for working in logistics service centres and in business process outsourcing centres, which have created significant employment in Poland over recent years. Technical vocational schools as well collaborate to prepare students for working in such centres.

Engaging business in designing study programmes and teaching: Together with partners from business the University of Łódź designed a new major in data analysis engineering. Students learn to exploit large quantities of data from different sources, so called Big Data, for business purposes. The programme involves practical work in enterprises. The university also works with companies and sometimes the public sector giving informatics students opportunities to develop mobile apps for them and present the result in their thesis. In some cases this has helped the university to sell technology licenses. There are also increasing numbers of practitioners who lecture.

Providing opportunities to build networks: The management of the special economic zone organises events that allow local businesses to meet foreign investors, such as business mixers, to facilitate business development.

Figure 1.15. **The Łódź special economic zone has performed particularly strongly, 2005-15**



Source: P. Cizkowicz, M. Cizkowicz-Pelaka, P. Pekala and A. Rzonca (2015), "The effects of special economic zones on employment and investment: Spatial Panel modelling perspective", *Narodowy Bank Polski Working Paper*, No. 208, Warsaw; Statistics Poland.

StatLink http://dx.doi.org/10.1787/888933688703

innovation (Carlino and Kerr, 2015), it is much less clear whether public policy can create or reinforce this (Chatterji et al., 2014). Some studies indicate that cluster policies have helped to promote innovation and attract well-performing firms (Engel et al., 2012; Falck et al., 2010; and Fontagné et al., 2010). Yet, Martin et al. (2011) find no positive effect of a smaller-scale French cluster programme. Likewise, Nishimura and Okamuro (2011) find no significant effect on productivity from participating in Japanese clusters, while collaborating with a national university or partners outside of the cluster does increase R&D productivity. This suggests that collaboration with research partners as such can be more important than participation in a cluster. Burger et al.'s (2015) results indicate that cluster organisations mainly help attract economic activities with less specific location requirements, such as production plants, sales and marketing offices, rather than high value-added activities that occur in headquarters or R&D facilities.

Polish cluster initiatives, technology parks and other structures supporting innovation through firm co-location are relatively recent, and few have proven effective so far. Most of them have been set up since 2010, often with the support from EU funds. In many cases their innovative activity and orientation towards foreign markets is low and their financial viability without subsidies is questionable. Many lack a common business strategy for their members and make insufficient use of mentoring, coaching and business development services. The management of these structures and the ministries that sponsor them often lack information about innovative activity and economic results of the firms that they are serving, precluding effective evaluation (NBP, 2016; NIK, 2016).

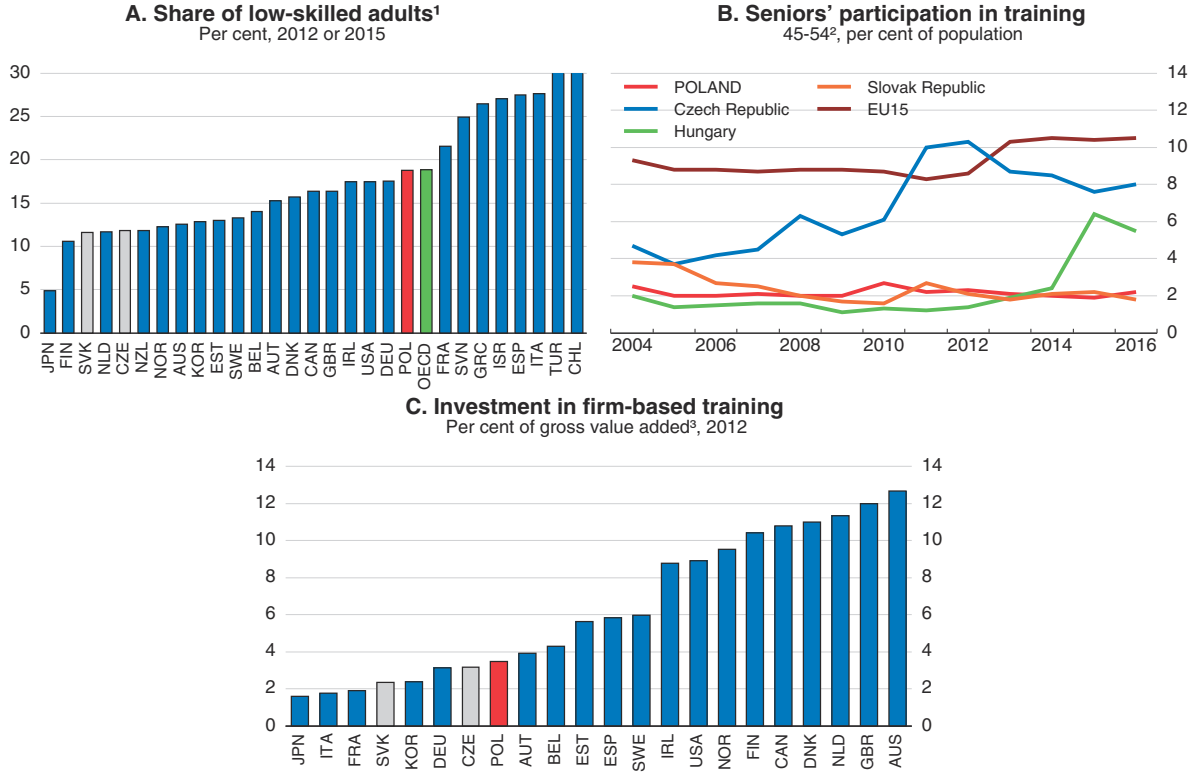
Going forward the central government plans to focus support on a small group of key clusters. These were chosen in a competition to identify the most promising cluster initiatives in terms of size, management quality, innovative activity and presence in foreign markets. Public support is meant to help them expand further into foreign markets. Given that little is known about effective policies to support clusters' innovation output and productivity, it seems indeed sensible to concentrate on framework conditions, such as internationalisation, investment in infrastructure and training. This should include efforts to improve cluster management, as well as links to research institutions. Clusters, technology parks and similar initiatives that receive public support should be required to set up a plan how to increase their own earnings and those that fail to gradually attain viability by themselves should eventually lose their subsidies. A robust evaluation framework is needed to better understand what works, but trying to build firm agglomerations in remote areas far from research and training institutions is unlikely to be effective.

Adult learning and vocational training

Special efforts are needed to help Poland's many small and relatively unproductive firms to become more efficient; enhanced education and training will be essential. Focussing on high-tech start-ups will not be enough to lift the performance of the Polish economy. Relatively unproductive small firms operating in mature sectors employ a large share of the labour force, and they need support to modernise and improve their efficiency. Education and training for their managers as well as their general workforce will be key to strengthening their capacity to adopt new products, production processes and organisational practices. The results of 15 year-old pupils in reading, maths and sciences have improved since comprehensive education was increased by one year in the late 1990s with strengthened curricula, according to the Programme of International Student Assessment (PISA), a skill test organised by the OECD, and are now somewhat above the

OECD average. There are also fewer students with particularly weak skills. Yet, data from the International Adult Literacy Survey (PIAAC) reveal that the share of adults with exceptionally weak literacy, numeracy and digital skills, who struggle to understand even simple texts or basic algebra, is greater in Poland than in other OECD countries. At the same time participation in adult learning is low, in particular among those who need it most, older workers and adults with low educational attainment. The share of firms that send their staff on training is also much lower than in other European countries (Figure 1.16).

Figure 1.16. **Lifelong learning is underdeveloped, especially for low-skilled and senior individuals**



1. Share of adults scoring below level 2 in the PIAAC reading proficiency scale.
2. Percentage of individuals having had training in the 4 weeks preceding the survey.
3. Firms' investment in formal and on-the-job training.

Source: OECD (2016), *Skills Matter: Further Results from the Survey of Adult Skills*, OECD Skills Studies, OECD Publishing, Paris; Eurostat (2017), "Education and Training Statistics", *Eurostat Database;* OECD (2016), *OECD Science, Technology and Industry Scoreboard* (database).

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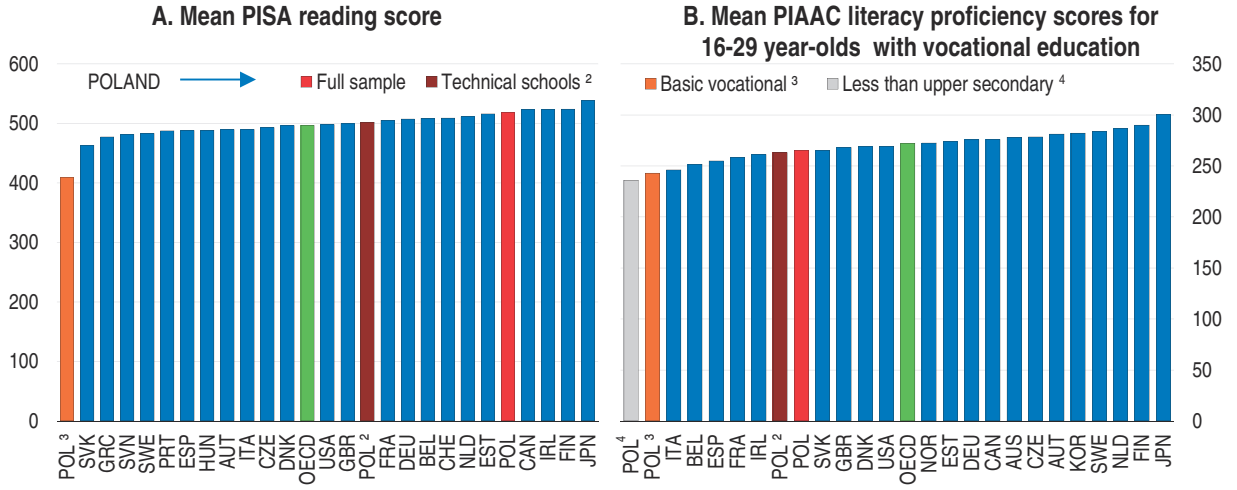
The weakest students are often concentrated in vocational education. PISA and PIAAC results of pupils and graduates of basic vocational schools – which unlike technical vocational schools do not allow graduates to enrol directly in university – are weak. In fact, for adults they are only marginally higher than for those who completed only lower secondary schools at most (Figure 1.17). The government has recently increased the mandatory school starting age from six to seven. It also changed the school structure in 2017 by abolishing middle schools and extending primary school from six to eight years, reducing comprehensive education by one year. Basic vocational schools will be replaced by so called sectoral schools, where students would receive a first professional qualification after three years and a second qualification after two more years. At that point they would also be

Figure 1.17. **The skills of students and graduates from basic vocational schools are weak, 2012**



1. The data are based solely on Flanders for Belgium and on England and Northern Ireland for the United Kingdom.
2. Mean reading score for 16 year-old students of Polish technical schools (Panel A) from an optional national study for the first grade of upper secondary school (16 year-olds) complementing PISA and mean PIAAC literacy proficiency score for Polish adults having attended technical schools (Panel B).
3. Mean reading score for 16 year-old students of Polish basic vocational education (Panel A) from an optional national study for the first grade of upper secondary school (16 year-olds) complementing PISA and mean PIAAC literacy proficiency score for Polish adults having attended basic vocational education (Panel B).
4. Mean PIAAC literacy proficiency score for adults with less than upper secondary education.

Source: OECD (2013), *OECD Skills Outlook 2013* (database); OECD calculations.

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allowed to take matriculation (*matura*) exams opening the way to tertiary education, essentially the same exam as in general upper secondary schools, although with a possibility to replace one subject with a practical exam in the student's occupational orientation. The government hopes to attract better students to these schools, as qualifications after the two cycles would be close to those in technical schools, which have a better reputation. A better way to offer attractive qualifications in line with labour market needs and with students who prefer practical to academic training might have been be to offer a matriculation exam with an emphasis on practical skills in the students' vocational specialisation instead, akin to *berufsmatura* in Switzerland. Employers could have a strong involvement in setting the practical part of the exams, which would open the way to vocational tertiary education in the students' specialisation, while further exams could be required to enter more general academic fields.

More efforts will be needed to attract highly qualified pedagogues to sectoral schools through attractive pay and career prospects, especially as a large part of the teaching workforce is set to retire. Attracting more teachers who combine strong teaching skills with up-to-date industry experience, for example maintained through part-time work in firms, will also be crucial. The recent decision to lift caps on pay for practitioners teaching in vocational schools is helpful in that respect. Learning programmes should be adjusted so that math, Polish and ICT classes fit the training context and professional specialisation of vocational students, which has been shown to strengthen motivation and learning outcomes.

More has to be done to convince workers and firms of the benefits of training. Surveys show that more than 60% of Polish firms try to recruit workers who are already well-adapted to their jobs without much of an intention to develop their skills. Likewise, many Polish

workers do not engage in training because they do not see benefits for their labour market situation (Worek et al., 2015). More than 60% of adults did not want to participate in training according to data from the OECD Survey of Adult Skills, compared to around 40% on average in participating countries. Survey data reveal that more than 75% of Polish firms complain that they cannot find personnel with skills corresponding to their needs and 30% of firms that do not invest in training point to a lack of training measures that suit their requirements (PARP, 2015). These employers need to be convinced that their own engagement is required if they want to be able to count on workers with the skills they need. There are examples of firms in Poland who benefitted substantially from setting up apprenticeship-type programmes for youngsters and adults in collaboration with vocational schools building on the German experience (Box 1.3). The government can use these to advertise their benefits.

Box 1.3. **Firms addressing skill gaps by sponsoring dual vocational education programmes**

The German-Polish Chamber of Commerce has supported a number of companies to introduce dual vocational education programmes, combining practical training in the workplace and theoretical education in vocational schools. This helps firms deal with their skills needs by training workers themselves. While Germany has a long tradition in this type of training, Poland is still struggling to establish closer collaboration between vocational schools and employers. In the cases described below, the Chamber has acted as an intermediator, helping companies find partner schools, design curricula and advertise the programme in schools and in educational fairs to attract motivated young people as apprentices. The Chamber also monitors the training, secures close contact between the schools and employers and designs and organises exams. Successful graduates obtain a Polish and a German VET certificate. Participating companies appreciated being able to tailor the education programme to their needs and screening their apprentices during work periods. This helps them to shape their trainees' abilities and establish a close link with them to benefit from their skills in the long term, by hiring them upon graduation for instance. Examples for education programmes built in this way include the following:

Mechatronics. The Polish affiliate of German home appliances producer Bosch, experiencing difficulties with finding technicians with skills at the crossroads of mechanics and electronics, set up an educational programme combining the two, mechatronics. It collaborates with a local vocational school at its Poznań headquarters. The programme is designed to help theoretical and practical skills in programming, design, assembly and maintenance of mechatronic devices and systems. The company directly influenced the content of the programme, and the best graduates were offered a job in the company upon graduation.

Industrial mechanic and automobile mechatronics. Confronted with a similar skills gap the Polish bus producer *Solaris* built partnerships with vocational schools at its different production sites to train industrial mechanics and automobile mechatronics. Specifically for the practical training of its mechanics it installed equipment for welders.

Tool makers and machine operators. Phoenix Contact, a specialist in industrial automation, interface and interconnection solutions, has sponsored apprenticeships in different fields since 2013. The company pointed out that training apprentices at its workplaces, rather than relying on graduates of school-based vocational education who did their practical training in school workshops, was an investment that helped to save on firm-specific training of workers in the longer run.

Box 1.3. **Firms addressing skill gaps by sponsoring dual vocational education programmes** *(cont.)*

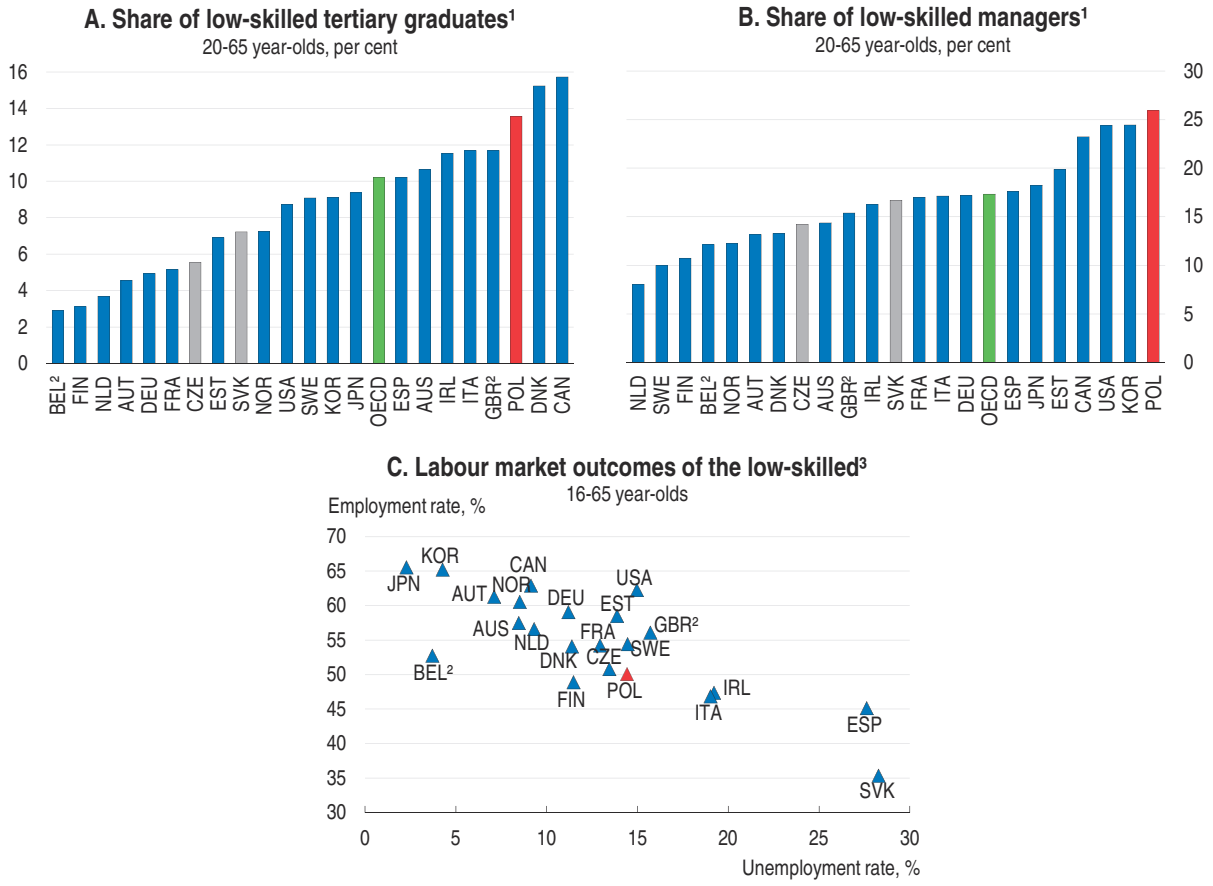
Apprenticeships sponsored by Volkswagen. Volkswagen is one of the pioneers of dual education in Poland and has sponsored apprenticeships in mechatronics since 2002. It is the biggest employer of apprentices at the secondary level in the Poznań region, training youngsters in five different professions.

Dual education at the tertiary level – mechanical engineering. Building on their experience with apprenticeships for students at the secondary level, Volkswagen, Solaris and Phoenix Contact have been jointly sponsoring dual tertiary studies of mechanical engineering in collaboration with Poznań University of Technology since 2014. At the same university there is a specialisation in automation and robotics sponsored by Volkswagen and Phoenix.

The government has taken various initiatives to engage employers more in training, but this has been hindered by relatively weak and dispersed employers' associations. Given rising skills shortages, employers' interest in training workers has risen recently. The government is currently holding seminars with employers from a large range of sectors, including sectoral skills councils set up by Polish Agency for Enterprise Development, PARP, to identify the need for new training programmes and develop guidelines for schools and employers to work together, as there is little experience with such cooperation. This should be a priority. The regions and the central government should actively reach out to small companies, whose engagement is often particularly weak. At the same time, they are set to benefit considerably when providing their inputs in programme design to meet their needs. Taking on vocational students as workers who gain competencies in modern technologies and management thanks to high-quality vocational schools would help these companies develop their capacity to innovate and grow. Many shy away from the investment costs of taking on apprentices, though. One solution for them would be to pool their resources with other companies to equip training centres; governments should help organise such efforts. In Australia, small and medium-size companies organise so called Group Training Organisations, which select and recruit apprentices, place them with host employers and manage employer responsibilities as well as quality (OECD, 2016c). They also provide mentoring and guidance. Joining forces in this way could help Polish SMEs to benefit from apprenticeships, while controlling the costs. The government should also develop educational material to convince companies that training workers is an investment that pays. A German study (BIBB, 2015) comes to the conclusion that there are considerable net benefits to taking on apprentices in the longer term, and some employers recuperate their cost already during the training period, as apprentices contribute to regular work.

The Polish government plans with the OECD to develop a skills strategy involving early childhood and compulsory education, the whole government and stakeholders, and this is welcome. Basic skills should feature high on this agenda, as Poland lacks a strategy to fight illiteracy. Strong basic skills are essential for adults to find high-quality employment and for workers to contribute to productivity growth of their firms. In fact, while unemployment is high among workers with low literacy and numeracy skills, a considerable share of them are employed (Figure 1.18). The share of managers and tertiary graduates who can barely read simple texts or solve basic mathematical tasks is also high, a serious limitation of their innovation capacity. Low literacy has negative stigma; hence, reaching those in need of further training requires a special approach. Many OECD countries,

Figure 1.18. **Low skills are pervasive and weigh on labour market outcomes, 2012**



1. Share of tertiary-graduated adults (Panel A), and managers with at least upper secondary education (Panel B), scoring below level 2 in at least one of the PIAAC proficiency scales, i.e. literacy, numeracy and problem-solving in technology-rich environments.
2. The data are based solely on Flanders for Belgium and on England and Northern Ireland for the United Kingdom.
3. Share of adults scoring below level 2 of the PIAAC scale of numeracy proficiency.

Source: OECD calculations based on OECD (2013), *OECD Skills Outlook 2013* (database).

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including Germany, France and the United Kingdom, have developed basic-skills strategies that can serve as an inspiration for Poland. They include information campaigns to raise awareness, professionalization of basic-skills teachers for adults, partnerships with schools and employers to reach workers and parents with weak literacy, as well as training for job-search assistants and continuing-education teachers to identify clients with weak basic skills (OECD, 2016a). Basic-skills training combined with practical work experience in firms can be particularly helpful to motivate candidates. The government's pilot project to build a network of local adult learning centres focussing on low-skilled and inactive adults with regular evaluations is welcome.

Stronger efforts are needed to improve participation in adult learning and ensure its quality. Over recent years the government has taken a number of initiatives to improve participation in adult education and training. Rather than attending full-time vocational schools, adults can now obtain new qualifications by enrolling in shorter courses, which can be part-time and modular, making it easier to reconcile training with work. The recently adopted integrated qualifications framework describes knowledge, skills and competences associated with formal qualifications. The hope is that this will make it easier for employers

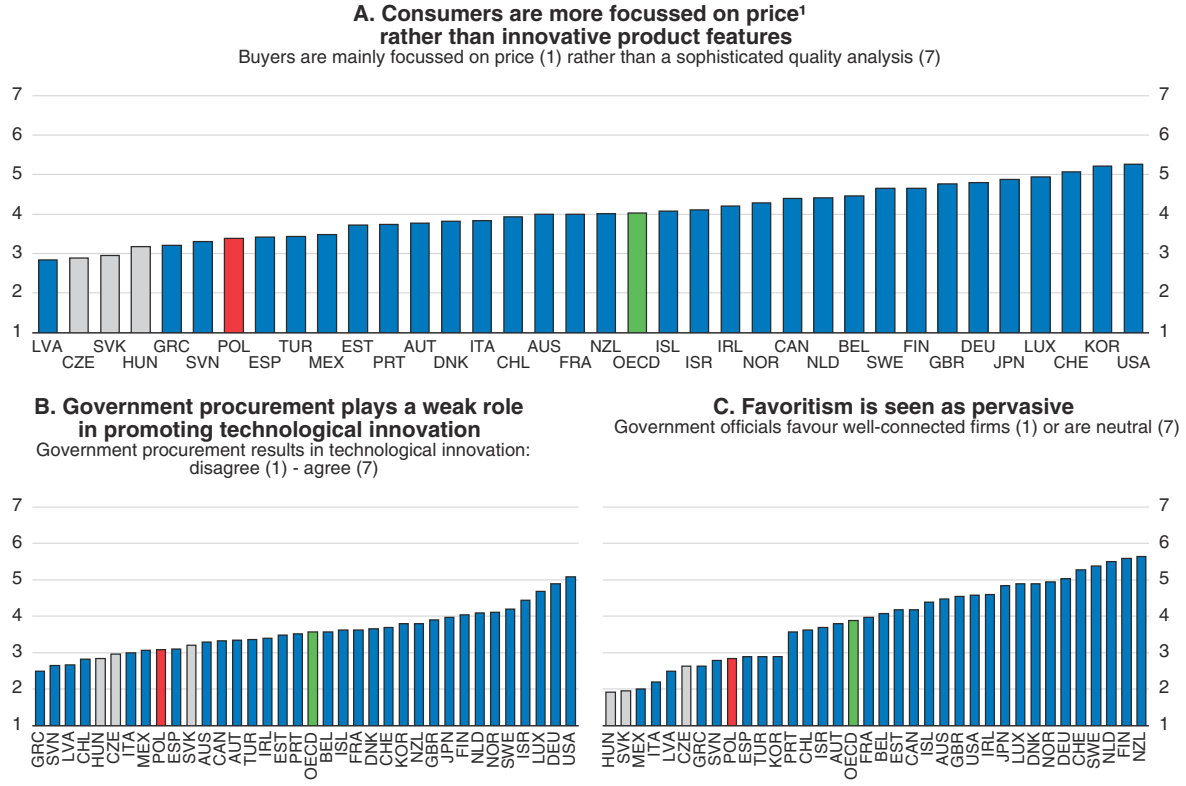
to choose training measures adapted to their needs, promoting stronger participation. The framework will also facilitate certifying informal and non-formal learning, such as training on the job, making it easier for experienced workers with little time for formal training to obtain further qualifications. The framework is also used to accredit certifying bodies that award qualifications through exams at the end of training programmes. The hope is that this would serve as a quality signal, making the training market more transparent. However, progress has been slow, and so far only a handful of measures have been accredited. Germany has private certifiers, which are approved by a central agency. Since 2016 Poland has used a similar system to accredit providers of training and other enterprise development support services, such as consulting and mentoring, through certified private accreditors. Accreditation is as prerequisite for making these services eligible for financing with EU regional funds, and inclusion in a databank set up by PARP is meant to make it easier for firms and training candidates to find what they need. PARP reviews accreditation certificates and performs on-site audits with a staff of five people to ensure service quality. This is welcome progress. This new approach should be evaluated and extended to make accreditation a prerequisite for receiving other types of public subsidies as well. Yet, more staff may be needed to ensure effective quality control.

Strengthening demand for innovation through public procurement

The government wants to use public procurement as an instrument to promote innovation by creating sufficient demand, but this requires a step change in procurement practices. The volume of public procurement is indeed substantial, amounting to 12% of GDP in Poland in 2015, but like household demand it is mostly focussed on low price. There is little appetite for sophisticated technologies (Figure 1.19, Panels A and B). Only 7 % of awarding entities reported having been involved in public procurement for innovative products or services between 2007 and 2010, and only 5% of firms (Starzyńska and Borowicz, 2012). The lowest price was long the only criterion used for contract award in the overwhelming majority of procedures, more than 80% in 2014, before it became mandatory to apply at least one additional criterion (UZP, 2015). Many government officials involved in public procurement pointed out that market-proven products reduce the risk of appeals and are easier to defend to auditors (Starzyńska and Borowicz, 2012). More generally, adopting new solutions always involves the risk that these might prove inferior to proven ones. In particular, when large sums are involved it can be appropriate for public buyers to weigh this risk against opportunities associated with promoting innovation. Beyond that, favouritism is seen as pervasive, which can discourage new and innovative firms from participating in public tenders (Panel C). Capacity also seems to be an issue as public buyers cited their employees' difficulties in establishing objective evaluation criteria for innovative projects. Complex procedures were cited as a barrier for small companies to participate in public tenders (Starzyńska and Borowicz, 2012). The Polish Agency for Enterprise Development offers SMEs training and counselling to help them participate in public procurement procedures in Poland and abroad.

Recent reforms should help to gradually strengthen the role of quality standards in public procurement and make it easier to favour innovative solutions, provided capacity is built. Since 2014 at least one secondary criterion is required for contract evaluation in addition to price. Yet, first results suggest that relatively simple criteria, such as delivery dates or payment terms, have been used in more than 60% of the cases. Quality, functional requirements and knowledge or experience were used in less than 15% of the cases until

Figure 1.19. **Demand for innovation is low, 2016-17**



Source: World Economic Forum (2017), *Global Competitiveness Index 2017-18* (database).

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mid-2016. Yet, a 2016 law requires contracting authorities who want to give a weight of more than 60% to the price criterion to specify quality standards and provide evidence on how they take life-cycle costs into account. Since then the use of quality standards and technical requirements in public procurement seems to have increased. The obligation to take life-cycle costs into account should give more room for innovative solutions to succeed, such as energy-efficient products, which often combine higher purchase prices with lower operating costs. Technical and competitive dialogues as well as negotiated procedures allow public buyers to discuss feasible quality standards and design features with potential suppliers before defining the subject matter of the award, making it easier to look for innovative solutions. Yet, these procedures are complex and have only rarely been used in Poland. The government intends to launch several pilot, pre-commercial procurement procedures in coming years, for example to harness the potential of young software developers. In addition, there are a few examples of innovation through public procurement procedures (Box 1.4). Yet, stronger capacity is needed for more widespread use of public procurement for innovation. The public procurement office offers training to help contracting authorities deal with innovation and other secondary public procurement objectives and it advertises best practices. In addition, technical help from the central government for smaller contracting authorities with less experience would be helpful as well as making it easier for them to launch joint projects through harmonised online tools. Establishing a national database of qualified consultants should be considered as well (OECD, 2016a).

Box 1.4. **Innovation through public procurement in Poland**

SOLARIS – a synchrotron radiation facility in Kraków

The first Polish synchrotron radiation facility SOLARIS was inaugurated at the Jagiellonian University in Kraków in 2015. Synchrotron is a unique man-made source of electromagnetic radiation, which has supported cutting-edge research in physics, chemistry, material science, medicine, geological and environmental sciences, structural genomics and archeology. The Polish synchrotron is the first research infrastructure of such substantial size in Central and Eastern Europe, providing state-of-the-art research opportunities for diverse and multi-disciplinary groups. Beyond research benefits can include education and training opportunities, creation of high-tech companies and services, and product as well as process development for research oriented industries.

The Regional Center for Water and Sewage Management, city of Tychy

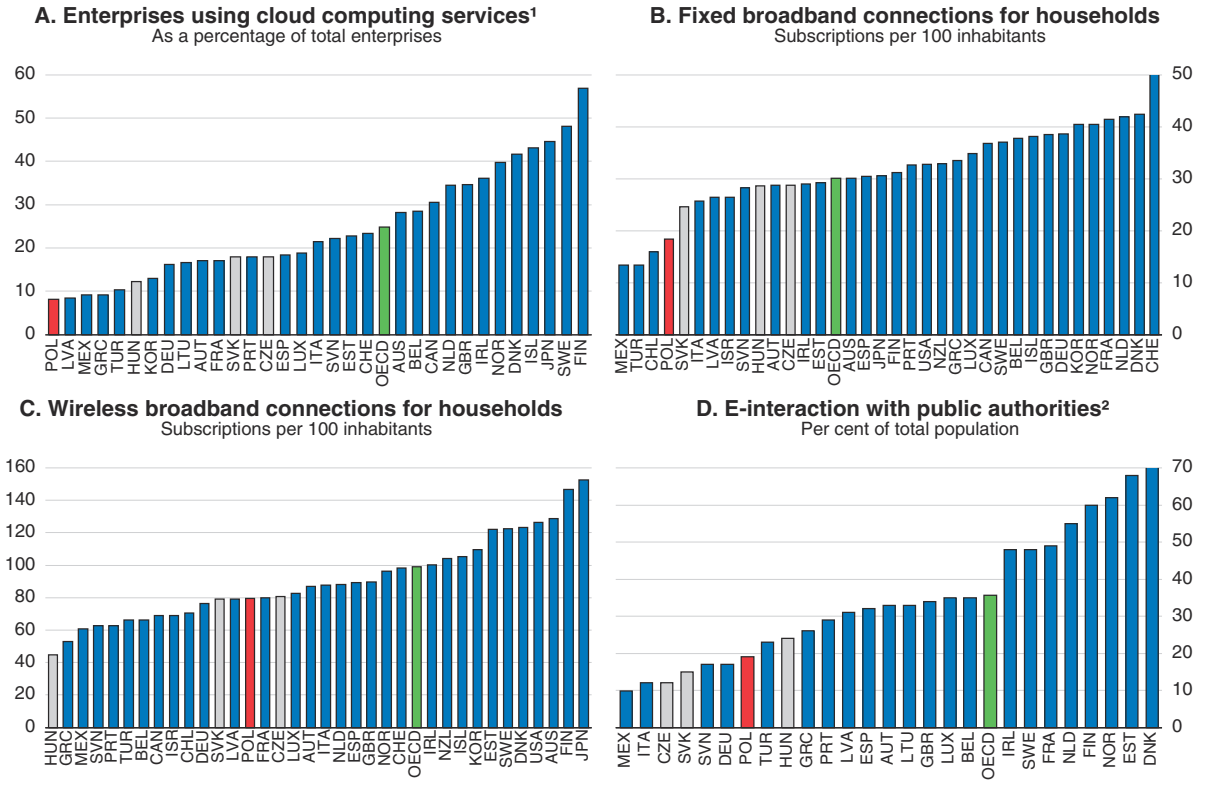
The Regional Center for Water and Sewage Management in the city of Tychy is an example of an institution with a long-term commitment to sustainable public procurement. The Center has transformed its highly polluting sewage treatment plants into one of the most modern and environmentally friendly facilities of its kind in Poland and Europe. Through green and innovative public procurement, setting high standards for energy consumption and reducing emissions, the Tychy Center for Water and Sewage Management has become a leader in eco-innovation in waste water treatment, renewable energy generation and management. Biogas is the primary source of renewable energy during the production of electricity and heat in cogeneration. Currently, the energy consumption of the sewage treatment process is only 0.33 kWh/m^3 of purified wastewater. Local nuisance noise has also been reduced by using blowers based on technology applied in Boeing jet aircrafts. The Center not only fully meets own energy needs, but is also able to support other city infrastructure.

The public procurement reform also simplifies procedures, which should promote participation of SMEs. It encourages the division of orders into smaller parts to make it easier for smaller enterprises to compete, although this can also be misused to circumvent public procurement obligations, and that should be closely monitored. It also makes e-procurement mandatory as of 2018. Documentation requirements are simplified, and relying on third parties to comply with some of the requirements of public procurement procedures, e.g. concerning professional qualifications or experience, will now be allowed.

Demand for information and communication technologies is low, as is capacity to use them. Polish enterprises make little use of cloud computing services, the number of both fixed and broadband internet subscriptions is low and e-government should be further developed (Figure 1.20).

The government has developed a digital strategy to promote e-government and a nationwide e-payments system. The strategy aims to improve public-sector efficiency and the quality of public services and to promote cashless payments with a view to fighting the informal economy and enhancing tax compliance. Elements include the creation of a single email-box for citizens to communicate with public services, including for delivery of official documents and compliance with reporting obligations; e-identification to facilitate information exchange between citizens and the government, digitalisation and simplification of benefit and tax payments, in particular social contributions; and improved health-care services through digital information exchange concerning patient profiles and treatment histories between providers. The strategy also foresees the promotion of cashless

Figure 1.20. **ICT penetration is low, 2016**



1. Cloud computing refers to ICT services used over the Internet as a set of computing resources to access software, computing power, storage capacity and so on.
2. Share of individuals who used internet to send filled forms to public authorities in the 12 months preceding the survey.

Source: OECD (2017), *OECD Digital Economy Outlook 2017*, OECD Publishing, Paris; *OECD Broadband Portal*, *www.oecd.org/sti/broadband/broadband-statistics/*; OECD (2017), *OECD Government at a Glance 2017*, OECD Publishing, Paris.

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payments between the public sector and citizens as well as within the private sector, the development of a nation-wide e-payments system, and development of e-billing and e-receipts. The government sees the implementation of this strategy as an opportunity to promote the development of new technologies in Poland and plans business incubators, seed accelerators and clusters surrounding e-billing services and block-chaining technologies. However, it will need to be accompanied by effective ICT training to enhance the capacity of Polish citizens to use these technologies. The planned Foundation of the Industry of the Future, mentioned above, could play a useful role in that respect.

Recommendations to strengthen innovative capacity in Poland

(Recommendations that appear in the Key Recommendations are in bold and italics)

Higher education and research

- ***Enhance industry-science collaboration. Continue to increase funding for higher education and research over time, to merge small universities and independent research institutes to build strong research universities, and to allow underperforming institutions that do not improve over time to shut down.***
- Move towards multi-year budgets for universities. Induce universities to do more fundraising by offering matching grants.

Recommendations to strengthen innovative capacity in Poland *(cont.)*

(Recommendations that appear in the Key Recommendations are in bold and italics)

- Ensure that allocation criteria for financing are based on research quality and impact.
- ***Improve the quality of doctoral training by structuring it through coursework and tutoring and tightening entry criteria.***
- ***Offer well-remunerated academic positions, and base career progression on an evaluation of research and teaching quality by faculty and external experts.*** Adjust the timing of evaluations to allow for family-related career breaks.
- Engage with the research diaspora, and develop systematic policies to attract researchers from abroad and send Polish researchers and students to foreign countries.
- Develop a strategy for modern entrepreneurship training as part of the envisaged higher education reform.
- Ensure sufficient funding for technology transfer offices, and encourage mergers of offices from different universities.
- Take technology transfer out of the realm of public finance.

Education and training

- ***Develop a national skills strategy with a strong basic skills component.***
- ***Incentivise employers to develop workplace-based vocational education and adult training.***
- Dedicate multi-annual financing to build strong workplace-based vocational education programmes co-financed and -managed with business.
- Attract highly qualified teachers to sectoral schools through attractive pay and career prospects. Strengthen basic-skills training, and adjust subject content in Polish and maths to pupils' practical training context.
- Evaluate and expand the new system to certify training providers and the public database detailing their quality and courses. Ensure that training quality control is sufficiently staffed.

Innovation support

- Continue the simplification of administrative procedures and tax laws without foregoing rules that are essential to ensure good environmental, social and economic outcomes.
- Continue simplifying procedures to apply for EU funds. Allow more for personal presentation of projects, while directing promising candidates to coaching to develop and apply their ideas, if needed.
- Develop brokerage and consulting services to help SMEs make better use of innovation support and technology.
- Provide for systematic evaluation of the economic effects of innovation support. Set aside funding for that, including for evaluation based on experimental methods.
- Provide regions with central government support to improve their public procurement capacity. Ease application procedures for EU funds that they administer.
- Concentrate support for clusters and technology parks on improving their management, such as support for members to expand abroad, network and obtain training.

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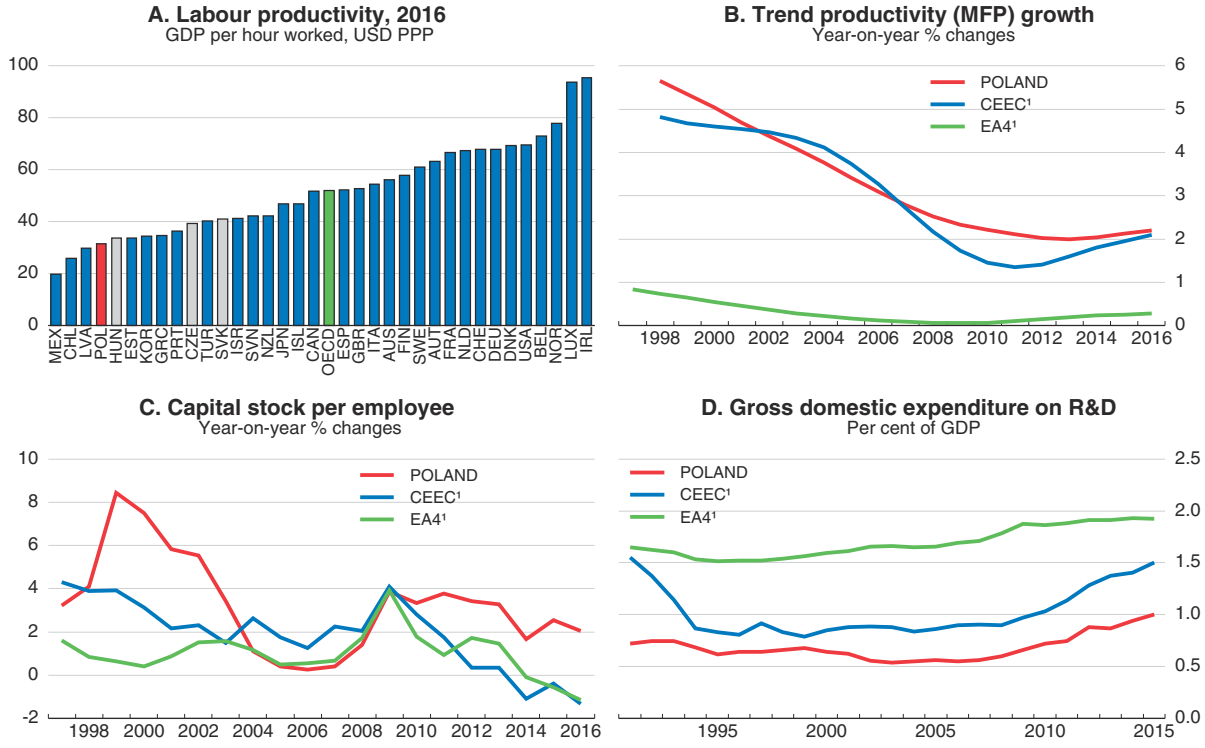
Chapter 2

Financing innovative business investment

Poland's productivity has grown strongly over the past two decades. However, the public and private capital stock is weak, and investment remains focused on the adoption of existing technologies, which weighs on future productivity gains and innovation. Many micro enterprises have low productivity, and structural bottlenecks reduce start-ups' growth and their chances of survival. The EU and the government are stepping up funding for business research and development, collaboration with the public sector, entrepreneurship and innovation. This is an opportunity to improve the management of public business support, and the large new programmes should be carefully discussed with stakeholders and regularly evaluated to avoid the risks of subsidising low-productivity firms and to strengthen the take up from the most productive small and medium-sized enterprises. The sustainability of this ambitious package of measures will also require significant public revenues and promoting alternative market-based financing instruments will be critical over the medium term. Ongoing improvements in insolvency procedures and efforts to reduce the regulatory burden are set to ease reallocation of resources through the economy. However, the level of state involvement would remain important, and ensuring the independence of the network industry regulators and the Competition Authority and a level playing field between alternative technologies, as well as easing labour mobility would be good moves.

Poland has to keep upgrading its knowledge and technology to sustain long-term economic growth. Labour productivity has increased rapidly but remains below many other OECD countries (Figure 2.1, Panels A and B). Productivity gains explain the major part of Poland's recent growth performance. Impressive technological progress has driven improved standards of living, and physical capital intensity has increased significantly (Panel C). However, spending on research and development (R&D) activities is still lagging (Panel D), and the innovative capacity of the economy low (Chapter 1). Fostering innovation and diffusion of new technologies and ideas would support productivity growth and raise medium-term growth prospects (Andrews et al., 2015), as economic efficiency gains are becoming harder to achieve and Poland's catch-up process will be mechanically slowed by the fast population ageing resulting from low fertility rates and a steady rise in life expectancy (OECD, 2016a).

Figure 2.1. **Productivity growth and business investment**



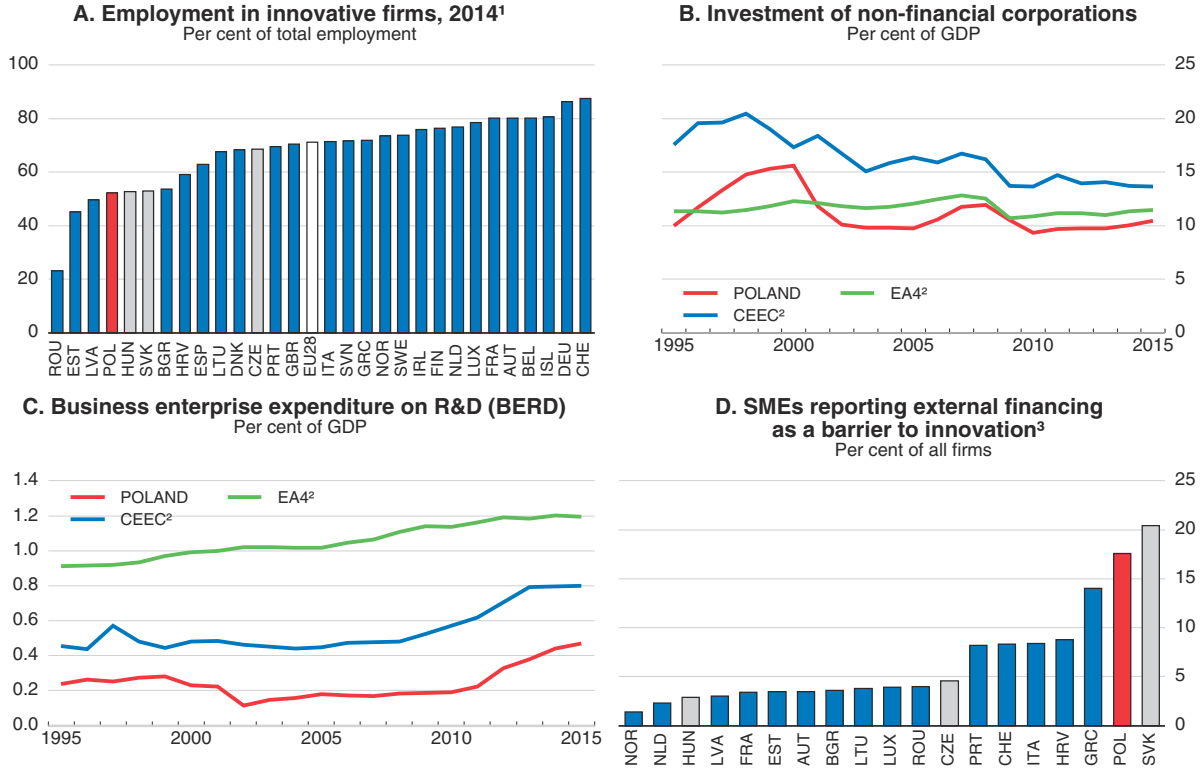
1. EA4 is the average of Germany, France, Italy and Spain. CEEC is the average of Hungary and the Czech and Slovak Republics.
Source: OECD (2017), *OECD Economic Outlook: Statistics and Projections*, *Productivity Statistics* and *Research and Development Statistics* (databases); Statistics Poland (2016), *Science and technology in Poland in 2015*, Statistics Poland, Warsaw.

StatLink http://dx.doi.org/10.1787/888933688817

Firms are major drivers of innovation, but investment in R&D and innovation (RDI) remains limited. On the one hand, weak RDI activities reflect Poland's industrial structure

where less R&D-intensive industries such as business services and medium-low-technology industries are well represented. On the other hand, even after controlling for industrial structure, Poland has a low business R&D intensity compared to the OECD average (OECD, 2017) in that Polish firms, notably small and medium-sized enterprises (SMEs), are less innovative than those from many other European countries, and business investment has lagged most OECD countries and other central and eastern European countries (CEECs) over the past two decades (Figure 2.2, Panels A and B). In particular, business R&D spending is limited (Panel C). SMEs and the growing share of micro enterprises with less than 10 employees (PARP, 2015 and 2017) still face significant financing challenges, as innovation needs long-term investment in intangible assets, skills and technology, which may be difficult to finance without own funds and collateral (Panel D). Indeed, Polish enterprises mention insufficient funding as the main barrier to innovation, particularly in its initial phase (European Commission, 2016a; Lewandowska, 2016). OECD econometric evidence points to a lack of any statistically significant relationship between the growth of firms in Poland and their innovation, as measured by their patenting activity over 2003-10 (Andrews et al., 2014). In many sectors, allocative efficiency, as measured by the extent to which the most productive firms are the largest thereby indicating their ability to attract workers, appears weak compared to other European countries (Andrews and Cingano, 2012; European Commission, 2013).

Figure 2.2. **Business investment and R&D spending**



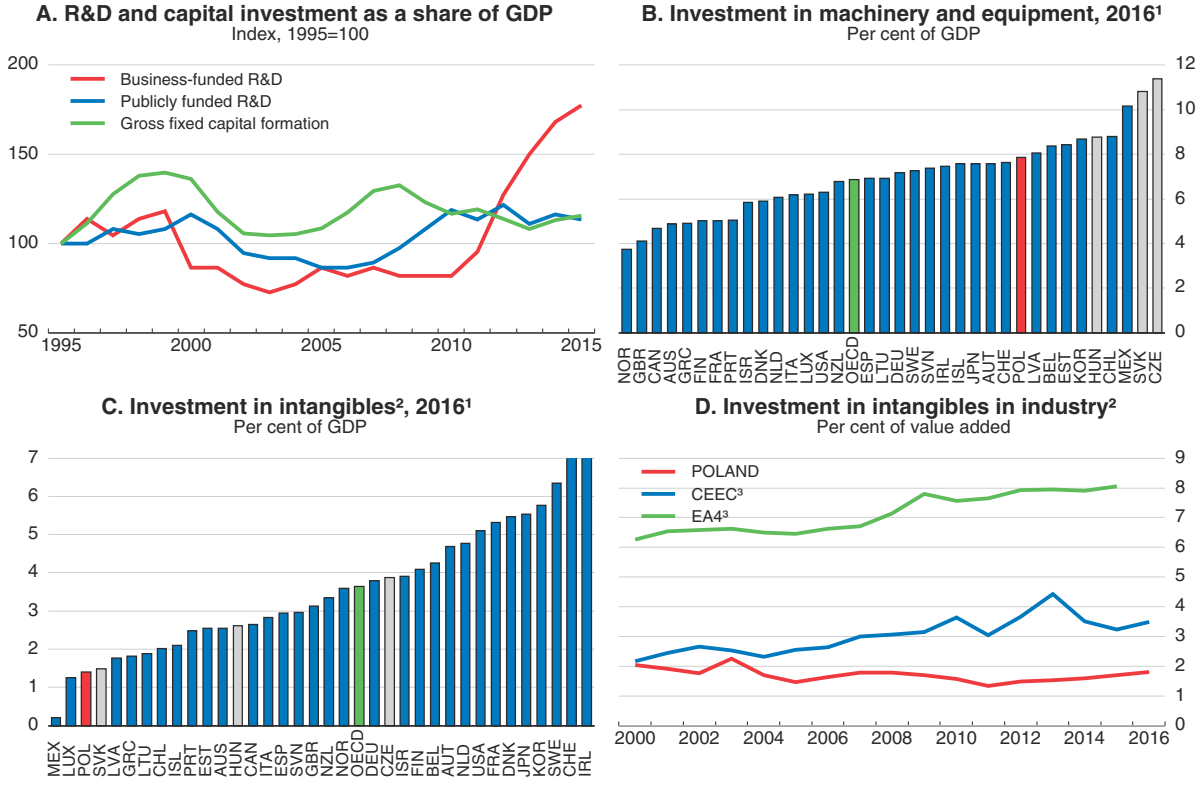
1. An enterprise is considered innovative when it has introduced either a new or significantly improved product, service, production process, organisation of management or way of selling goods or services in the past twelve months.
2. EA4 is the average of Germany, France, Italy and Spain. CEEC is the average of Hungary and the Czech and Slovak Republics.
3. Share of 10-249 employee firms for which the lack of credit or private equity is a highly important barrier to innovate.

Source: OECD (2018), *Research and Development Statistics* and *National Accounts Statistics* (databases); Eurostat (2017), "Community Innovation Survey (CIS) 2014", *Eurostat Database*.

StatLink http://dx.doi.org/10.1787/888933688836

Business RDI spending remains targeted at the diffusion of innovation. Historically, public and private business R&D spending has increased at a slower rate than overall investment in Poland (Figure 2.3, Panel A). Encouragingly, given its link with higher labour productivity growth, machinery and equipment investment is relatively high (Panel B). However, despite a fast increase in business spending on R&D over recent years, most innovative investments remained targeted at the acquisition and diffusion of existing technologies in the 2007-13 EU budget period (Chapter 1; Kapil et al., 2013). In particular, investment in intangible assets in the economy, such as data, software, patents, designs, new organisational processes and firm-specific skills, which in aggregate constitute so-called knowledge-based capital (KBC), has increased only moderately over the past 10 years and remains low in international comparison (Panel C). Though the ongoing productivity catch-up and substantial public infrastructure investment explain part of the structure of investment (OECD, 2016a), expenditures on intangibles have also declined from a low level in the industrial sector (Panel D). This may hamper productivity growth in the longer term, as investment in knowledge such as R&D can be recombined with many other inputs in multiple applications, giving rise to increasing returns, and may result in positive spill-overs for other firms (OECD, 2013a).

Figure 2.3. **Structure of investment**



1. Or latest available year.
2. Intangible fixed assets that are consistent with the definition in the System of National Accounts (SNA) 2008. This includes R&D, mineral exploration, software and databases, and literary and artistic originals.
3. EA4 is the average of Germany, France, Italy and Spain. CEEC4 is the average of Hungary and the Czech and Slovak Republics.

Source: OECD (2018) *National Accounts Statistics* (database); Eurostat (2018), "National Accounts (including GDP)", *Eurostat Database*.

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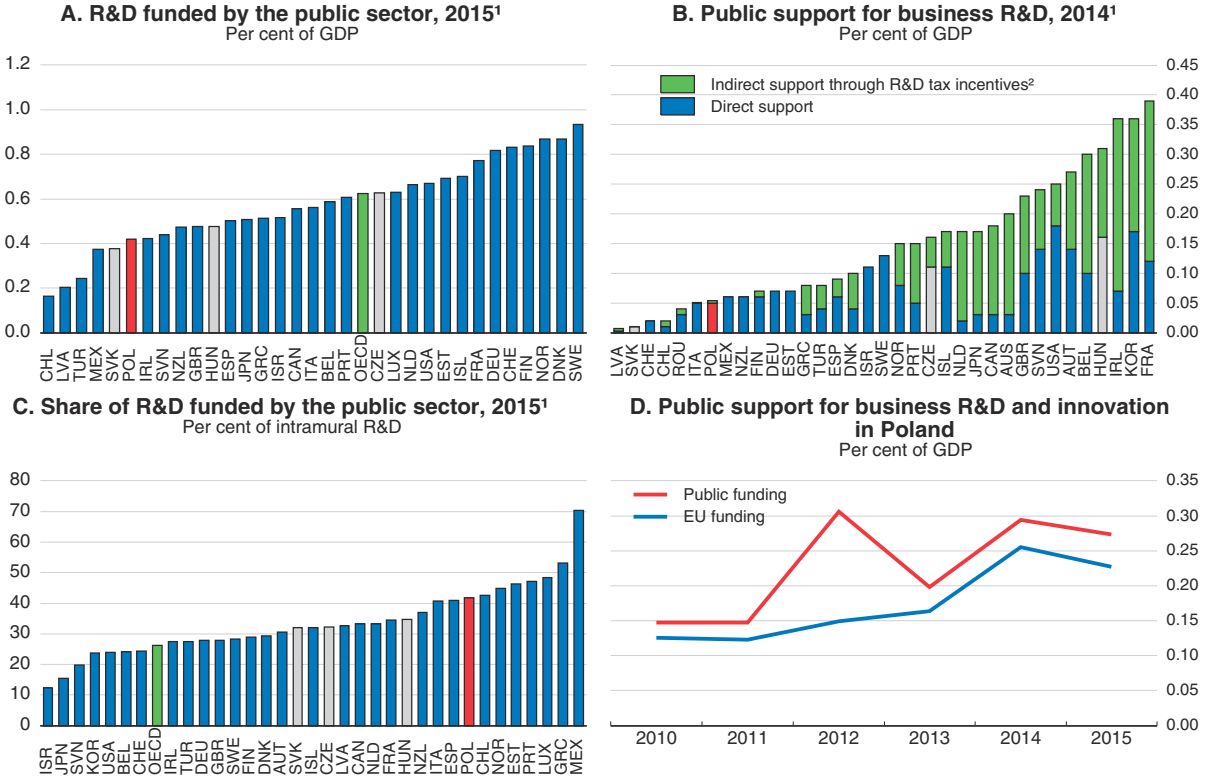
Public support for business innovation has increased, and the government has taken many steps to strengthen the financing of business RDI. Until 2014, public funding for R&D and business R&D, notably tax incentives, remained low compared to other OECD countries (Panels A and B), though public expenditures were a significant share of overall R&D spending (Figure 2.4, Panel C). The Strategy for Responsible Development foresees an increase in R&D spending from 1% of GDP in 2015 to 1.7% in 2020 and overall investment from 20% of GDP to above 22% of GDP (Ministry of Economic Development, 2017a). The government has reformed the innovation framework over 2015-17 based on the 2016 and 2017 innovation laws, and the 2016 "White Paper on Innovation" developed further legislative and organisational proposals (Ministry of Science and Higher Education, 2016). In the medium term public support for RDI relies heavily on increasing EU funding, which accounted for around 83% of public expenditures for business innovation in 2015 (Panel D). The 2014-20 EU Structural and Investment Funds (ESIF) foresee spending about EUR 105 billion (24% of 2015 GDP) over seven years in Poland, and projects under the Smart Growth Operational Programme (see below) would receive 9.7% of the total amount to develop research and innovation as well as technology diffusion, entrepreneurship and SMEs (Ministry of Economic Development, 2014).

Figure 2.4. **Public funding for innovation**



1. Or latest available year.
2. Indirect support refers to PLN 284 million CIT tax exemptions granted for innovation activities in 2014.

Source: OECD (2017), *OECD Main Science and Technology Indicators 2017*, Volume I, OECD Publishing, Paris; OECD (2015), *OECD Science, Technology and Industry Scoreboard 2015* (database); Statistics Poland (2017), *Expenditures on innovation activities*, Statistics Poland, Warsaw; Ministry of Finance.

StatLink http://dx.doi.org/10.1787/888933688874

The development of public support for business innovation is welcome, but its large scale and fast implementation bear risks. Increasing public support appears justified. Firm innovative expenditures, including firm R&D spending, can boost productivity and their gains may be shared with other firms through knowledge and information spillovers. However, such spillovers also lower private spending incentives, and firms may face difficulties to find external market-based finance for intangible assets (OECD, 2016b). A number of obstacles still hinder innovative activities and the efficiency of public support in Poland, such as the large share of micro firms, the complexity of administrative procedures and the lack of experience of public and private managers in the development of innovation (Kapil et al., 2013; Breznitz and Ornstorn, 2017). In addition, competitive pressures that could provide incentives for innovation remain low in some sectors, and a large share of the population has relatively weak skills (OECD, 2016a). Strengthening the design and management of public and private RDI support, as well as improving the regulatory environment, would improve the medium-term sustainability of RDI programmes. Indeed, infrastructure needs remain substantial, and other public spending items, notably on health and pensions, are set to rise, while RDI funding could decline following the 2014-20 ESIF programming period (OECD, 2016a).

This chapter reviews the institutional framework surrounding the financing of innovative business investment and start-ups. The main results are:

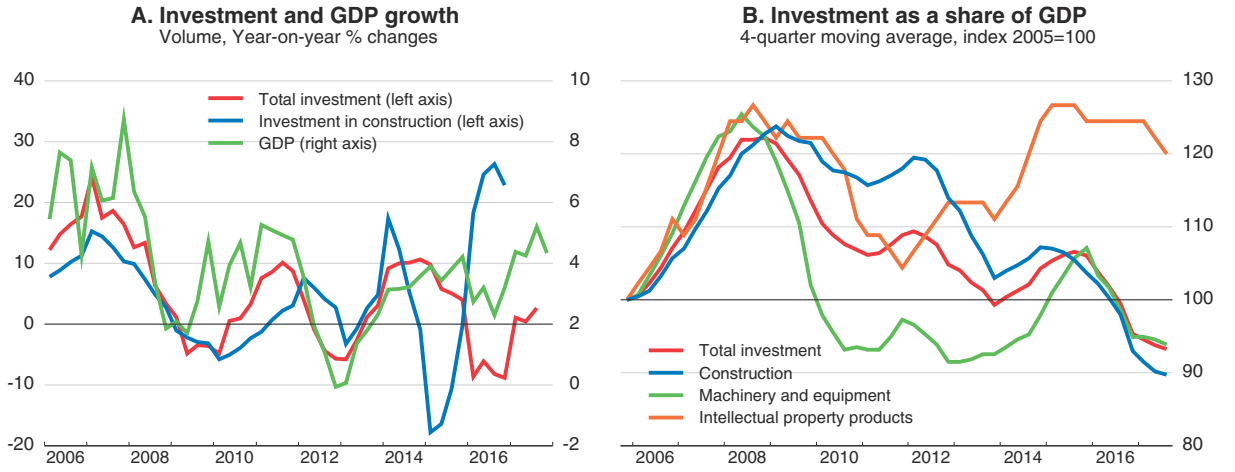
- Despite significant progress in boosting private RDI, innovative business investment remains low. In particular, small firms' innovativeness appears to lag other OECD countries. The government should pursue its efforts to strengthen business support, through ESIF funds, by better integrating policy and investment priorities across ministries and agencies. Over the medium term developing domestic public funding and market-based financing is needed to ensure sustainable support and investment.
- Credit supply has been resilient, and the authorities have provided additional tools to support new investment in intangible capital and SMEs. However, the profitability of the banking sector has declined, and there is ongoing uncertainty related to the foreign-currency-denominated mortgage loans as the details of a law meant to facilitate the voluntary restructuring of such loans have yet to be fully decided. At the same time, the targeting and magnitude of the numerous support measures for entrepreneurship and SMEs remain questionable and could increase businesses' incentives to remain small and discourage efforts to enhance productivity, while preventing the emergence of market-based finance.
- More structural product and labour market reforms would help attract innovative foreign direct investment (FDI) and bolster the quality of business investment. Strengthening the policy formulation process, creating pro-competitive market structures and securing non-discriminatory network-sector regulations would have considerable benefits for medium-term investment incentives and productivity.

Financing innovative business investments

General financing conditions have improved, but structural bottlenecks remain

Investment has declined sharply in volume terms in 2016 on the back of weaker disbursement of EU funds and increasing uncertainty. The decline is mostly attributable to a large fall in construction (Figure 2.5, Panel A). As in other CEECs, infrastructure investment has fallen because of temporarily lower disbursements of EU funds, notably in network

Figure 2.5. **Short-term developments in investment**



Source: OECD (2018), *OECD Economic Outlook: Statistics and Projections* (database) and updates; Eurostat (2018), "Gross fixed capital formation with AN-F6 asset breakdowns", *Eurostat Database*.

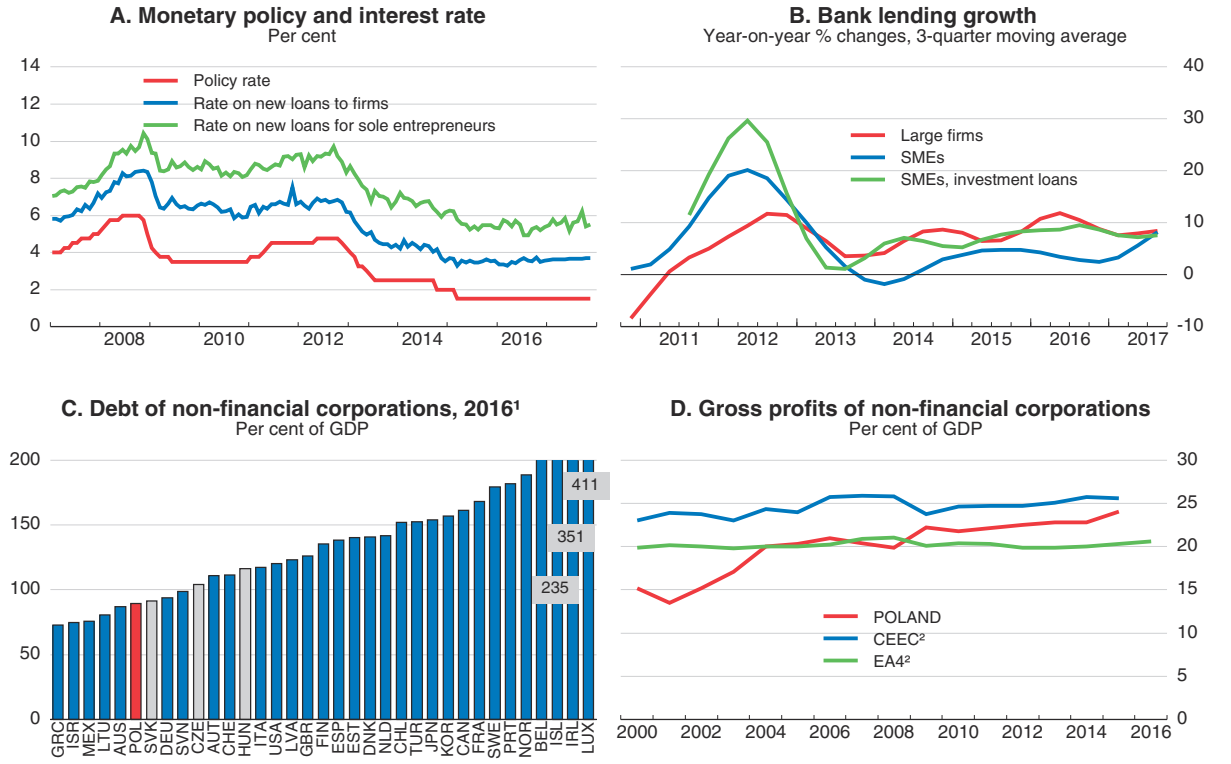
StatLink http://dx.doi.org/10.1787/888933688893

sectors. Increased uncertainty is also holding back business investment, despite easy credit conditions, rising profits and high capacity utilisation. In particular, the introduction of sector-specific taxes, together with frequent changes in the regulatory environment (see below), has reduced predictability and risk tolerance. Investment in machinery and equipment as a share of GDP is just back to its 2005 level, while expenditures on intellectual property products have stalled.

Financing conditions have generally been supportive of business investment. A historically low policy interest rate since March 2015 has continued to be supportive, and interest rates have declined steadily (Figure 2.6, Panels A and B). Corporate debt has continued to grow as a share of GDP, but it remains contained by international standards (Panel C). At the same time, the annual gross operating surplus of non-financial corporations is relatively high and growing steadily, suggesting that many companies have the capacity to finance investment from retained earnings (Panel D). In fact, retained earnings have been the dominant source of funding for investment since 2008 (NBP, 2017a). However, credit extension to SMEs has somewhat lagged that to the largest firms until 2017, and the spread between average lending rates for non-financial corporations and sole proprietorships and unincorporated partnerships, which accounted for 84% of the firms created in 2015 (Statistics Poland, 2017), remains sizeable.

Some SMEs and start-ups are financially constrained, which hinders their investment, productivity and growth. Employment in micro firms is a large share of the total, while intermediate-sized enterprises (ISEs), capable of innovating and developing and exporting new products, are in short supply (Figure 2.7, Panel A). This firm size distribution reflects a plethora of start-ups, which experience significant difficulties to survive and grow, despite a dynamic economy (Panels C and D). In particular, SMEs' innovation expenditures (including R&D spending) are low, mirroring a wide and persistent innovation gap compared to larger firms (Figure 2.8). As in other OECD countries, sub-optimal investments in young firms and SMEs may result from monitoring problems for credit institutions and from a narrow range of financial products and services (OECD, 2015a; Calvino et al., 2015). In Poland, such structural problems in access to financing are compounded by remaining weaknesses in the

Figure 2.6. **Credit developments and situation of non-financial corporations**



1. Or latest available year. Debt is the sum of special drawing rights, currency and deposits, debt securities, loans, insurance, pension, and standardised guarantees, and other accounts payable.
2. EA4 is the average of Germany, France, Italy and Spain. CEEC is the average of the Czech Republic and Hungary.

Source: Narodowy Bank Polski; KNF (Komisja Nadzoru Finansowego); OECD (2017), *Financial Indicators Statistics* and *National Accounts Statistics* (databases).

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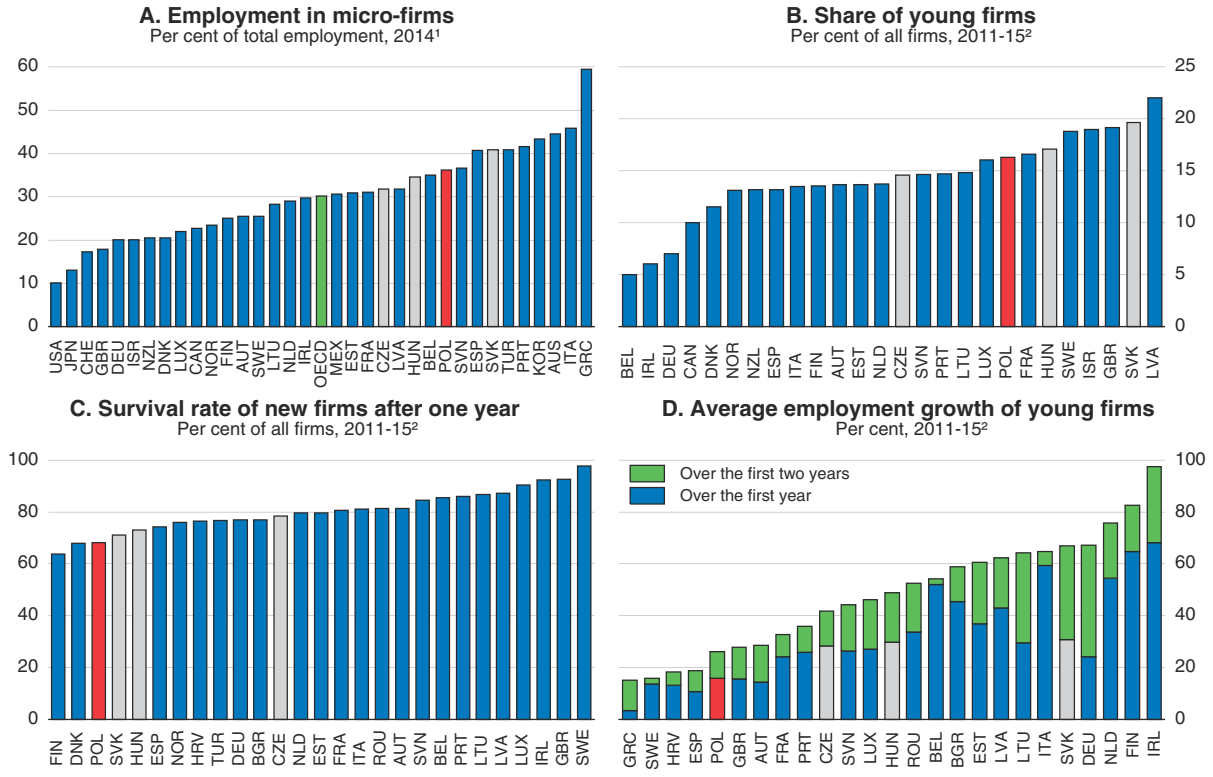
business environment, such as a lack of independence of some sectoral regulators and weak competitive pressures in services (OECD, 2016a and 2016c).

Public support for business SMEs, start-ups and business RDI is set to increase sharply. The 2014-20 ESIF foresees a continuously high spending through the Smart Growth operational programme. Various measures targeted at RDI and SMEs' competitiveness would reach nearly 5.7% of 2015 GDP over seven years (Figure 2.9). The European Commission expects that support for private investment and RDI will involve around one third of Polish SMEs (European Commission, 2017). In particular, the new EU programming period targets a larger amount of EU funds being allocated to private-sector R&D and cooperation between science and business, and less direct focus on capital investment. It also puts additional emphasis on the SME sector. Renewed public support for business RDI could boost productivity growth and innovation in the economy, but implementation challenges are elevated. The current innovative capacity of RDI institutions remains low, and the large scale-up of public support for RDI could raise wage pressures for researchers and high-skilled workers, as shortages have already occurred, and a large share of the workforce lacks advanced and digital skills (OECD, 2016a).

Figure 2.7. **SMEs and young firms in the economy**



1. Or latest available year.
2. Average of available years. Young firms are those less than two years old.

Source: OECD (2017), *Entrepreneurship at a Glance 2017*, OECD Publishing, Paris; OECD (2018), *Business Demography Statistics* (database); Eurostat (2018), "Structural Business Statistics", *Eurostat Database*.

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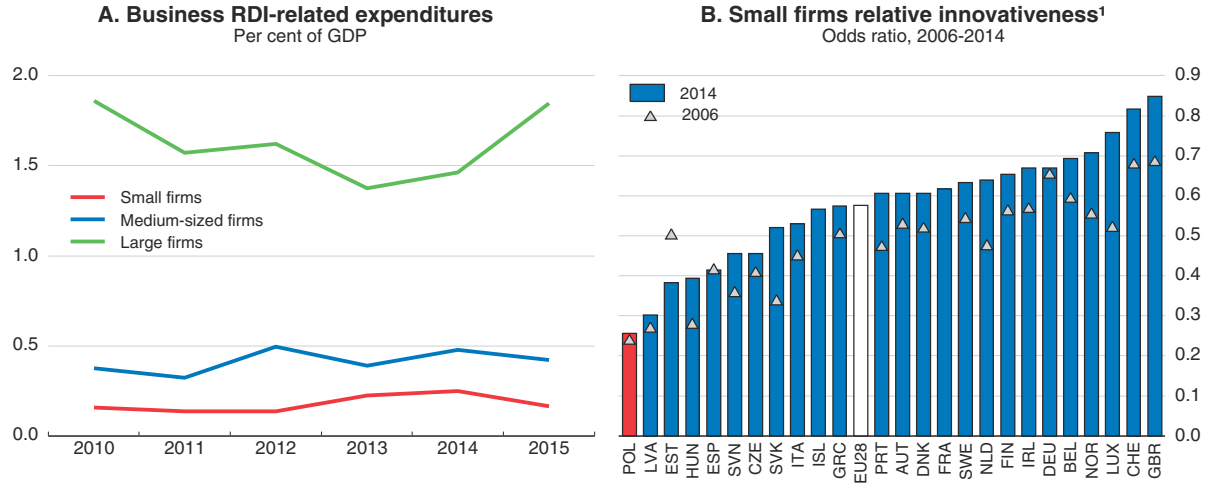
Figure 2.8. **R&D and innovation expenditures and innovation by firm size**

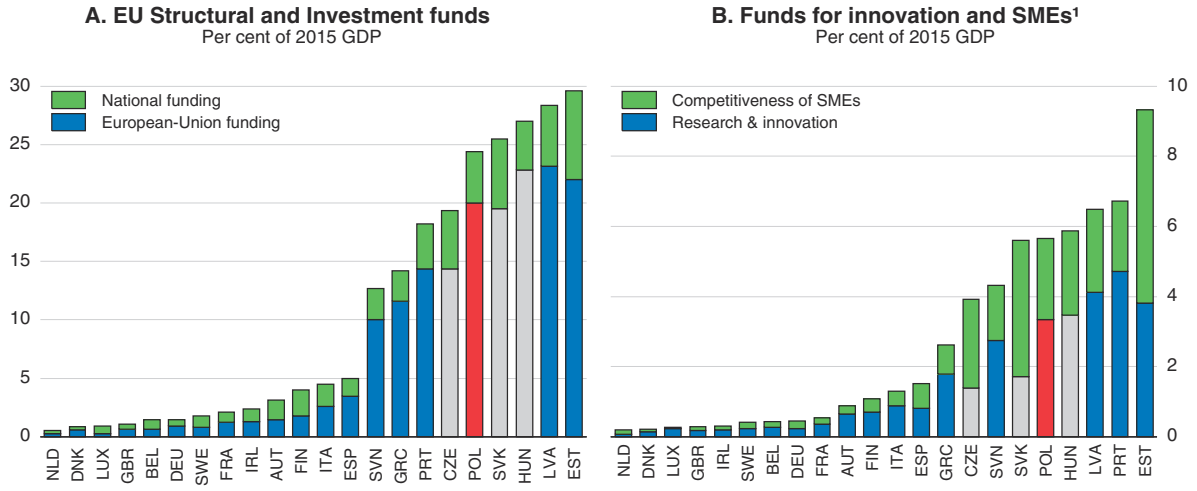


1. Share of innovative firms among 10-49 employee firms divided by the share of innovative firms among firms with over 250 employees.

Source: Statistics Poland (2017), *Expenditures on Innovation Activities*, Statistics Poland, Warsaw; Eurostat (2017), "Community Innovation Surveys (CIS) 2006-14", *Eurostat Database*.

StatLink http://dx.doi.org/10.1787/888933688950

Figure 2.9. **EU Structural and Investment Funds, 2014-20**



1. EU and domestic funding. The data refers to European Structural and Investment Funds with thematic objectives "Research & Innovation" and "Competitiveness of SMEs". For comparison across countries, the figure excludes some measures for technical assistance that represent 3.4% of expenditures under the Smart Growth operational programme in Poland.

Source: European Commission (2016), *ESIF Finance dataset*.

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Ensuring the effectiveness of government support to SMEs and innovative firms

The Polish authorities have reformed the organisation of support to innovation and business RDI. At the beginning of 2016 the government attempted to improve coordination with the introduction of the Innovation Council, engaging five ministries. Finally, several agencies and funds are becoming part of a single Polish Development Fund (Chapter 1 and Box 2.1). This could promote cooperation between different institutions, ease firms' take-up of specific measures and encourage cooperation between firms, universities and other research institutions (Chapter 1; Kapil et al., 2013). But old agencies and new departments may still operate in the same area, and their individual priorities may continue to adversely affect the effectiveness of activities and of expenditures. Moreover, the creation of the Innovation Council is a step in the right direction, but it has attracted private-sector scepticism, as it relies exclusively on public-sector institutions (Breznitz and Ornston, 2017). As policies that promote innovation are difficult for governments to design and even more difficult for them to successfully implement, greater private-sector involvement could help the government identify the right policies, as in several productivity commissions of OECD countries, such as Denmark and New Zealand (Banks, 2015). The Netherlands' approach to industrial policy in R&D-intensive sectors – "top sectors" – whereby representatives from industry, public research and government provide systematic input to the drafting of an innovation agenda is another example of best practice in this respect (OECD, 2014a).

Stepping-up evaluation efforts would increase the efficiency of public spending. Indeed, firms judged the design and implementation of past measures to support business innovation (Figure 2.10, Panel A) to be particularly complicated. Though the Regulatory Impact Assessment (RIA) framework in principle guarantees firms' engagement at all key stages of the policy-making cycle (Panel B), and the availability of e-information system for businesses and trade unions has increased, minimum periods for consultation with stakeholders are not always respected (OECD, 2015b). The frequency of business legislation has also accelerated recently, which further reduces the scope for public consultations

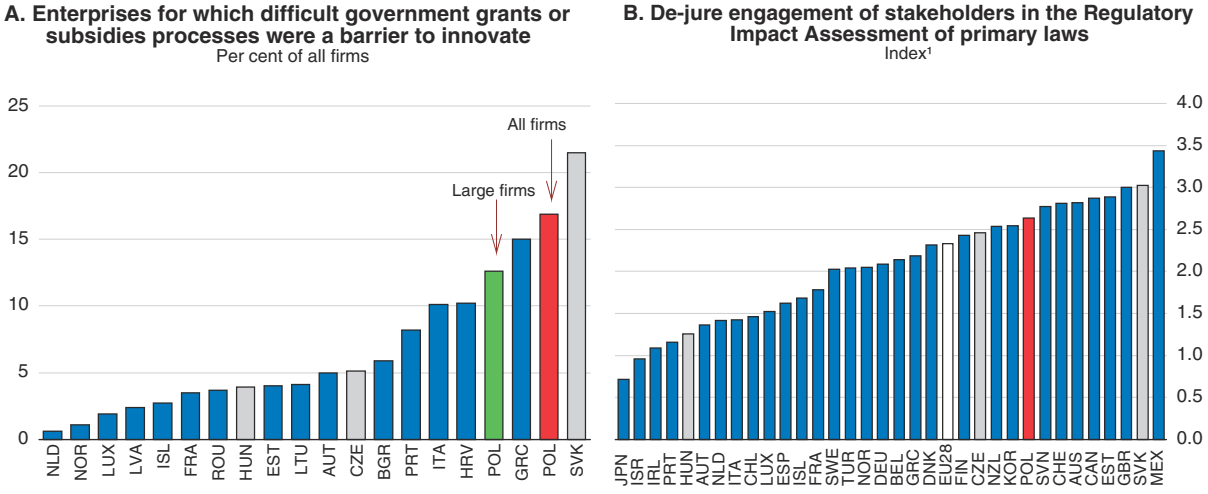
Box 2.1. **The 2016 and 2017 innovation laws and the Polish Development Fund (PFR)**

The 2016 innovation law entered into force in January 2017. It concerns four key aspects of the financing of innovation. First, it reformed the 2016 incentives for R&D by increasing tax deductions. For example, the deductibility of the R&D wage bill increased from 30% to 50%. It also expanded the carry-forward period from three to six years and eligible cost categories (covering notably patent application costs for SMEs) and created cash refunds for start-ups. Second, the law removed the five-year limit during which scientists could be entitled to a share in the profits from commercialisation, and abolished the taxation of the in-kind contribution of intellectual and industrial property incomes. Third, the law included a temporary tax preference for venture capital firms. Fourth, universities and other research institutes are now obliged to spend 0.5% of their grants for commercialisation.

The 2017 innovation law entered into force in January 2018. The authorities foresee a further reform of the R&D tax incentive to: i) increase tax breaks for enterprises investing in R&D – the level of tax relief would increase to 100% of the costs incurred (up to 150% for research centres); and ii) include tests to determine patentability and earlier scientific research into eligible costs. The authorities also plan to extend the temporary tax exemptions for venture capital funds on the sale of stocks of some innovative companies, create new tax relief for those investing in innovative start-ups, ease collaboration with businesses using PhD students, and update the accountancy law and the reporting of R&D expenditures.

The Polish Development Fund (PFR) was created in April 2016. It is based on the 2013 Polish Investments for Development (PIR) fund. This state-owned investment fund targets innovation and business support at various stages of development. It also integrates the management of the state-owned development bank (BGK) and the export credit agency (KUKE), and puts under the same umbrella public institutions responsible for supporting entrepreneurship in Poland, such as the National Centre for Research and Development (NCBiR), the Polish Agency for Enterprise Development (PARP), the Industrial Development Agency (ARP), and the Polish Investment and Trade Agency (PAIH). One of the first PFR programmes was "Start In Poland", which targets the development of venture capital though PFR ventures (Box 2.2).

Figure 2.10. **Design of public support for innovation and stakeholder engagement in Regulatory Impact Assessments, 2014**



1. Index from 0 to 4 (best practices).

Source: Eurostat (2017), "Community Innovation Survey (CIS) 2014", *Eurostat Database*; OECD (2015), *2014 Regulatory Indicators Survey results*.

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(Grant Thornton, 2017). The authorities could increase the transparency of the policy formulation process and the general knowledge of RIA inside and outside of government by publishing the annual RIA report that is presented to the government and using more standardised and simpler guidelines. Together with private-sector participation in the Innovation Council, this would improve stakeholders' engagement in the design of RDI support and encourage the presentation of alternative solutions to enhance the impact of legislation and regulations.

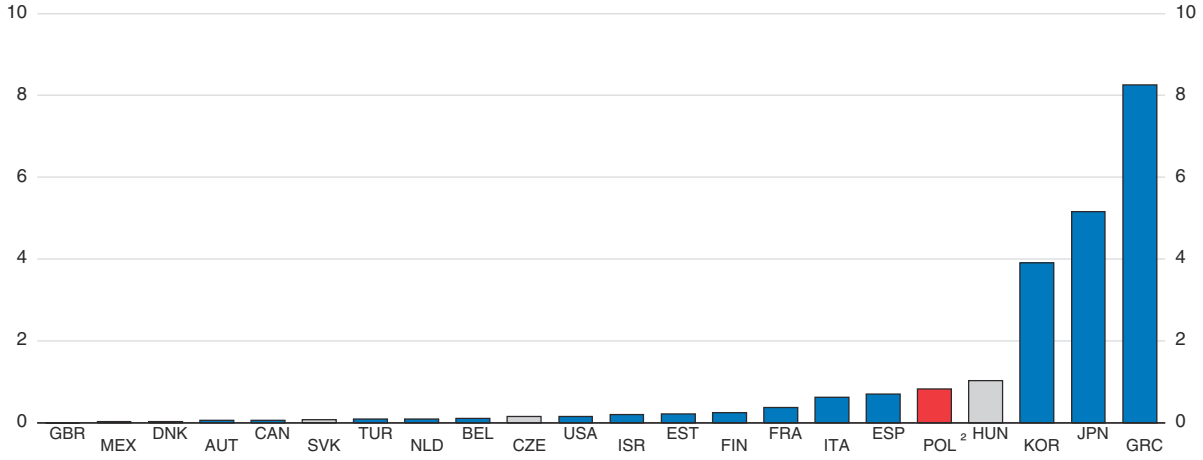
Ex post evaluation efforts should also be strengthened, while maintaining more stable policies. As in other OECD countries, such efforts have been partly lacking (OECD, 2016c), though they are mandatory for EU-funded programmes. For example, the agency in charge of business innovation subsidies has no obligation to monitor their effectiveness, though it granted support worth 0.3% of GDP in 2015 (NIK, 2016a). It is also noticeable that data and evidence about the effectiveness of the 2017 R&D tax break are lacking, while the government increased further its funding in 2018. Defining *ex ante* the timing of the evaluation would have allowed a more efficient adjustment of the scheme and avoided incentives for firms to delay their investments. More generally, systematically evaluating RDI support schemes would help to ensure that they are constantly improved based on experience. This could be done by identifying a permanent body to monitor innovation policies, such as the Innovation Council, and by encouraging the participation of all stakeholders and promoting independent evaluations.

The authorities have taken numerous steps to support SMEs and start-ups, but they have had mixed effects on productivity and growth. As in other OECD countries, loan guarantees remain the most widely used policy instrument used by governments to facilitate SME access to finance (OECD, 2016d). Such programmes cover a large share of the economy (Figure 2.11) and are rapidly expanding (AECM, 2016). The state-owned development bank (Bank Gospodarstwa Krajowego, BGK) provides low-cost guarantees for bank loans towards working capital and investment through the *de minimis* guarantee programme. In December 2016, 119 000 SMEs were using such guarantees with outstanding value worth PLN 13.9 billion – 0.8% of GDP at end-2016 (BGK, 2017). In addition, heterogeneous local guarantee funds provided guarantees worth PLN 1.59 billion in 2015 (KFSP, 2016). Some 43% of *de minimis* participants report that the scheme supported some forms of innovation and 41% that it helped lift innovative investments (BGK, 2016). However, such large government support and the fragmented structure of local and regional funds may induce bank forbearance, allow the survival of low-productivity firms, lower long-run efficiency and crowd-out alternative financing sources (Adalet McGowan et al., 2017; Biernat-Jarka and Planutis, 2013), but there is no rigorous evidence that such effects have materialised in Poland.

Guarantees targeted at more risky projects are set to rise, but alternative market-based financing methods should also be developed for SMEs. Under the EU COSME programme the European Investment Fund (EIF) will support BGK's provision of PLN 2 billion (0.1% of 2016 GDP) in loans to Polish SMEs (EIF, 2015). The loans would require less collateral than the *de minimis* programme thanks to an 80% guarantee provided by BGK and backed by EIF counter-guarantees. However, this high guarantee level could also discourage banks from actively monitoring their credit risks. Rigorous evidence on the effectiveness of both programmes is lacking. Yet, they should be carefully evaluated to reduce their potential costs for public finance, support to mature, low-productivity ("zombie") firms and risks of negative spillovers towards non-targeted firms. In this regard, making data available to external researchers would be helpful to support an independent evaluation of these programmes. Indeed, the

Figure 2.11. **Poland makes extensive use of government loan guarantees for SMEs**

As a percentage of GDP, 2015[1]



1. Or latest available year.
2. 2016 data for Poland. They refer to PLN 13.9 billion of outstanding *de minimis* guarantees at end-2016 and PLN 1.59 billion of guarantees from local and regional funds.

Source: OECD (2017), *Financing SMEs and Entrepreneurs 2017, an OECD Scoreboard*, OECD Publishing, Paris; NBP (2016), *Financial Stability Report*, December, Narodowy Bank Polski.

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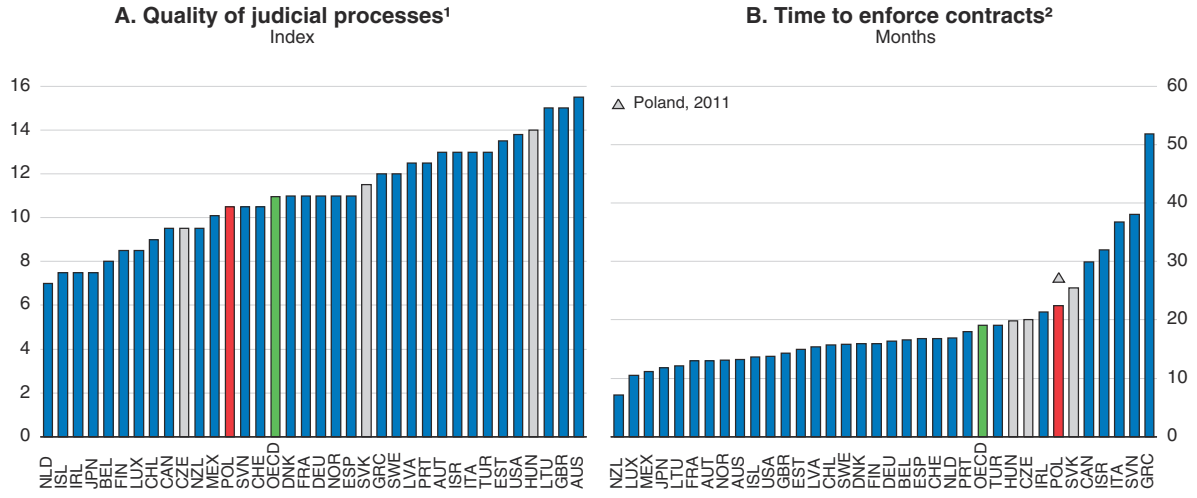
supply of guarantees to SMEs is already deemed as sufficient by many banks (Vienna Initiative, 2014), and fostering the development of the risk evaluation tools for SMEs as planned by the 2016 insolvency law would allow the development of further market-based finance for SMEs (see below).

While the market for factoring is relatively well-developed in Poland, developing it further along with reverse-factoring could reduce SMEs' need for guarantees and ease their access to trade finance and supply chains (OECD, 2015c). This would protect them against payment delays that remain pervasive (Intrum Justitia, 2016; Coface, 2017), albeit they are not cited by firms as a strong barrier to development (NBP, 2017a). Factoring is a short-term financing mechanism whereby a firm receives cash from a specialised institution (the "factor") in exchange for its accounts receivables. The credit risk and the collection of accounts are therefore entirely transferred to the factor. In contrast, reverse factoring generally entails the case of a large creditworthy firm which offers its suppliers, typically small SMEs, factoring; that is, the factor agrees to finance any of the receivables of the large firm generated by invoices from the small suppliers. Given that SMEs' customer bases and future cash flows are difficult to assess and that payment delays are substantial, factoring and reverse factoring should be developed further. This could notably be done by securing tax treatment that allows the same deductibility as for other business financing methods and reducing the time needed to enforce contracts in the judicial system, which remains much longer than elsewhere in the OECD (Figure 2.12). Indeed, courts and judges tend to be overburdened by small, non-litigious cases and the take-up of e-technologies is low, though judicial spending is relatively high, and a 2015 reform eased ICT use for civil proceedings (CEPEJ, 2016; World Bank, 2013 and 2016).

Many public grants also target innovative investment. Until recently, grants were the bulk of public financing for business innovation. Grants are in principle appropriate for supporting early-stage innovation by young firms, which generally lack the profits to benefit

Figure 2.12. **Enforcement of contracts, 2017**



1. Index scale from 0 to 18 (best practices), 18 indicates best practices in the court structure and proceedings, case management, court automation and alternative dispute resolution.
2. Period for resolving a commercial dispute through a local first-instance court.

Source: World Bank (2017), *Doing Business 2018: Reforming to Create Jobs* (database), the World Bank Group, Washington, DC.

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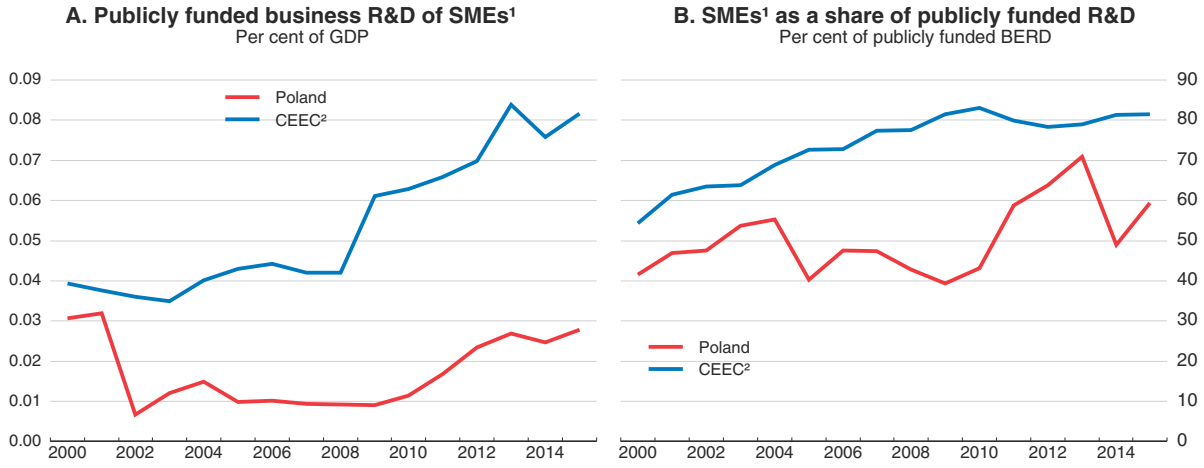
from non-refundable tax credits (Appelt et al., 2016). Some grant programmes have benefited from thorough evaluation and have had significant positive effects. In particular, a scheme for consortia of firms and research entities – In-Tech – led to more science-industry collaboration and increased the probability of applying for a patent, with tentative positive effects on commercialisation (Bruhn and Mckenzie, 2017). However, most programmes have favoured large firms and established technologies (Kapil et al., 2013). Indeed, risk aversion has steered a large proportion of public funding to big companies, in the form of grants for the adoption of existing technologies, and neglected innovative SMEs (Figure 2.13). For example, under the EU 2007-13 and 2014-20 programmes, BGK has used competitive applications to provide grants for innovative SMEs when they finance their innovation through bank loans. The "technological credit" covers up to 75% of project costs. The programme has been scaled up significantly under the EU 2014-20 programme. The grants have been awarded through open competitions since 2009, with the maximum eligible amount per project of EUR 1.5 million. During the 2007-13 EU financial framework, expenditures have been higher than planned, but the selection process has not supported the most innovative firms and was overly bureaucratic (NIK, 2016b).

The new EU programming period provides more diversified sources of funding for business RDI. The ESIF funds put more emphasis on the use of revolving and equity-based instruments and on financing technology development (as opposed to its absorption), with several measures focused on launching new products and services. In particular, the amount of many loan instruments targeted at innovative start-ups and SMEs is being scaled up (Figure 2.9 and Table 2.1). Within the so-called "SME window", a BGK guarantee fund will help innovative SMEs secure up to 80% of the loans. In addition, new equity-based instruments would involve private investors, such as venture capital funds and business angels to finance innovative enterprises (see below). These programmes are welcome, as they will offer diversified sources of funding for firms and innovations at different stages of development. For example, grants and equity-based finance will be appropriate for young

Figure 2.13. **Public support for business RDI and firm size**



1. SMEs are defined as firms with 0 to 249 employees.
2. CEEC is the average of Hungary and the Czech and Slovak Republics.
Source: Eurostat (2018), "Science, Technology and Innovation", *Eurostat Database*.

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Table 2.1. **EU Structural and Investment Funds for innovation in Poland, 2014-20**

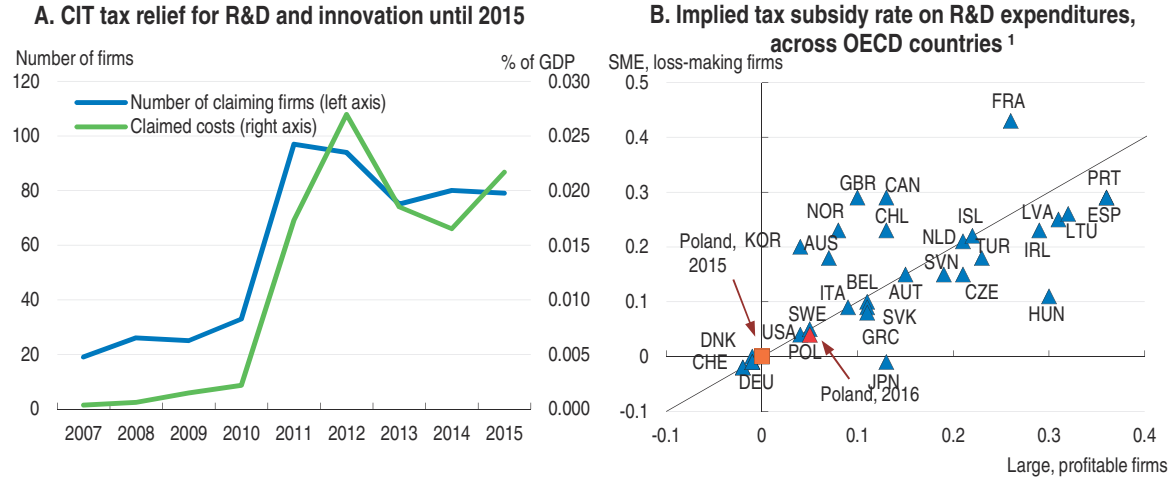
Programme	Total financing (EUR billion)	Total financing (% of 2015 GDP)	Share of EU financing	Domestic financing (% of 2015 GDP)
A. Smart Growth (of which)	10.2	2.4	84.5%	0.4
I. Support for R&D activity of enterprises	4.6	1.1	84.5%	0.2
II. Support for the environment and capacity of enterprises for RDI activity	1.2	0.3	84.5%	0.0
III. Support for innovation in enterprises	2.6	0.6	84.5%	0.1
IV. Increasing the research potential	1.4	0.3	84.6%	0.1
V. Technical Assistance	0.4	0.1	84.6%	0.0
B. Regional programmes[1]	7.0	1.6	84.6%	0.3
C. Eastern Poland[1]	0.8	0.2	85.0%	0.0
D. National Rural Development[1]	6.3	1.5	63.6%	0.5
E. Maritime and Fisheries[1]	0.3	0.1	74.7%	0.0
Total (A+B+C+D+E)	24.7	5.7	79.1%	1.2

1. Refers to European Structural and Investment Funds with thematic objectives "Research & Innovation" and "Competitiveness of SMEs".
Source: European Commission (2016), *ESIF Finance dataset*.

firms and highly innovative start-ups, while loan programmes would be available to finance absorption-oriented activities and capital investments that are likely to generate stable long-term cash-flows (Appelt et al., 2016). However, the multiple government agencies operating under the Polish Development Fund still face the challenge of creating operational synergies in order to better integrate research and innovation policies. In addition, young people are not always eligible for some regional programmes for entrepreneurship (OECD, 2015d) and the authorities should ensure a fair access to grants regardless of age.

R&D tax incentives have been scaled up and should be carefully reviewed. Until 2015 the use of R&D tax incentives had remained anecdotal, with only 80 companies using it that year. The non-refundable system tended to favour large firms and was focused on acquiring existing technologies (Figure 2.14; Kapil et al., 2013; NBP, 2016a). A new R&D tax allowance that also supports internal R&D investments replaced the tax relief for acquiring new technology in 2016. In 2017 the authorities expanded the list of tax-deductible R&D spending, made the

Figure 2.14. **The R&D tax relief system**



1. 2016 data except for Poland. The implied tax subsidy rate is proxied by the 1-B-index for some profit scenarios and a common share of current and capital expenditures. The B-index is a measure of the before-tax income needed to break even on USD 1 of R&D outlays. For Poland, the 2015 figure refers only to the accelerated depreciation incentive for R&D capital (machinery and buildings). The 2016 figure refers to the accelerated depreciation incentive for R&D capital (machinery and buildings) and the R&D tax allowance scheme at a rate of 30% for R&D wage costs and 20% (10%) for other qualified R&D expenditures in the case of SMEs (large companies).

Source: Ministry of Finance; NBP (2016), *Potencjał innowacyjny gospodarki: uwarunkowania, determinanty, perspektywy*, Narodowy Bank Polski; OECD (2017), *OECD Science, Technology and Industry Scoreboard 2016* (database); OECD (2016), *OECD Science, Technology and Industry Scoreboard 2015* (database).

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subsidy refundable for start-ups in the first year of business activity (two years for SMEs) and extended the carry-forward option from three to six years. The authorities further scaled up deductions in 2018 (Box 2.1). These are welcome steps, as the tax subsidies remained limited until 2016, and evidence suggests that R&D tax incentives should positively affect R&D spending and innovation (Appelt, 2017; Becker, 2015; Dechezlepretre et al., 2016; OECD, 2016e). If the take-up of the R&D tax relief by small innovative SMEs remains low, making the tax allowance refundable more generally (e.g. for SMEs operating for more than two years) could help boost SMEs' R&D spending. At the same time, the authorities should monitor the risks of abuse of the scheme for tax avoidance and cross-border tax planning by multinationals. Indeed, OECD research shows that, if not well designed, R&D tax incentives tend to protect incumbents and slow down the sectoral reallocation process (Bravo-Biosca et al., 2013).

Further measures could enhance the efficiency of the new R&D tax relief. Unclear Polish law and interpretations by tax authorities have created uncertainty about eligible costs and may slow the take-up of the measure (Deloitte, 2016). Indeed, tax allowance rates vary by type of cost and firm size, and many firms remain concerned by how tax authorities evaluate qualification requirements. The recent progress made in extending the R&D tax relief (Box 2.1) would be supported by further improvements in tax administration to make it more accessible to start-ups and small companies. For example, using the OECD Frascati Manual (OECD, 2015e) to develop standardised definitions for R&D expenditures and compiling a common list of qualified costs would help. A centralised review of claims and training of tax administration personnel would also be helpful. Finally, many OECD countries offer services to assist firms in tax-claiming procedures (e.g. online information and simplified claims forms) and to improve the speed and predictability of claims processing, such as certification procedures that have binding effects on national tax authorities in Austria, France, Hungary and Spain (OECD, 2016e; Appelt et al., 2016).

Beyond R&D expenditures, the government plans new tax support for business investment. The corporate income tax (CIT) law provides for favourable depreciation rules for intangible assets, their annual depreciation rates range from 20% to 50% for copyrights and software licenses, and 100% for R&D expenditures. A 2017 bill also introduced a new accelerated depreciation of machinery and equipment. This would expand the possibility to immediately write off capital investment, which has been available heretofore only to SMEs (OECD, 2015f). The authorities estimate it could benefit up to 150 000 companies every year (Ministry of Economic Development, 2017b). The new scheme would apply to asset purchases between PLN 10 000 and 100 000. This could push firms to frontload their investments and accelerate technology absorption, and it would reduce young firms and SMEs' liquidity constraints. The authorities should monitor this new scheme, and should the take-up be low for young and small firms, adjust its provisions to ensure effective incentives for this category of firms.

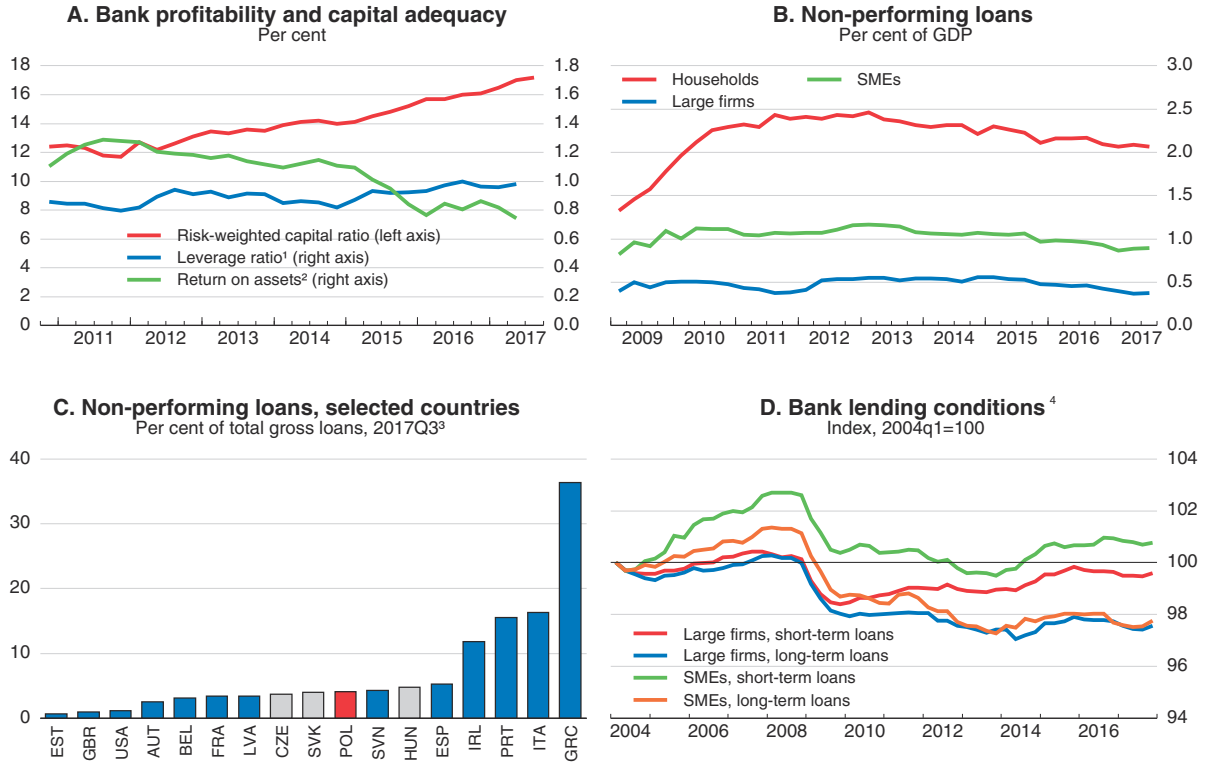
Specific tax measures have also been targeted at SMEs, but the authorities should avoid creating size thresholds that discourage firm growth. The CIT rate was cut from 19% to 15% for small and newly registered firms in 2017. They also exempted new businesses from some social contributions and reduced them for small companies (PNB, 2017). There can be a rationale for special tax regimes for small and initially unprofitable firms, especially in a country with relatively high informality, to ease tax compliance and related fixed costs that are more burdensome for SMEs (OECD, 2015f). However, such reduced tax SME rates and the abrupt end of the social security contribution exemption after two years may also curb firm growth, induce some firms to split, distort resource allocation and waste resources with little impact on innovation and entrepreneurship as they are available for all SMEs, irrespective of their investment needs (OECD, 2015f; IFS, 2010). These negative efficiency costs can be particularly large. For example, evaluations of such losses range from 0.3-4.5% GDP for regulatory thresholds in France (Gourio and Roys, 2014; Garicano et al., 2016). By contrast, further general simplification of the tax system would improve efficiency, as its complexity continues to weigh particularly heavily on smaller firms (World Bank, 2016). Phasing out the relief from social security contributions for start-ups over a longer period of time could also allow young businesses to develop without facing onerous adjustment costs.

The large increase in public support for business investment and RDI also raises issues for its medium-term fiscal sustainability. Policymakers should ensure that these measures are integrated into a long-term agenda, since beyond the current EU budgetary cycle, funding may be substantially reduced, and R&D expenditure and innovation require a predictable policy environment. This could notably allow to crowd-in more private investment, as long-term public research funds can help support projects with high and long-term social returns but that are too risky for private investors (Mazzucato, 2015). It is welcome that the 2017 Plan for Responsible Development set goals for innovation policies both to 2020 and 2030. However, bridging the remaining infrastructure gaps (OECD, 2016a) and maintaining a stable support system for innovation will require significant fiscal discipline. However, some recent measures, such as the lowering of the retirement age and the hike in family benefits, may not be conducive to long-term growth and could reduce public revenues over the medium term in addition to increase public spending. The currently available fiscal room would have been better used to bring forward the planned investment in infrastructure that could crowd-in private investment and complement innovation support over the longer term (OECD, 2016f).

Maintaining a sound financial system

Poland's banking system is well capitalised and liquid, but recent policy decisions imply new financial burdens for the banks. The average core Tier 1 capital ratio, at 17.2%, stood well above Basel III requirements at end-September 2017. Leverage has been stable at a moderate level (Figure 2.15, Panel A). Non-performing loans are declining, while their share is relatively low (Panels B and C). Despite historically low interest rates, there are no signs of asset price bubbles nor unwarranted debt accumulation (OECD, 2016a). However, due to narrowing interest rate margins and increasing costs, bank net profits declined in 2015-16. Indeed, banks have contributed to a new fund for distressed debtors in 2015, and they had to pay higher contributions to the bank-guarantee fund, following payments to depositors of credit unions and two cooperative banks as well as the need to build ex-ante resolution funds following the implementation of the European Bank Recovery and Resolution Directive (BRRD). In addition, in 2016 the authorities levied a new tax on the total value of bank assets in excess of PLN 4 billion, excluding own funds and purchased sovereign debt. Together, these three measures amount to around half of 2014 bank profits (OECD, 2016c), and indicators of bank lending conditions tightened at the end of 2016, notably for long-term loans (Panel D). Moreover, the bank asset tax may have created incentives for banks to

Figure 2.15. **Banking sector developments**



1. Median capital ratio (core capital over unweighted assets).
2. 12-month profits in per cent of 12-month assets.
3. Or latest available information.
4. An increase in the index value means that credit standards are eased, a decrease means that they are tightened.

Source: KNF (Komisja Nadzoru Finansowego); NBP (2017), *Financial Stability Report – December 2016* and *Senior loan officer opinion survey on bank lending practices and credit conditions – 4th quarter 2016*, Narodowy Bank Polski; IMF (2017), *Financial Soundness Indicators* (database).

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increase holdings of (exempted) local government bonds (IMF, 2016a) and could potentially be detrimental to business financing over the medium term.

New costs for the banking sector should be thoroughly evaluated. While the economic risks associated with the portfolio of foreign-currency-denominated mortgage loans do not appear to have systemic consequences (NBP, 2016b), the details of a law to facilitate the voluntary restructuring of such loans through bilateral negotiations between banks and their clients have yet to be fully decided. Discussions over this matter have been ongoing for over two years and need to be quickly drawn to a close. However, most of the recommendations issued by the Financial Stability Committee in January 2017 to facilitate the voluntary conversion of foreign-currency-denominated mortgage loans through regulatory changes – such as higher risk weights to be provisioned by banks on their foreign-currency-denominated mortgage loans – have been implemented.

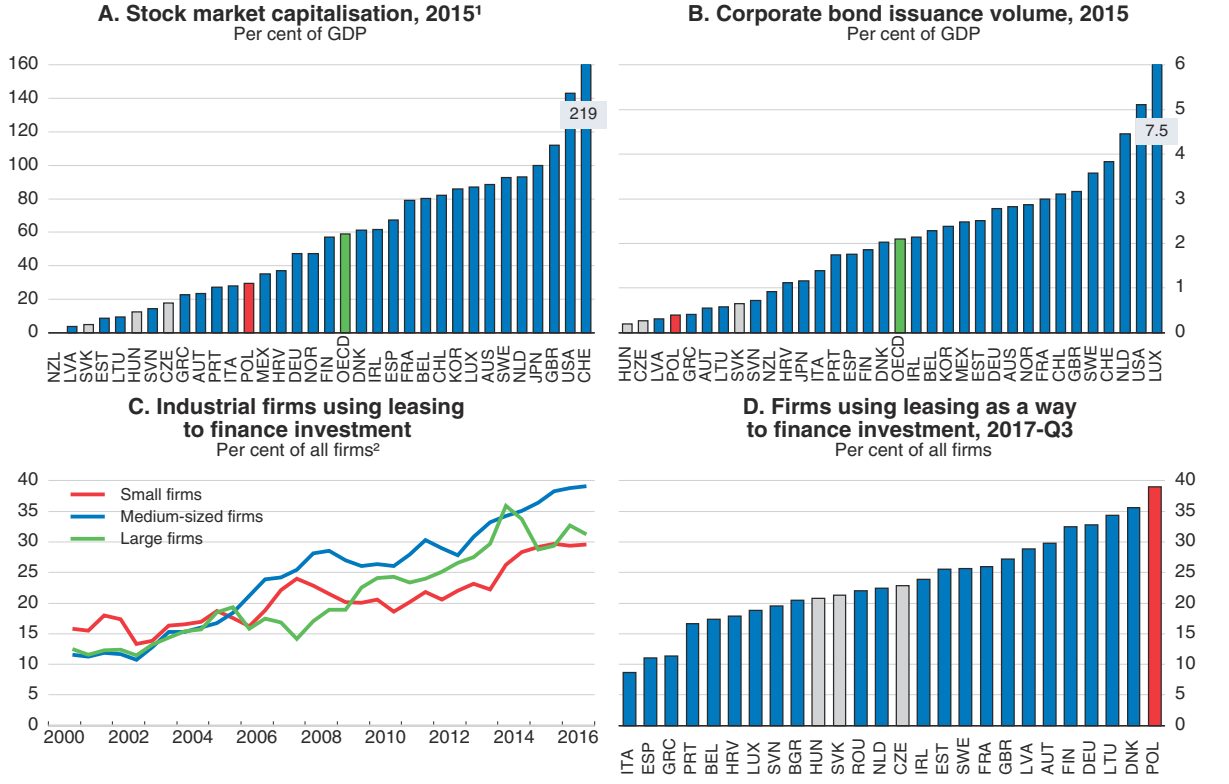
The authorities have strengthened the financial-sector framework, and securitisation is being developed. A macro-prudential framework has been completed, which allows for early detection and prevention of systemic risk, and the new bank resolution system, in accordance with the European Bank Recovery and Resolution Directive (BRRD) has been implemented. A recent regulation on non-banks limited non-interest costs of loans and constrained the practice of rolling over credit, in particular to prevent escalating consumer debts (IMF, 2016b). Moreover, a welcome 2015 law eased the issuance of covered bonds and improved long-term liquidity. Indeed, Poland's universal banks neither had direct access to covered bonds nor engaged in securitisation and relied on the stickiness of short-term deposit liquidity for mortgage lending. The new law reduces tax barriers to the development of covered bonds and promotes pension-fund, credit-union and foreign investment in such assets. As a result, two new mortgage banks were established, and covered bond issues increased by 55% year on year in 2015 (ECBC, 2016). This is welcome, as this lengthens the maturity of bank funding, but the level of outstanding covered bonds – at 0.3% of GDP in 2015 – remains well below other CEECs (EMF, 2016).

Developing alternative sources of finance

Capital market finance has increased, but the availability of long-term private sources of financing remains limited for SMEs and start-ups. Polish companies raise slightly more funds on the stock market than in other CEECs, though stock market capitalisation is dominated by large stated-controlled firms, and corporate bond issuance is relatively limited (Figure 2.16, Panels A and B). Financing instruments that sustain the short and medium-to-long-term financing needs of SMEs, but that rely on different mechanisms than traditional debt, have expanded quickly (Table 2.2; OECD, 2013b, 2015c and 2015g). This is the case of asset-backed finance, such as leasing, which has increased rapidly for all firm sizes (Panel C and D). However, leasing is mostly used for investment in transport material (NBP, 2017b). Moreover, Polish capital markets have recently faced headwinds from uncertainty about the liquidation of open pension funds (OFEs) and global capital outflows from emerging market economies which may affect the development of the financing of innovative activities (OECD, 2016f).

The development of venture capital has been limited by regulatory and tax uncertainty. The use of venture capital and private equity instruments for innovative projects remains particularly rare, and perceived opportunities for funding are few (Figure 2.17), though low investments may also be explained by a lack of good projects. This may be especially problematic for young Polish companies that intend to roll their product out to the market, as venture capital plays a prominent role at a late stage of the innovation cycle. Venture

Figure 2.16. **Development of alternative forms of finance**



1. Market capitalisation is the share price times the number of shares outstanding (including their several classes) for listed domestic companies. Investment funds, unit trusts and companies whose only business goal is to hold shares of other listed companies are excluded. Data are end-of-year values.
2. Small firms have between 10 and 49 employees, medium-sized firms between 50 and 249 and large firms more than 500. Data are smoothed over the March and October Surveys.

Source: World Bank (2018), *Global Financial Development Statistics* (database), the World Bank Group, Washington, DC; European Central Bank (2017), *Survey on the access to finance of enterprises – SAFE* (database); Statistics Poland (2017), *Koniunktura w inwestycjach w przemyśle – baza bieżąca – dane półroczne*, Statistics Poland, Warsaw.

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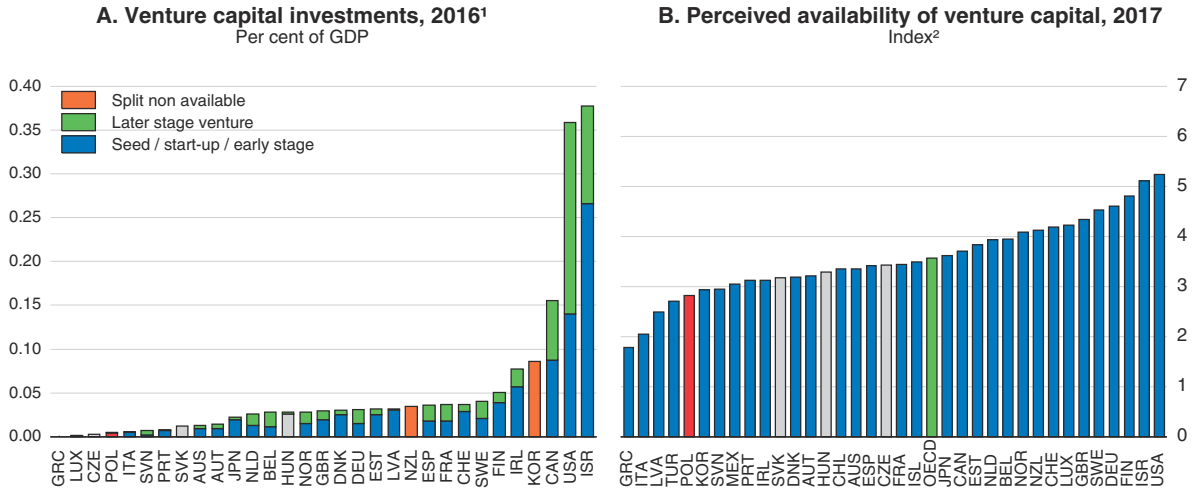
Table 2.2. **External financing techniques for SMEs and entrepreneurs**

Low risk/ return	Low risk/ return	Medium Risk/ Return	High risk/ return
Asset-based finance	**Alternative debt**	**"Hybrid" instruments**	**Equity instruments**
• Asset-based lending	• Corporate bonds	• Subordinated loans/bonds	• Private equity
• Factoring	• Securitised debt	• Silent participations	• Venture capital
• Leasing	• Covered bonds	• Participating loans	• Business angels
• Purchase order finance	• Private placements	• Profit participation rights	• Specialised platforms for public listing of SMEs
• Warehouse receipts	• Crowdfunding (debt)	• Convertible bonds	• Crowdfunding (equity)
		• Bonds with warrants	
		• Mezzanine finance	

Source: OECD (2013), *Alternative Financing Instruments for SMEs and Entrepreneurs: The Case of Mezzanine Finance*.

capital investments had been subject to double taxation though CIT and PIT, as the profit achieved by the funds and dividends paid to shareholders were both taxed (Stroiński and Prager, 2012; Breznitz and Ornston, 2017). Regulatory uncertainty is also high. In particular, Polish pension funds represented a well-developed investor base that was, in principle, able to invest in riskier long-term projects through equity and private equity vehicles. However, the 2014 pension reforms shrank their role, as most people switched to the public pension

Figure 2.17. **Venture capital development**



1. Or latest available year.
2. Index from 0 to 7 (highest perceived availability).

Source: OECD (2017), *Entrepreneurship at a Glance 2017*, OECD Publishing, Paris; World Economic Forum (2017), *World Competitiveness Index 2017-18* (database).

StatLink http://dx.doi.org/10.1787/888933689121

scheme for their mandatory contributions, and voluntary contributions to private pension funds are now modest. In addition, the government has announced another reform of the OFEs (see below) and even envisaged their liquidation, creating further uncertainty.

Several recent tax and regulatory reforms have aimed at removing barriers to the development of venture capital (VC). The 2016 innovation law (see Box 2.1) permanently removed the tax on intellectual property income and created a temporary tax exemption for the sale of stocks of R&D-performing companies in which VCs hold at least 10 % of the capital. This second exemption initially held only for investments realised in 2016-17, but was subsequently extended up to 2023 according to the 2017 bill on innovation. Making this solution permanent would stabilise the tax environment for VC funds and encourage their development.

The authorities have stepped up their direct support to the development of venture capital. The Polish Growth Fund of Funds (PGFF) was established in 2013 in cooperation with the European Investment Fund (EIF) to stimulate equity investments, and the National Capital Fund (KFK), owned by BGK, was refocused on venture capital funds supporting the start-up phase of innovative SMEs. The state-owned Polish Development Fund (PFR) also has a 2017-23 total budget of PLN 2.8 billion (0.2% of 2016 GDP) to make early-stage direct and indirect (through private VC funds) equity investments in start-ups and innovative companies (Box 2.2). The first call for proposals took place in January 2017 (PFR Starter FIZ) and was targeted towards VC funds that will invest in innovative SMEs at the earliest stages of development. Under the new EU programming period, multiple measures have also been integrated into the PFR programmes (European Commission, 2017). Private-sector involvement is welcome, as it ensures in principle more independence from the public sector in terms of projects and is in line with recent developments across OECD countries (Wilson, 2015). However, much will depend on PFR Ventures' implementation. The scale of funds appears to be particularly large compared to total VC investments, and earlier KFK initiatives had to be downscaled significantly because of a lack of viable projects. The overall

Box 2.2. **PFR ventures and the development of venture capital**

PFR Ventures is one of the companies within the Polish Development Fund (Box 2.1). PFR Ventures is to invest PLN 2.8 billion of public funds through the "Start In Poland" programme. Investments target various stages of the innovation cycle through co-investment with national and international private investors or through direct public investment.

In the incubation phase PFR Ventures is in charge of five funds worth PLN 1.05 billion. Technology incubators provide tangible and intangible services to new technology-based firms and entrepreneurs. In particular, the PFR Starter FIZ programme (PLN 782 million) would invest in 10 to 25 seed capital funds, for relatively small projects from PLN 200 000 to PLN 3 million.

In the acceleration phase, PFR relies mostly on the Polish Agency for Enterprise Development (PARP) structure. The NCBiR manages notably two programmes, BRIdge Alfa and Bridge VC, which support proof of principle and concept until the formation of a spin-off of the initial R&D projects, and then the commercialisation of the projects. In addition, the Scale up programme will link young firms and SMEs with large firms.

In the development phase, PFR ventures plans to support the expansion of production and the commercialisation of innovative solutions, and business R&D expenditures by investing PLN 1.75 billion.

governance framework of PFR Ventures needs also to ensure independence from the authorities and state-owned companies, in particular for direct investment, as well as long-term accountability. In particular, PFR should progressively withdraw from these activities in order to ease the development of private investment funds over the medium term.

Enabling venture capitalists to recover their investments is also crucial to encourage reinvestments in innovative activities. Further development of the stock and private equity markets would provide venture capitalists with a way to exit and monetise their investments (Nasser and Wehinger, 2016; Wilson, 2015). The limited development of the stock market for SMEs and the difficulties of mergers and acquisitions constrain exit strategies and the possibilities to realise financial returns. NewConnect, the specialised platform for SME listings that is part of the Warsaw Stock Exchange, benefits from a regulatory architecture designed for smaller enterprises and is more successful than comparable capital markets (Harwood and Konidaris, 2015). However, its activities remain rather limited in that it has helped to raise only PLN 1.8 billion (0.1% of 2015 GDP) since its creation in 2007, and its liquidity is low, suggesting that venture capitalists may potentially face difficulties in recovering their investments in Poland.

Strengthening the pool of domestic long-term investors would also help the development of capital markets. OFEs are the main large-scale institutional investors in Poland, and the Strategy for Responsible Development includes proposals to reform them in 2018. The authorities would transfer 25% of OFEs' assets to the demographic reserve fund, and the remaining 75% of assets would be put into new privately owned funds under the umbrella of the Polish Development Fund (Box 2.1; Ministry of Economic Development, 2017a). Though the reform could clarify the private nature of pension funds and put an end to the repeated transfers of assets towards the ZUS, it has not yet been approved, and some details remain to be spelled out. In particular, the authorities should avoid regulations constraining funds' investment portfolios, such as specific restrictions on equity and bond

holdings, and the current rules of transfers of private individual pension accounts towards the ZUS 10 years prior to retirement should be lifted to allow a more diversified range of long-term saving plans to be available to households.

A level playing field over different forms of finance would also encourage the development of capital markets and innovative firms. The tax deductibility of interest payments on debt from taxable income puts equity financing at a disadvantage in Poland as in many European countries (Nasser and Wehinger, 2016; European Commission, 2016b). This in turn favours certain business types that are more suited to debt than equity financing in turn biasing capital allocation away from innovative new investments in knowledge. Firms with tangible assets as collateral will find it easier to raise debt and thereby gain the tax advantage relative to innovative new firms whose main asset is knowledge-based capital. Limiting the deductibility of interest from the corporate tax base in line with the OECD Base Erosion and Profit Shifting (BEPS) project (OECD, 2015h) could allow a less distortive financing structure for the economy and broaden the tax base. Moreover, the development of crowdfunding could help kick-start projects by innovative firms. Crowdfunding connects those who need funding for a specific project with a large number of investors, lenders or donors, typically in public online tenders. Setting up a regulatory framework for crowdfunding as in other OECD countries such as Italy could facilitate its development by fostering trust in this financing source, while addressing concerns about transparency and investor protection (OECD, 2015c). In this respect, implementing the recommendations from the Special Task Force for Financial Innovation in Poland would help enhancing legal certainty for crowdfunding activities and be conducive for their development (KNF, 2017).

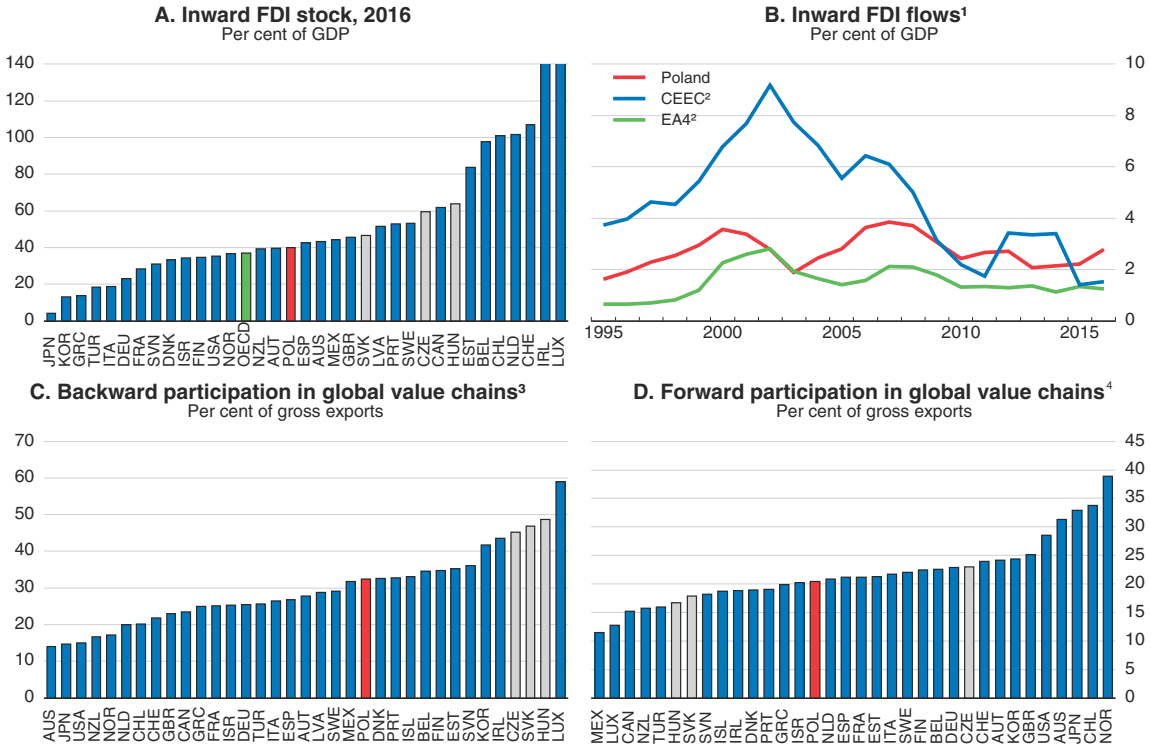
Improving financial education would complement the measures to expand the use of capital markets. Most Polish firms do not consider the equity market as relevant for financing (European Commission, 2016c), and smaller companies with fewer than 50 employees are more likely to say financial skills would help improve or kick start their innovation activities than larger companies (European Commission, 2016a). It is welcome that the 2014-20 ESIF programming period supports the development of SME-specialised ecosystems (including investment banks, SME-specialised banks, research analysts, sales people, brokers, market makers and other third-party advisors focused on SMEs) that can support small public equity offerings.

Improving incentives for innovative investments

Beyond policies to improve access to finance, increasing innovative investment also requires that firms and investors expect good returns on their projects. In this respect the government can play an important role as a customer for new technologies, for example through public procurement (Chapter 1). However, maintaining strong institutions and policies also raises the risk-adjusted returns to investment, and many labour- and product-market reforms could support investment and innovation by lowering the costs of labour reallocation and easing the social costs of experimentation and firm exits (Andrews and Saia, 2017). Well-chosen infrastructure projects could also crowd in private investment, as transport and energy sector bottlenecks still weigh on productivity in Poland (Goujard, 2016). This could help attract FDI that has been shown to generate positive technology spillovers to Polish firms (Kolasa, 2012).

FDI is another important potential source of innovative investment. Poland's stock of inward FDI as a share of GDP is slightly above the OECD average, but lags other CEECs (Figure 2.18, Panel A), particularly due to smaller inflows before the global financial crisis

Figure 2.18. **FDI investment and integration in global value chains**



1. 3-year moving average.
2. EA4 is the average of Germany, France, Italy and Spain. CEEC is the average of Hungary and the Czech and Slovak Republics.
3. The indicator measures the value of imported inputs in the overall exports of a country (the remainder being the domestic content of exports). This indicator provides an indication of the contribution of foreign industries to the exports of a country by looking at the foreign value added embodied in the gross exports in 2011.
4. The indicator provides the share of exported goods and services used as imported inputs to produce other countries' exports. It gives an indication of the contribution of domestically produced intermediates to exports in third countries in 2011.

Source: OECD (2017), *FDI Statistics* (database); OECD (2015), *Trade in Value Added (TiVA) – October 2015*.

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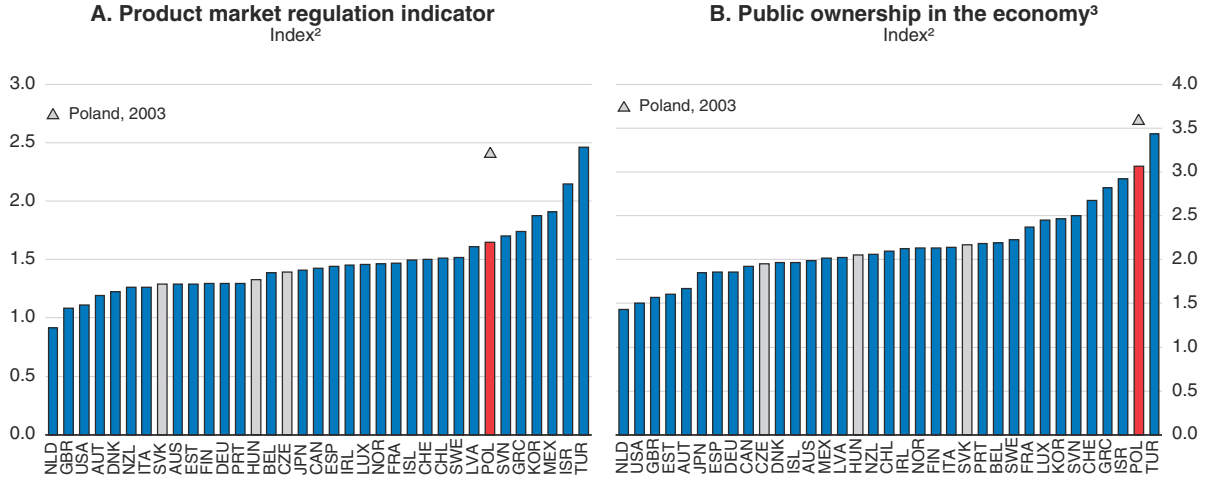
(Panel B). The low level of FDI as a share of GDP is linked to Poland's position in global value chains, where it tends to act as supplier of intermediate inputs in medium-low technology industries (Panels C and D). Indeed, Poland stands out negatively in the region, especially in terms of its limits on the shares of foreign investors in selected sectors, such as transport. Another area that reduces investment incentives is the government's wide scope for using exemptions from merger regulation on public interest grounds. This means that market participants in these sectors do not know what forces are shaping future market structures. For example, the authorities blocked the sale of local heating and electricity assets by a French utility to a Czech company in January 2017 (Reuters, 2017). Moreover, fostering regulatory convergence would help raise FDI inflows (OECD, 2016g), as its transposition of EU law into national legislation lags behind other European countries (European Commission, 2016d). Such measures would also promote FDI by removing entry barriers and ensuring a more pro-competitive regulatory framework (see below).

Strengthening the overall regulatory framework

The government wants to reduce the administrative burden on firms and start-ups. This could also encourage process innovation and improved management methods by

raising competitive pressures. Poland substantially reduced the burden of Product Market Regulation (PMR) on the economy between 2003 and 2013, according to the OECD's aggregated PMR indicator (Figure 2.19, Panel A). Since 2013, the authorities developed new services and support for taxpayers, notably young businesses. In 2015 Poland finalised an ambitious deregulation of services that is improving access to non-tradable inputs, which should boost the competitiveness of manufacturing firms. The 2017 Strategy for Responsible Development also foresees the implementation of a new "business constitution" and 100 improvements for SMEs that could lower administrative compliance costs. The government would notably introduce the possibility of a simplified joint stock company with low capital requirements to facilitate business start-ups.

Figure 2.19. **Product market regulation in OECD countries, 2013**[1]



1. 2008 for the United States.
2. Index scale from 0 to 6, from least to most restrictive.
3. The OECD public ownership indicator measures the scope of public ownership in 30 sectors, the extent of state ownership in network industries and the level of public control in enterprises where the state owns shares. The indicator is based on qualitative information, for example the presence or absence of SOEs in a given sector. It measures the scope of public ownership across sectors, rather than the quantitative scale of public ownership in the economy.

Source: OECD (2017), *Product Market Regulation Indicators* (database).

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Substantial state involvement in key network industries can make it difficult for private actors to obtain equal conditions to compete. State involvement in the economy remains pervasive (Figure 2.19, Panel B), but the government has announced it will stop privatisation. Reinforcing the independence of sector regulators would reduce regulatory uncertainties that inhibit private investment, as reported in previous OECD Surveys (Égert and Goujard, 2014; OECD, 2014b and 2016a). For example, the president of the Competition Authority can be recalled without justification. Regulators should have fixed-term, non-renewable mandates during which they cannot be dismissed without fault. At the same time revolving-door opportunities should be eliminated.

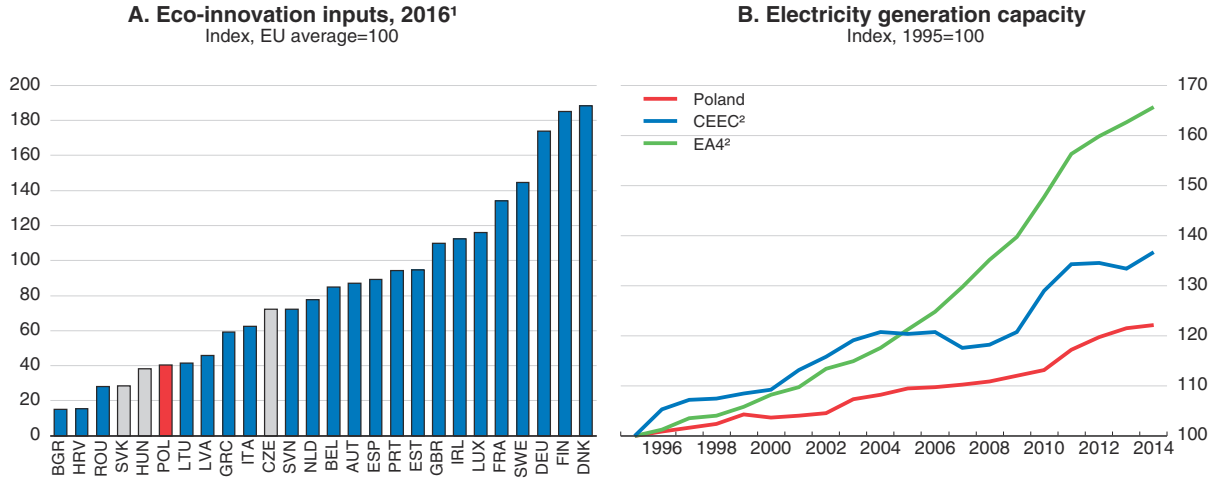
The government plans to get large state-owned enterprises (SOEs) involved with SMEs to develop innovative activities (Box 2.1). Though state ownership can in principle promote a longer-term horizon for management and innovation (Aghion et al., 2013), regular reshuffling of managers and assets among state-owned enterprises and the lack of transparency about the nomination of board members, with the removal of open selection

procedures, is likely to lower the efficiency of this programme. Indeed, management and supervisory board positions in the numerous SOEs may be subject to potential conflicts of interest, and the establishment of a non-partisan appointments committee to select candidates would help alleviate them (European Commission, 2014). This could also lower the perceived risks of conflicts of interest and regulatory uncertainty that may deter private investment (OECD, 2015i).

Boosting greener investment and innovation

Specific sectoral policies are also hampering greener investment and innovation. Poland's current R&D expenditures in eco-innovation and investment in more traditional electricity generation capacity appear particularly low by EU standards (Figure 2.20). Though the development of green technologies, such as e-buses, is supported by key national strategy documents, the instability of the regulatory framework has deterred private investment. Poland's ageing generation capacity remains dominated by coal, with substantial resulting environmental and health costs (EEA, 2016; OECD, 2015j and 2016a); an updated long-term energy plan has been pending over the past two years. At the same time, recent tightened regulations of onshore wind farms have lowered the potential to develop such technologies.

Figure 2.20. **Energy and environmental investment**



1. The index is based on three indicators: government investments in environmental and energy R&D, green early-stage investments and total R&D personnel.
2. EA4 is the average of Germany, France, Italy and Spain. CEEC is the average of Hungary and the Czech and Slovak Republics.

Source: European Commission (2018), *Eco-Innovation Scoreboard* (database); IEA (2015), *Electricity Information Statistics 2015* (database).

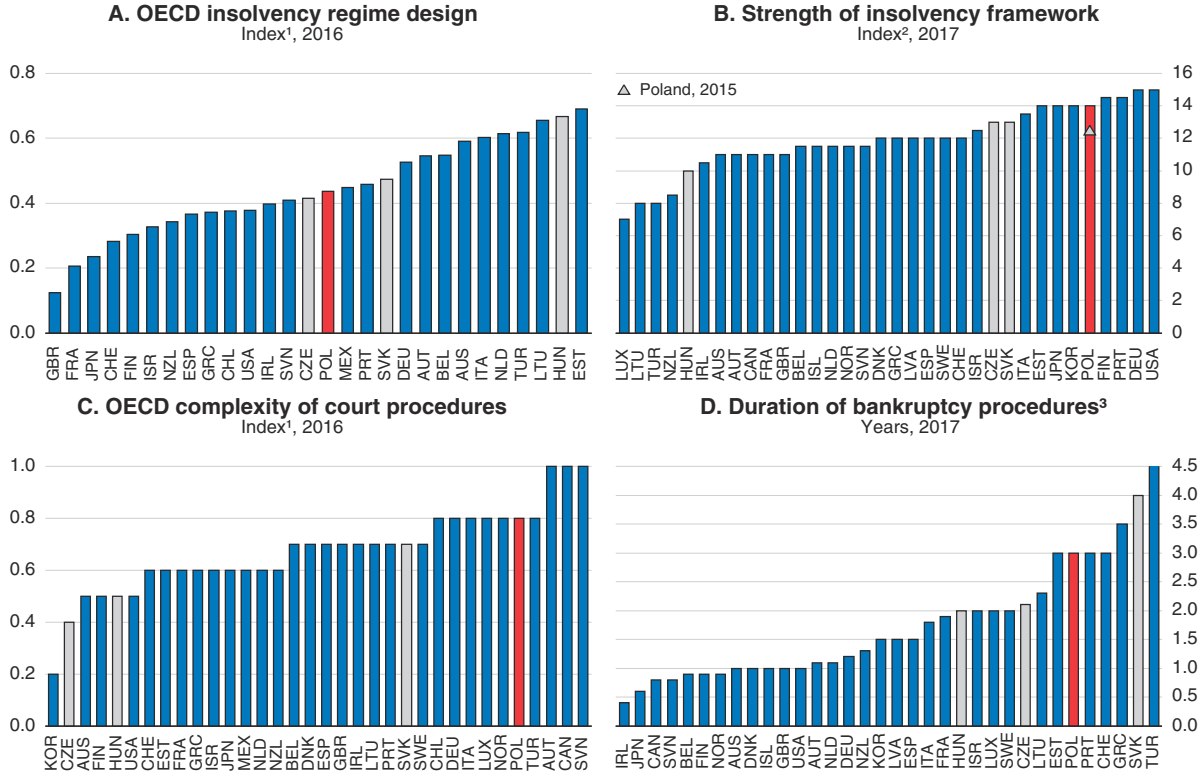
StatLink http://dx.doi.org/10.1787/888933689178

Regulations and green taxes could raise the return to innovative and greener investment. For example, coal used by households for heating is a significant source of urban air pollution but is not subject to any environmental tax. While this is allowed by EU regulations, a tax would reinforce the government's subsidy programmes to replace inefficient individual household heating systems and its plans to move towards district heating. Indeed, CO_2 and energy taxes could promote district heating and help to reduce emissions in the residential sector, as in Sweden (OECD, 2011). Many Polish companies developing environmental technologies point to insufficient demand as a barrier to investment in the development of greener solutions (Klincewicz and Szkuta, 2016).

Removing barriers to efficient resource allocation

Recent reforms of the insolvency framework should help restructure companies that are still viable and speed up liquidation procedures. The main design characteristics of Poland's insolvency framework, such as the time to discharge, creditors' ability to initiate restructuring, the presence of pre-insolvency regimes, the possibility and priority of new financing or the possibility to "cram-down" on dissenting creditors, are now similar to the OECD average (Figure 2.21, Panel A; Adalet McGowan, et al., 2017). Indeed, the 2016 changes to the corporate insolvency regime significantly improved the insolvency framework (Panel B): a dedicated tribunal is now in charge of firm restructuring, a bankruptcy register is being established, entrepreneurs can start negotiations with creditors to reach out-of-court agreements, and specific procedures have been put in place to outvote minority creditors and shareholders that could unduly prevent restructuring. This tends to encourage restructuring instead of liquidation of viable firms (European Commission, 2016d), and the number of formal bankruptcy procedures declined by 14% year on year over the first half of 2016, while restructuring procedures increased (Sielewicz, 2016).

Figure 2.21. **Bankruptcy procedures**



1. Index scale from 0 (most efficient) to 1 (least efficient).
2. Index scale from 0 to 16, from the system the least (0) to the most (16) able to rehabilitate viable firms and liquidate nonviable ones.
3. Period from the company's default until the payment of some or all of the money owed to the bank.

Source: Adalet McGowan, M., D. Andrews and V. Millot (2017), "Insolvency Regimes, Zombie Firms and Capital Reallocation", *OECD Economics Department Working Paper,* No. 1399, OECD Publishing, Paris; World Bank (2017), *Doing Business 2018: Reforming to Create Jobs* (database), the World Bank Group, Washington, DC.

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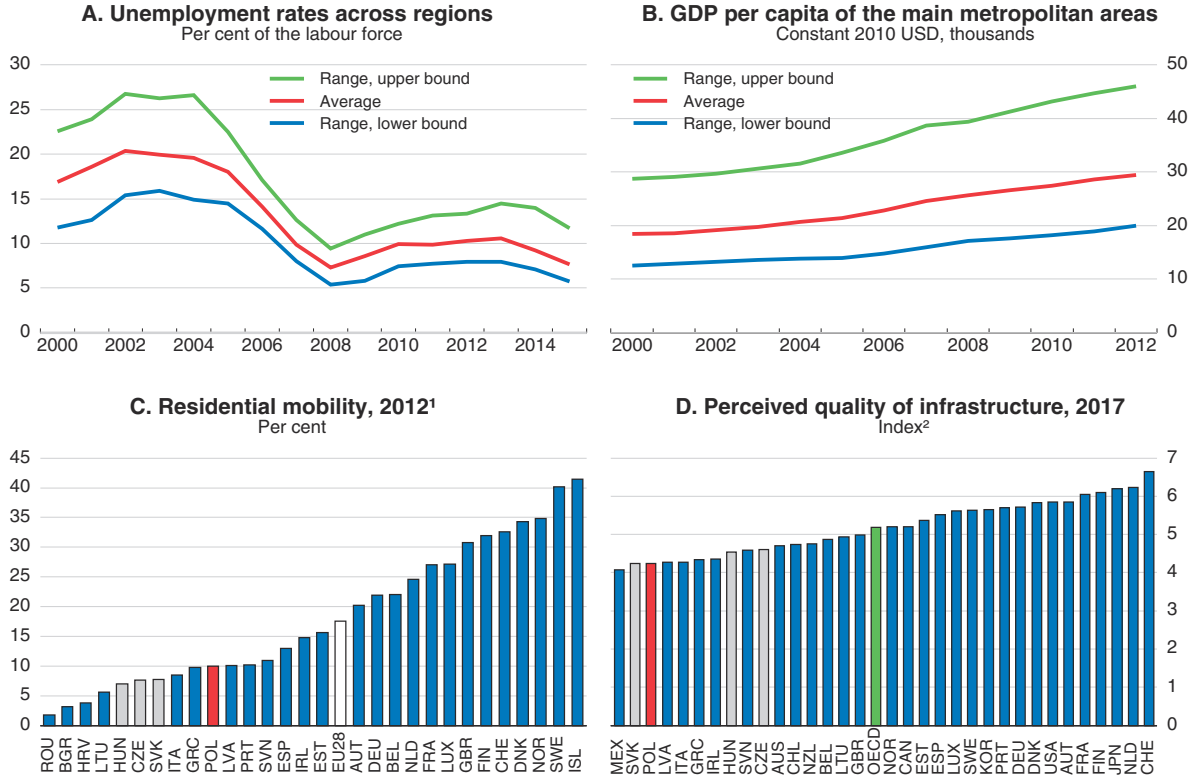
Faster and more efficient insolvency procedures are likely to contribute to higher private investment. They would facilitate the reallocation of capital and other resources to more productive companies, as court procedures remain complex and the time needed to deal with insolvency cases was among the highest in the OECD in 2016 (Figure 2.21, Panels C and D). However, practices may take time to change, and the Strategy for Responsible Development targets only to reduce the duration of the court process to less than 20 months by 2030. Limiting the burden of non-litigious cases on judges could free up some resources, as in commercial-court cases (see above).

The authorities also plan to develop the 2014 "new chance policy" to prevent bankruptcies and support entrepreneurs through additional training and mentoring (Ministry of Economic Development, 2017a). The 2016 insolvency law reduces the debt discharge period for honest insolvent entrepreneurs to three years in line with European best practices (Carcea et al., 2015). The authorities also plan to strengthen lifelong training opportunities. This could encourage experimentation and innovation, as international evidence shows that training programmes tend to help prospective entrepreneurs launch new businesses more quickly (McKenzie and Woodruff, 2014). However, the quality of business development services (business advisory services, coaching and mentoring) is highly variable across Polish regions (OECD, 2015d).

Facilitating labour and housing mobility would also strengthen innovative investment and the diffusion of new technologies. Indeed, spatial disparities in terms of unemployment and GDP per capita have recently risen (Figure 2.22, Panels A and B), and residential mobility remains low, while the quality of transport infrastructure is still perceived as weak (Panels C and D). At the macroeconomic level, lowering transport costs would improve access to markets and regional resource re-allocation and boost agglomeration effects, productivity and economic growth. Developing more efficient transport infrastructure, notably urban rapid transit, is important to reduce the sector's environmental impacts and local labour market mismatches, and to sustain regional development. This would require extending spatial zoning, possibly through mandatory requirements and fostering municipal collaboration within metropolitan areas (OECD, 2016a). At the same time, capital gains from the sale of real estate are tax-exempt if the individual has owned the property for at least five years. Shifting public support away from home ownership could make investment in the rental market and firms more attractive, as would reducing VAT tax preferences on construction work worth 0.6% of GDP in 2014 (Ministry of Finance, 2016).

Figure 2.22. **Labour market and regional disparities**



1. Share of population having moved to another dwelling within the last five-year period.
2. Index from the lowest perceived quality (0) to the highest (7).

Source: OECD (2017), *Metropolitan Statistics* (database); and Eurostat (2017), "SILC Statistics" and "Unemployment rates by NUTS 2 regions", *Eurostat Database*; World Economic Forum (2017), *The Global Competitiveness Report 2017-18* (database).

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Recommendations to boost innovative investment

(Recommendations that appear in the Key Recommendations are in bold and italics)

Strengthening the financing of innovative activities

- ***If the take-up of the new R&D tax allowance is low among small innovative firms, adjust its provisions.***
- Enhance financial and digital literacy of entrepreneurs.
- Monitor the use of tax incentives and government guarantee schemes.
- Improve transparency, stability and impact assessment of public support by involving the private sector in the Innovation Council. Make more extensive use of impact analyses, notably by engaging with stakeholders in *ex ante* consultative processes and *ex post* evaluations.
- ***Plan for the national financing of business R&D and innovation programmes beyond the current EU budgetary cycle, if necessary.***

Developing market-based finance

- Rigorously evaluate the general loan-guarantee programme for SMEs and adjust its provisions if needed as it can lock in resources in low-productivity firms and crowd-out alternative financing sources. Improve the enforcement of contracts to ease the development of alternative market-based financing instruments, such as reverse factoring.

Recommendations to boost innovative investment *(cont.)*

(Recommendations that appear in the Key Recommendations are in bold and italics)

- Stabilise the regulatory and tax environment of pension and venture capital (VC) funds. Make permanent CIT tax exemptions that prevent the double-taxation of VC funds investing in innovative firms and their shareholders.
- Reduce the bias towards debt over equity financing of businesses.

Improving the allocation of capital and investment

- Continue efforts to cut red tape and reduce barriers to entry. Make the relief from social security contributions for start-ups degressive over time, rather than ending it abruptly after two years.
- Build on the recent bankruptcy law to reduce the length of court procedures, and strengthen second-chance training opportunities for entrepreneurs.
- Introduce fixed-term, non-renewable mandates for the President of the Competition Authority and all sectoral regulators, during which they cannot be dismissed without fault, and prevent revolving-door opportunities. Ensure a level playing field between state-controlled and other companies.
- ***Develop and implement clear and stable climate-change policies aligned with European and international objectives to reduce uncertainty for innovative green investments. Ensure the stability and clarity of policies affecting investment decisions.***
- Reform tax incentives to foster the demand for innovative and green investments. In particular, raise taxes on fossil fuels to help finance investment in and the demand for green innovation.
- Ensure tax neutrality between different assets for households. In particular, phase out support for home ownership, while developing the rental market to support business investment and improve labour mobility.

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The Polish economy is expanding rapidly and living standards continue to rise, catching up with those in other OECD countries. To sustain this trend Poland needs to invest further in skills and infrastructure and develop its capacity to innovate. Indicators of scientific research quality are below those in the leading OECD countries, and business R&D investment remains weak despite rapid recent growth. Vocational training suffers from limited business engagement, and adult learning is not well developed, inhibiting citizens' ability to acquire stronger basic and digital skills. This is holding back the economy's capacity to innovate and the ability of Poland's plentiful small enterprises to adopt new technologies, modernise their organisation and production procedures, and thus improve their productivity and grow. The government plans a higher education reform and the development of a skills strategy to address those issues. To help Poland confront rapid ageing, policies need to bolster seniors' and female employment, while making Poland more attractive to domestic and foreign workers alike. Poland also needs a strategy how to ensure continued financing for investment in infrastructure, skills and innovation from domestic sources should the availability of EU Structural Funds decline in the next EU budgetary cycle.

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