



CEE
INNOVATORS
SUMMIT

SPECIAL REPORT

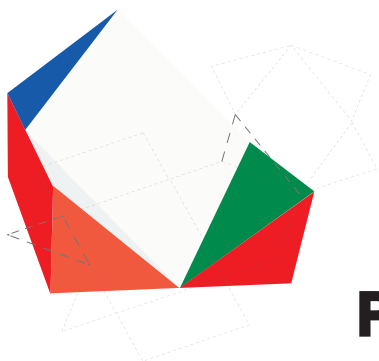
Visegrad Group countries as a European centre of innovation

an ecosystem and financing



PFR

Polish Development Fund



PAWEŁ BORYS



INTRODUCTION

After a difficult period of interrupted statehood, wars, and communism, Central Europe is now redefining its position in the global economy. In the past 27 years, Visegrad Group countries experienced a rapid transformation, building inclusive economic and political institutions, strengthening local entrepreneurship, and improving the quality of their infrastructure and education systems. Despite the many challenges and problems, convergence with the more affluent parts of Europe is progressing steadily, but the productivity and income gap compared with the EU average still stand at around 25% to 30%. The existing development levers, which are largely based on transferring technology, the legal system, and capital from

abroad, have become insufficient for countries of the region to maintain a high growth rate and catch up with the most developed economies in terms of prosperity. The risk of Poland, the Czech Republic, Slovakia, and Hungary falling into the medium income trap is real, particularly given the adverse demographic trends, social and geopolitical tensions and the threat of secular stagnation in the global economy, which has not stabilised after the financial crisis.

Additionally, new technologies are exerting a powerful influence on societies and on the structure of the global economy. The Schumpeterian process of creative destruction is now taking place much faster than just a few decades ago. The Industrial Revolution

4.0 is shortening the lifecycles of products and technologies and dictating entirely new forms of work, organisation, communication and distribution. Physical and financial capital plays a secondary role; the key resource is knowledge coupled with the ability to adapt quickly and cooperate. Digitisation and robotics are rapidly changing the business environment, creating huge opportunities, but also posing major threats to job stability and exacerbating income inequality. As a result, Central European countries are now facing a challenging double transformation. The first one is associated with rebuilding a competitive economy after communism and the second one is triggered by rapid technological changes in the global economy. The course and result of this double economic transformation cannot be known in advance. In the worst-case scenario, it may resemble a wild-goose chase, since more technologically advanced countries will grow faster than Central Europe by effectively leveraging positive feedbacks in their economies. In the optimistic scenario, Visegrad Group countries will use the

“backwardness rent” to their benefit and make a decisive leap forward in their development level. In order to build a competitive and innovative economy, an active economic policy is required, and its priority should be high-quality education and scientific research, a business-friendly regulatory environment, a fully developed financial market and direct public funding or incentives for the private sector to invest in research and development and in new technologies. Social factors such as higher levels of trust, the willingness to take risks and acceptance of failure are important as well. A long-term development vision is needed and it is essential to set ambitious goals such as making Visegrad Group countries a European centre of innovation. In Poland, the plan intended to ensure the development of innovative economy is the “Strategy for Responsible Development” drawn up by Deputy Prime Minister Mateusz Morawiecki. However, in the era of globalisation, a significant additional development lever is regional cooperation, which could lead to a strong innovation ecosystem emerging in Central Europe. Joint initiatives may include e.g. regional research projects,

venture capital funds or sectoral clusters, which leverage the strengths of each of the countries in the region.

This report, drawn up by Polski Fundusz Rozwoju (Polish Development Fund) for the unique meeting of political and economic leaders of Visegrad Group countries during the Innovators' Congress, presents an outline of the current state of innovation in Visegrad Group economies in the context of the envisaged regional hub for new technologies. In the first part, the main barriers, levers of development and recommendations concerning the construction of a strong innovation ecosystem are presented. The second chapter presents the current innovation status of the region's economies and assesses their competitiveness. The final part of the report contains the results of PFR's own research concerning the stage of development of the venture capital market. We hope that our report proves interesting to you and provides inspiration for actions aimed at strengthening Central European economies through innovation and the development of local entrepreneurship.

We would like to thank the following persons for their cooperation and open discussion of the matters raised in this report: Jan Filip Staniłko, Professor Wiesław Nowicki, Marek Dietl, (Cambridge), Maciej Ćwikiewicz, Monika Morali-Majkut, Barbara Nowakowska, and also Eliza Kruczkowska who coordinated work on the report as well as preparations for the Congress at PFR. We would also like to thank the Institute for Market, Consumption and Business Cycles Research, and the BCG and McKinsey consultancies for their institutional cooperation in preparing the report. We invite you to submit any questions, comments or suggestions you may have regarding the content of this report.

Yours sincerely,

Paweł Borys

President of the Management Board
Polish Development Fund
Innovators' Congress Organiser

Patrycja Klarecka

President of Polish Agency
for Enterprise Development
Main organiser of CEE Innovators Summit



I. VISEGRAD GROUP COUNTRIES AS A EUROPEAN CENTRE OF INNOVATION – THE BARRIERS AND LEVERS OF DEVELOPMENT

Building a modern economy requires the development of a complete ecosystem of innovation. It provides the ability not only to transfer but primarily to create new technologies, thereby increasing productivity. In the long run, it is the productivity of labour and capital that is the driving force of prosperity and improvement

of living standards. Increases in productivity are, in turn, driven by key factors such as advances in technology, changes in work organisation, and an increase in the share of the physical and intellectual capital in the structure of production factors. Meanwhile, both the level of economic productivity resulting from technological advancements and the level of capital are relatively low in the Central European countries. This is the legacy of the intermittent history of their statehood, the times of communism, and still too short a period of the region's economic transformation.

Most of the economies of Central Europe only marginally benefited from the first, second, and third industrial revolutions. However, the Visegrad Group countries now have a good chance to fill these gaps and make a major leap forward, mitigating risks and taking advantage of the development levers created by the fourth industrial revolution. For this to happen, Central Europe has to undergo a further rapid transformation towards a knowledge-based economy, evolving into one of the world's centres of innovation in the coming decades. Close

cooperation of entrepreneurs, the state, the world of science, professionals, and investment funds, forming an ecosystem for the development of new technologies and products with a global potential,

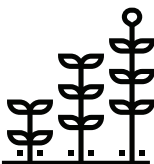
is the necessary condition for that vision to come true.

Complete ecosystem of an innovative economy



This section presents the results of analyses of the identified barriers, best practices, and levers of innovation in Poland, the Czech Republic, Slovakia, and Hungary, along with a set of

recommendations on policy-making to support the ecosystem of a modern economy, taking into account five key perspectives.





ENTREPRENEURS

BARRIERS

- Paradoxically, low labour costs reduce potential returns on investment in innovation and do not encourage such investments – the V4 countries spend EUR 100-300 per capita on innovation, which is almost two times less than the EU average (ca. EUR 560 per capita).
- The large dispersion and small size of businesses means that they “cannot afford” to invest in innovation – while the share of SMEs in GDP is close to the European average, more than 95% of SMEs are micro-enterprises (compared to just over 80% in Germany and the UK).
- The biggest enterprises are often state-owned companies, which are characterised by a greater risk aversion, a conservative approach, short-term strategies, and reluctance to accept possible failures.
- The scale of the business sector in the economy is much smaller than in Western Europe – even if spending on innovation in V4 was comparable with the European average in percentage terms, it would still be 60% lower in nominal terms than in Germany alone.
- Businesses in V4 have not accumulated enough capital, management skills or ability to expand into international markets and build chains of cooperation – enterprises are relatively young compared to the EU where over 65% of the 100 largest companies are more than 100 years old.

BEST PRACTICES

- Stimulating the creation of infrastructure for the cooperation of small businesses – e.g. numerous thriving industry organisations in Germany.
- Building industry innovation clusters – e.g. Boston focusing on the bio-tech and energy sectors.
- Large corporations – building new businesses and innovation centres as separate entities which, while benefiting from the financial strength and asset base of the parent company, are not burdened with procedures that would impede their operational flexibility, e.g. Amazon Web Services and Kindle as separate businesses of Amazon, Cofely of the Engi Group or companies of the CVC E-on Fund.

DEVELOPMENT LEVERS

- High level of entrepreneurship – more than 40 SMEs per 1,000 inhabitants, i.e. ca. 30-50% more than in Western Europe.
- Double-digit annual growth in R&D spending in the V4 countries in the last 5 years.
- An increase in labour costs, combined with the still low productivity, stimulates the creation of innovative solutions.

RECOMMENDATIONS

- Creating a transparent system of incentives and tax breaks to encourage research and development spending in enterprises.
- Stimulating the establishment of pan-regional industry clusters with dedicated infrastructure.
- Common investment funds in private or state-private innovations in cooperation with the largest enterprises, operating on a market basis outside corporations.

INVESTMENT FUNDS

BARRIERS

- Restrictions on access to capital of ca. USD 2.5 to 10 million (rounds A-C) in domestic markets and a lack of local actors to serve as “cornerstone investors” in funding rounds. Such amounts often exceed the capitalisation of the entire local VC funds but, at the same time, are necessary to implement a strategy of rapid technological and business expansion in order to create regional and global leaders.
- Low experience of the markets, funds and their managers, as well as the founders and employees of startups, especially with regard to international expansion. Moreover, private funds are discouraged by the small number of successful exits from investments and the low rate of return, given the high risk involved. This hinders both the development of companies and the acquisition of new rounds abroad, as well as the raising of capital for the funds.
- The high degree of dependence of local VC funds in V4 on the actions of the state. Most of the investments in preliminary rounds are carried out by publicly-financed funds, but market participants cite numerous problems with how financing is awarded by state agencies

BEST PRACTICES

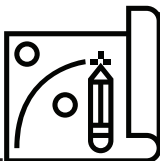
- Acquiring capital and know-how for expansion and growth abroad (investments and co-investments of foreign funds, e.g. Booksy, Doc Planner or Socialbakers) and locally in funds not previously engaged in VC investments.
- Isolated cases of investments made by local funds in companies in other V4 countries; this is primarily the case of the Czech Credo Ventures. Founders and early employees, who have gained experience, contacts, and financial resources as a result of their work for startups that ended in a successful exit from the investment, return to the market and reinvest their resources as entrepreneurs or investors.

DEVELOPMENT LEVERS

- In each of the V4 countries, the state pays attention to the VC market and attempts to stimulate it through transfers using the resources of funds and other vehicles, which significantly increases the number of operating funds and investments.
- A growing number of entrepreneurs and companies benefiting from support at an early stage (seed investments, accelerators, and incubators) creates opportunities for the faster accumulation of knowledge and experience.
- Startups and high-risk investments have become fashionable and are increasingly positively perceived, also by the media and prospective employees.

RECOMMENDATIONS

- Stimulating conditions for raising subsequent rounds of investment locally, also by supporting and creating funds that specialise in ticket size investments in the range of USD 2.5-10 million.
- Stimulating the transfer of lessons learned from investments by giving priority, in publicly-financed actions, to individuals and funds with a proven track record.
- Taking into account the opinions of the founders of the supported companies on funds investing in those companies, as well as opinions of the funds themselves on the resources of funds, in the process of evaluating and accounting for publicly-financed actions.
- Supporting activities of business angels by, amongst others, supporting the development of business angel networks.
- Allowing open pension funds and insurance funds to invest in non-regulated markets, including the private equity and venture capital segments.



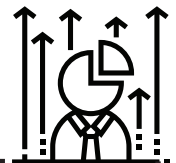
HUMAN RESOURCES AND TALENT

BARRIERS

- Lower pays persuade talented workers to seek employment in the countries of Western Europe and the United States (or locally in foreign companies)
- The most dynamic centres of innovation are located outside the V4 and attract talented entrepreneurs and workers from CEE.
- Migration of startup founders to more attractive centres in Western Europe – an annual net outflow of over 3% of startup founders from the CEE region (mainly to the UK and Ireland).
- Unfavourable long-term demographic trends – low fertility and an aging population.
- Social factors – reluctance to accept a possible failure, lack of trust, and low communication skills..

BEST PRACTICES

- Immigration support programmes addressing entrepreneurs and high-potential professionals, e.g. in the Silicon Valley, French Tech Ticket Startup Chile, immigration policy.
- Branding and communication campaigns to build the position of a country/region, egalitarianism, entrepreneurship and risk-taking – e.g. Berlin or Israel.
- Related grant programmes of companies and universities – e.g. Siemens or Shell programmes
- A detailed diagnostics of long-term needs in the field of specialisation, competence, and education – the diagnostic programme “Future of Work” in Australia.





DEVELOPMENT LEVERS

- A significant percentage of people with good quality secondary and higher education – above the EU average in each of the V4 countries.
- Workers acquire competencies in corporations and then move on to their own startup or investment business.
- Startup hubs in Warsaw and Prague attract a “critical mass” of talent; the founders consider them the most preferred business locations in CEE.

ASSESSMENT OF POLAND'S INNOVATION POTENTIAL VS. EUROPEAN UNION AVERAGE

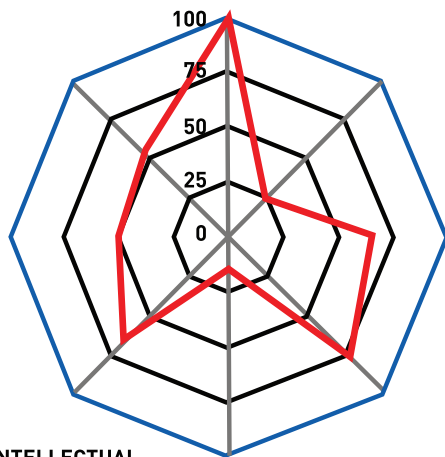
- Medium-tech and high-tech product exports
- Exports of knowledge-based goods and services
- Revenue from licences and patents from abroad

ECONOMIC EFFECTS

COMPANY INNOVATION

- SME innovation – products, processes, marketing, organisation
- Employment in innovative sectors

HUMAN RESOURCES



INTELLECTUAL PROPERTY

ENTREPRENEURSHIP AND COOPERATION

— PL

— EU average

RECOMMENDATIONS

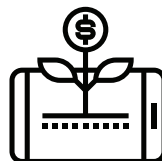
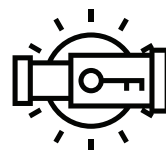
- Creating an environment that encourages highly qualified V4 citizens to return to their home country.
- Developing a programme of regional cooperation and talent exchange (a regional “Erasmus”).
- Developing a programme to recognise and support the most talented professionals and entrepreneurs in the region.
- A programme of grants and loans for students of key universities, linked to the requirement (or guarantee) of work in a V4 country/-ies.
- Developing digital literacy and economic education.

- International publications in collaboration with entities from abroad
- Most-cited publications
- PhD students from outside the EU

INTERNATIONAL RESEARCH TEAMS

PUBLIC FINANCING AND VENTURE CAPITAL INVESTMENTS

COMMERCIAL EXPENDITURE ON INNOVATIONS



- SMEs engage in cooperative activities
- Cooperation between innovative SMEs
- Publications prepared in cooperation between public and private entities

THE LEGAL ENVIRONMENT

BARRIERS

- The perception of high risk in dealing with the administration and the uncertainty of interpretation of the rules.
- Poor IP protection law in the V4 countries – the Czech Republic ranks 31, Slovakia 39, Poland 43 and Hungary 49 on the International Property Rights Index.
- Low position in the OECD in terms of business cooperation between SMEs and the public sector due to complex rules on public procurement, as a result of which the public sector does not build the long-term demand side.
- A multitude of initiatives and government agencies responsible for innovation, a lack of coordination and a lack of a coherent strategy managed from one place.
- A limited control of effects – the significant available and disbursed funds do not translate into growth.
- The low social capital results in a high degree of suspicion and distrust both in human relationships and, consequently, in relations between companies, organisations and the administration.

BEST PRACTICES

- Israel: Outlays on education and research and development – expenditure on civilian R&D is more than double the EU average; Providing public funding and support: state incubators and venture capital for startups, incentives, and grants for companies developing innovation labs, R&D centres.
- The UK's Enterprise Investment Scheme (EIS) offers investors tax credits for shares in the company in which they have invested. The investments relate to small businesses engaged in high-risk projects. EIS is intended for larger investors who can receive a 30% tax credit up to a maximum of one million pounds. On the other hand, the Seed Enterprise Investment Scheme has been launched to encourage seed investments in companies at an early stage of development. Investors obtain a tax credit equal to 50% of the

investment up to a maximum of GBP 100,000 and a Capital Gains Tax Relief. The maximum amount that can be invested in the company is GBP 150,000.

- Sectoral specialisation in Singapore supports biomedical innovation at many levels – the equivalent of the Ministry of Health (HSA) is heavily involved in the creation of new regulations facilitating research; the “Academy of Health” created in 2009 to support the exchange of knowledge on breakthroughs in medicine and related legal aspects; Cooperation between the HSA and the MIT Centre (USA) and 5 companies on medical innovation.

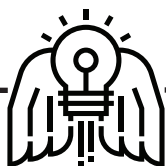
DEVELOPMENT LEVERS

- Marketising and simplifying access to EU funds (the scope, procedures, forms).
- Launching pre-commercial procurement – public procurement can be a driving force for the development of innovative economy in Poland while at the same time supporting the vibrant startup community – not so much through the co-financing or acceleration projects (whose effectiveness is often problematic) but rather by offering opportunities to contract innovative solutions, including those that require R&D.



RECOMMENDATIONS

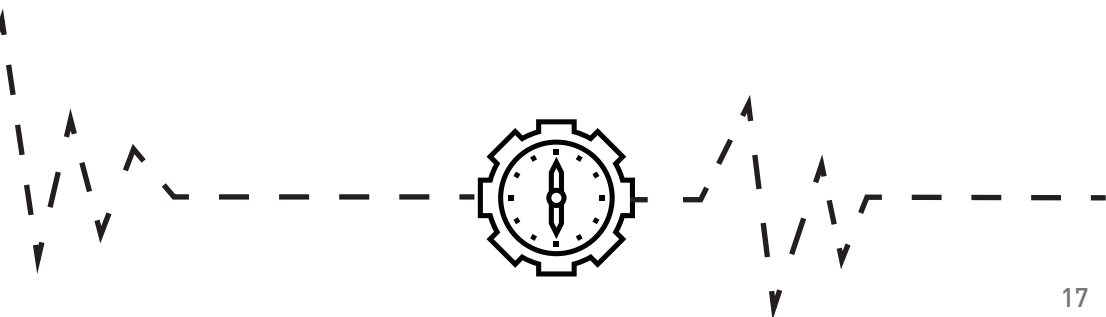
- Facilities for investors: introducing tax incentives for investors to finance startups, abolishing double taxation for commercial companies operating as funds, adopting regulations on the financing of innovative projects of the crowdfunding type, and introducing a simple joint-stock company as a new type of capital company.
- Facilitating risk taking – friendly bankruptcy regulations, including those concerning the establishment of another company.
- Protection of IP rights, facilitating patenting and participation in matters relating to property – creating a platform for supporting the registration of patents by Polish enterprises abroad.
- Strengthening the system of government institutions responsible for the ongoing measurement and control of effects and the setting of economic policy goals.
- Strengthening the stability of the economy and the law, and confidence in the stability of the system in which one operates. This will increase the sense of security and an unambiguous interpretation of the rules over the course of time (e.g. the Constitution for Business in Poland).



RESEARCH AND DEVELOPMENT

BARRIERS

- Low outlays on research in nominal terms due to GDP disparities: the V4 countries spend significantly less on research. The expenditure to GDP ratio is 1% in Poland, 1.14% in Slovakia, 1.38% in Hungary and 1.95% in the Czech Republic, which is the European average.
- The proportionally lower pays and the number and amount of research grants (basic research is the basis for application research).
- The low number of patents and research-to-practice implementations. It is estimated that 80% of scientists collaborate with industry in the United States and it is exactly the opposite in V4.
- Poor collaboration between industry and science, low social capital and lack of trust.
- Low competence in the area of technology transfer and commercialisation. Lack of good practices and standards.
- More coordination on the part of public funds can be seen at the stage of basic research than at the subsequent stages of development, including support in the form of technology development and acceleration.
- Public financing of science is focused primarily on basic research, with the subsequent stages (i.e. application and implementation research) being financed through public-private partnerships. There is a gap in the financing of the Proof of Concept stage. This can be addressed by seed funds and VC supported by public funds (e.g. in Poland).



BEST PRACTICES

- The model implemented in Israel – the focus of public funding is on technology transfer centres and other organisations supporting the collaboration of science and business (incubators, technology parks, and seed funds).
- The model applied in Belgium where so-called virtual institutes have been set up with the task of identifying and developing the research groups that are the most attractive in application terms, and looking for business partners for them.
- The model applied in Singapore where funds are allocated to grants for research groups with a track record in implementations.
- Accelerators affiliated with universities as an opportunity to generate income for a university – based on the example of Cambridge University.

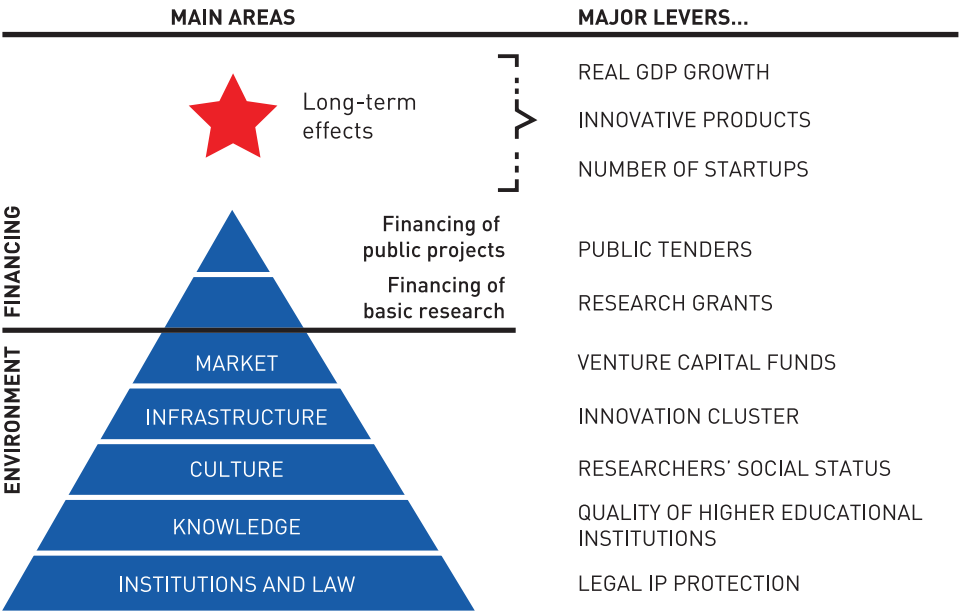
DEVELOPMENT LEVERS

- Better regulation, e.g. the Act on innovation in Poland.
- Large outlays on research infrastructure incurred under the previous financial perspective
- A visibly growing number of patents, e.g. 180 European patents awarded in Poland in 2016, an increase of over 16% year on year.
- Annual growth in science spending in the V4 countries in the last 5 years.
- Demographic changes will force some establishments and scientists to look for additional sources of financing outside education, e.g. application research and collaboration with businesses.
- Transformations in the labour market make it more attractive for businesses to establish relationships with universities and schools in order to influence the education of required specialists, as well as relationships with prospective job candidates.



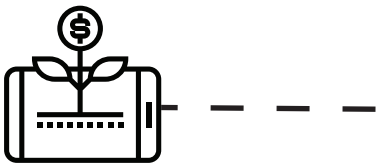
RECOMMENDATIONS

- The path of promotion and financial support for outstanding research groups.
- Professionalisation and funding of business environment entities and technology transfer centres.
- Changes in the evaluation of research units.
- Simplifying the rules determining the use of research results by research units.
- Focusing budgets around specialisations and industries with a high potential and local competence.
- Implementing a system of virtual institutes.



Source: Boston Consulting Group analysis

II. THE ECONOMIC ENVIRONMENT FOR THE DEVELOPMENT OF THE INNOVATION FINANCING MARKET IN THE VISEGRAD GROUP COUNTRIES



THE VISEGRAD GROUP COMPARED TO EUROPE

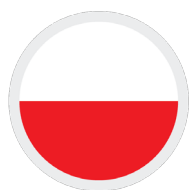
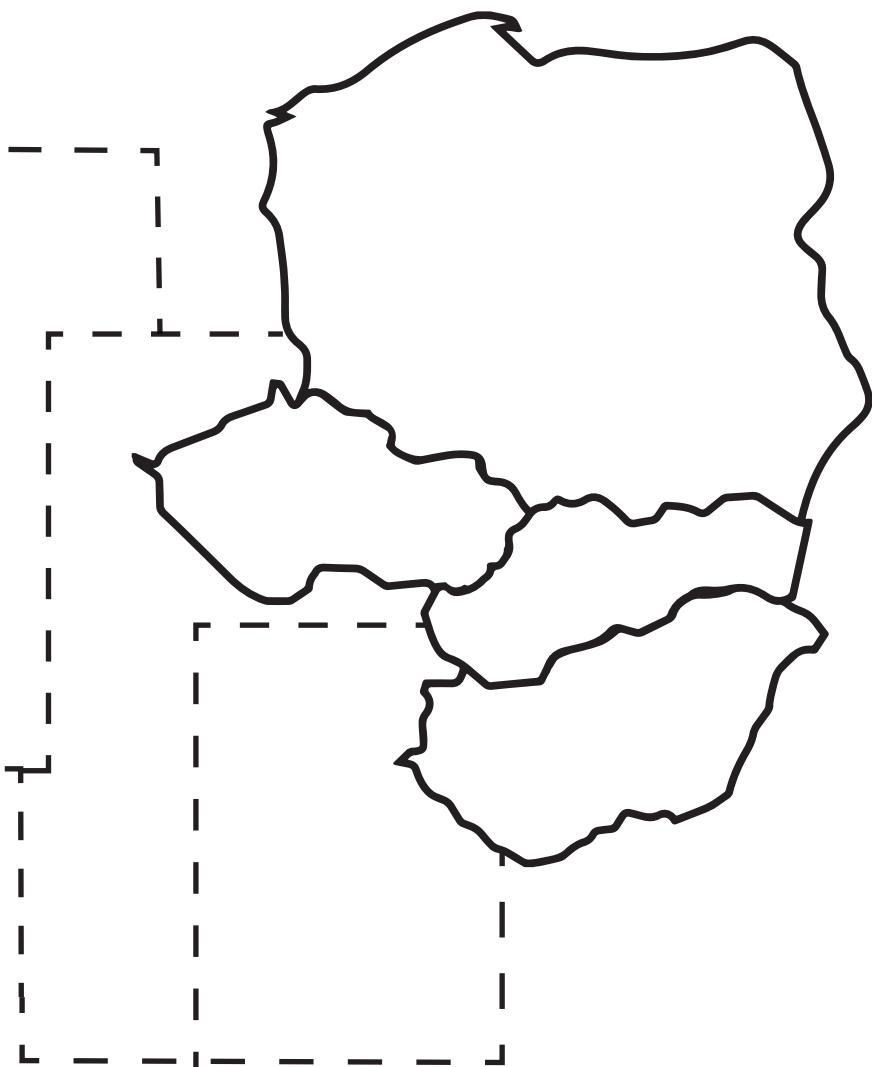
In Europe in 2015, the total amount raised through investment rounds exceeded EUR 47 billion. A total of 274 funds were created; there was a 15% decrease compared with 2014 but a better result than in 2012 and 2013. In 2015, nearly 40% of investors, including mainly institutional ones,

originated from outside Europe. Pension funds provided nearly 25% of mobilised capital and the funds raised by VC funds increased by 8% to EUR 5.3 billion, which is the highest figure since 2008.

Venture capital and private equity market in the CEE4 countries in 2014

Value in EUR '000	CZECH REPUBLIC	HUNGARY	POLAND	SLOVAKIA
Stage of development				
Seed	0	1,496	1,820	800
Startup	2,933	22,174	9,722	900
Subsequent rounds	6,134	8,477	10,472	3,000
Total investment	9,067	32,146	22,014	4,700

Source: Investeurope.eu 2015 European Invest Europe



COUNTRIES OF CENTRAL AND EASTERN EUROPE – SELECTED COMMON FEATURES

Compared to European Union countries, the countries of Central and Eastern Europe still rank relatively low in international innovation rankings. While it is clearly visible that they are climbing the rankings, Western European countries still have a definite advantage. This is due to historical factors and the transformation of the 1990s. Strategies to promote innovation are, in fact, a relatively new phenomenon in the CEE region and one that has only recently gained in importance.

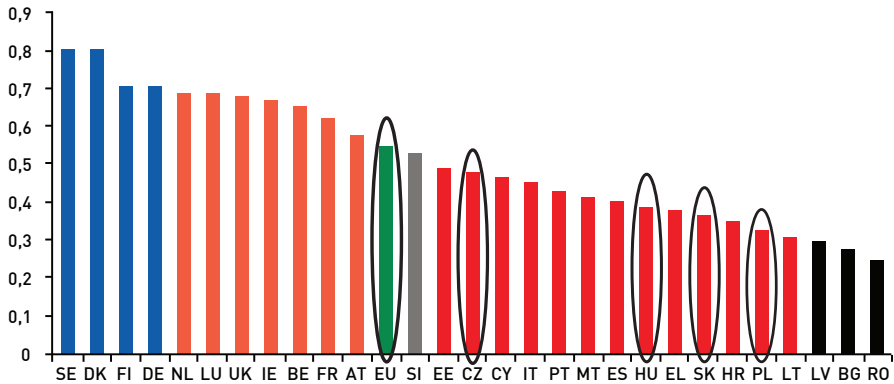
The economies of the CEE countries, including the Visegrad Group, struggled with post-transformational problems in the 1990s. An increase of competitiveness required in the first place strengthening the mechanisms of the market economy, structural reforms, creating an appropriate institutional and legal environment, and investing in technical infrastructure and human capital. In addition, the growth of labour productivity and the making up for delays were to a large extent possible thanks to the absorption of knowledge and technology from

abroad. This process resulted, firstly, from buying ready-made solutions and secondly, from the influx of foreign investments. At the same time, low labour costs meant that there was no need to search for other, more innovative solutions. The introduction of the first national innovation strategies in CEE countries coincided with the process of integration with the European Union. Access to EU funds, coupled with a fall in the competitive cost advantage, resulted in the creation of national programmes to promote and support innovation and research. Scientific and research infrastructure was modernised using EU funds. An increase in the wealth of society and in wage expectations meant that innovation and implementation of new technologies became critical to the ability of enterprises to maintain their competitive advantage. Capital accumulation is, nevertheless, still visibly lower than in Western Europe.

The CEE region is, however, not homogeneous in terms of innovation level. Some countries of the region, primarily Estonia and Slovenia, have succeeded in introducing solutions that allowed them to reach, and

in some cases even exceed, the level of innovation in the European Union countries. When analysing the data, we must keep in mind that rankings are compiled on the basis of an analysis of various phenomena and factors. The speed and direction of development of the particular countries depend also on the size of the country, its population, population density, as well as historical factors.

A comparison of countries in terms of innovation



Source: Innovation Union Scoreboard, European Commission

REVIEW OF MACROECONOMIC INDICATORS

I. CZECH REPUBLIC

BACKGROUND INFORMATION

Czech Republic: a population of 10.5 million, the second-largest country of the Visegrad Group. The group aged 15-64 is the largest in the population. The median age is 41.5. In comparison, the median age for all EU countries is 42.6. The Czech population is visibly changing: there is a clear increase in the percentage of persons aged over 64 but also in the percentage of persons aged under 14, although this group is still

the least numerous. The Czech society is aging, but the increase in the number of births is a positive phenomenon. The GDP per capita is USD 18,300 and at 4.3% the growth of GDP per capita was the highest among the countries of the group. This is the highest result since 2008 and it was driven mostly by growth in household spending. Revenues from sales of high-tech production total ca. EUR 13 billion. At the same time, foreign investments are decreasing, accounting for 1.3%

of GDP in 2015. The share of exports of goods and services in GDP increased to 83% in 2015.¹¹ High-tech exports accounted for 15.4% of all exports.

ANALYSIS OF INNOVATION

There are a number of indicators and methods of measuring innovation, including the ICT (information and communication technology) indicator developed each year by the Organisation for Economic Cooperation and Development in order to demonstrate the degree of a country's access to technologies facilitating the transfer of technology and the use of information. This analysis takes into account the Internet access indicator, which is measured as the percentage of households with Internet access in relation to all households in the country. For the Czech Republic, the indicator in question was 79% in 2015 and exhibited the highest growth rate (31%) in relation to the base year of 2010. While one of the highest among the Visegrad group countries, this figure is not among the highest compared to other EU countries. The percentage of households that have

access to a personal computer (access to computers from home) is similarly measured and it was 78.9% in 2015.² It is the second highest result among the analysed countries after Slovakia but one of the lower results among EU countries, despite its high growth of 23% compared to 2010. The above data reflect the increased focus the Czech Republic has been placing in recent years on the development of areas associated with the transmission of information. Global Innovation Index 2016, which is a measure of countries' innovation on a 100-point scale, is another of the analysed indices. The Czech Republic ranks 27th with 49.4 points a decrease by 3 positions compared to the previous year but still a better result than that of Poland, Hungary, and Slovakia.³ Czechs are increasingly placing emphasis on the development of innovation and they are spending more and more on it. They dominate the region in terms of conditions for stable economic development, as a result of which they occupy the high 31st place (with 4.7 points) on the latest Global Competition Index

1 World Bank data

2 OECD data

3 Global Innovation Index 2016 Report.

of the World Economic Forum.⁴ One reason for such a high position is the rapid GDP growth in recent times, but the state's consistent policy of improving conditions for doing business is also a factor.

The Czech Republic excels the other analysed countries also in terms of economic freedom: with 73.35 points, it ranks 28th on the Global Index of Economic Freedom.⁵ The state has a policy of interfering in economic activity in the least possible way in order to best stimulate it. Czechs are also strongly committed to fighting corruption but are outperformed by Poland in this field. With 55 points, they rank 47th on the Corruption Perceptions Index.⁶ This index ranks countries by corruption on a scale from 100 (very clean) to 0 (highly corrupt). Corruption scandals have been rife in the Czech Republic in recent years but their scope and significance have been decreasing.

The PISA index developed by the Organization for Economic Cooperation and Development is another interesting measure in the context of this report. This is an international study of 15-year-old school pupils

performance in mathematics, science, and reading. PISA results in the Czech Republic are among the highest in relation to the results of the entire studied group of countries. In the IMD Talent Report 2016, the Czech Republic ranked 31st out of 61 countries, improving its score by 6 positions compared to 2014, when it had one of the lowest results in its history. Given the PISA results and its increasingly high position on the IMD Talent Ranking, the Czech Republic is faced with the challenge of persuading its young talented people to stay in the country and contribute to its business development.

4 Global Competitiveness Report 2016–2017

5 2017 Index of Economic Freedom

6 Corruption Perceptions Index 2016.

II. HUNGARY

BACKGROUND INFORMATION

Hungary: a total population of 10 million and declining. While still dominant, the percentage of the working-age population is decreasing, whereas the second largest population of post-working-age persons is growing. The percentage of children in the population remains unchanged. The median age of the population was 41.9 in 2016 and is closest to the median age for all EU Member States.

The GDP per capita totalled USD 12,300 in 2015 and was similar to that of Poland. At 3.38%, the increase of GDP per capita in Hungary was one of the lowest among the countries of the Visegrad Group. Although changes in Hungary's GDP depend on the situation of the economy, it can be concluded that the country has returned to the path of growth after several years and is gradually improving its economic situation. Among the surveyed countries, Hungary is the only one with a negative balance of foreign direct investments, which amounted to -2.16% of GDP in 2015. This means that divestments prevailed over the flow of new investments.

This may be due to the policy in place, which is rather unfavourable to foreign investments, especially in the banking sector. Growing exports constitute a factor that stabilises the Hungarian economy and contributes to GDP growth. Net exports correspond to 90.7% of GDP. According to data (2014-2015), annual revenues from the sale of high-tech products produced in Hungary a total of EUR 16.3 billion, representing 15.2% of export revenues, a figure almost the same as in the Czech Republic (15.4%) and nearly twice as large as in Poland (8.5%).

ANALYSIS OF INNOVATION

For Hungary, the ICT indicators are among the lowest in comparison to other countries of the Visegrad Group. 75.6% of all households have Internet access, a figure similar to that of Poland. 75% of all households have a personal computer, which is the lowest figure among the analysed countries. The economy is not focused on the development of technologies related to the transfer of information, although this is slowly beginning to change, as evidenced by Hungary's high fifth position in the ranking of the best programmers. However, Hungary

dominates over the other Visegrad Group countries in terms of growth rates of both these indicators: a 30% increase in Internet access and a 25% increase in access to a personal computer were recorded in comparison to 2010. These outcomes may be related to the aging population. Older people tend to make less use of new technologies.

Hungary exhibits a high rate of innovation (Global Innovation Index) compared to other countries, ranking 33rd in the global ranking with a score of 44.71 points. This is due to the large share of manufactured high-technology goods in the structure of the GDP. As regards long-term economic growth, Hungary ranks 69th among 138 countries with the competitive indicator of 4.2 points. This means that Hungary is well-positioned to ensure long-term sustainable growth insofar as it is driven by productive factors, investments, and innovation. On the other hand, the score of 65.8 points has strengthened Hungary's 56th position on the Index of Economic Freedom of the Heritage Foundation, which indicates that the country is moderately free from the influence of the state on the economy.

However, no similarities can be found in the results of the PISA survey, which are much lower than in Poland and the Czech Republic in each of the surveyed areas of education, and lower than the average for OECD countries. This may be also associated with fewer talents – Hungary is only 50th in the talent ranking, which is a much lower position than that of Poland or the Czech Republic. This is slowly beginning to change, as evidenced by Hungary's high fifth position in the ranking of the best programmers according to HackerRank⁷.

7 <https://blog.hackerrank.com/which-country-would-win-in-the-programming-olympics/>

III. POLAND

BACKGROUND INFORMATION

Poland: in 2015, the population was 38 million, with a negative growth rate. It is still the largest of the Central and Eastern European countries analysed in terms of its population. Poland is a relatively young society. According to Eurostat data, the median age of the population in 2016 was 39.9 years, i.e. it was significantly lower than the median age of the population in the European Union (42.6); however, the declining population numbers combined with increasing average longevity means that this figure will tend to converge towards the European result. In 2015, GDP per capita amounted to USD 12,600 and increased by 3.97%; this was the second best result among Visegrad Group countries. The high growth rate resulted primarily from the steady increase in domestic demand, which was influenced by the Poles' growing consumption and, to a lesser extent, also by investment.⁸

In 2015, foreign investment inflows into Poland accounted for 2.95% of GDP, which was a smaller value than

in the previous year and could have resulted from a deteriorating sentiment among entrepreneurs. At the same time, volumes of exports of goods and services have grown steadily in recent years. In 2015, exports accounted for almost 50% of GDP.⁹

ANALYSIS OF INNOVATION

According to the analysis of ICT index values, the Internet access index in 2015 was 75.8%,¹⁰ and computer access index was 77.9%¹¹; these are the second lowest levels after Hungary. One reason could be that the state paid too little attention to the development of information technology in Poland, which may change soon given the announcements by the Ministry of Digital Affairs. The second reason is Poland's size and population numbers and the resulting effects of scale.

The Global Innovation Index is at 40.22 points and is the lowest among the countries surveyed. Poland is ranked 39th in this respect. Based on a Global Competitiveness Index of 4.6, Poland is ranked 46th in the world.¹² As concerns economic freedom, the IEF (Index of Economic Freedom) for Poland is 68.3,

8 <http://wyborcza.pl/1,155287,19535040,gus-w-2015-roku-pkb-w-gore-o-3-6-proc.html>

9 Internal research based on World Bank data.

10 OECD.

11 OECD.

12 <http://reports.weforum.org/global-competitiveness-report-2015-2016/competitiveness-rankings/>

resulting in 45th place in the ranking. Innovation and competitiveness indices are compiled using a number of detailed indicators whose combined analysis makes it possible to determine the rankings. It is worth noting that one reason for Poland's low ranking may be the figures related to issues of mutual communication and trust. According to studies, Poland is ranked respectively 70th and 100th in these categories, which undoubtedly lowers its global score and is consistent with expert opinions indicating that the weakness of social capital and considerable distrust are among the main reasons for low innovation levels in Poland.

In the PISA study, Poland fared the best among the countries analysed, and above the average for OECD countries.¹³ The latest talent report, in which Poland ranks 29th, is evidence of the high skills of young Poles. This is confirmed by the HackerRank ranking, according to which Polish software developers are considered among the best in the world, ranking very highly – in 3rd place.

Given the good results related to skills and at the same time poorer innovation and entrepreneurship scores, it may be concluded that measures and

changes in regulations are required in order to stimulate entrepreneurship and create an attractive labour market so as to persuade the most talented people to stay in the country.

IV. SLOVAKIA

BACKGROUND INFORMATION

Slovakia: a population of 5.5 million in 2015, growing each year. The median age of the population is the lowest at 39.4 years, and thus Slovakia is considered a relatively young country, like Poland. People of working age dominate the age structure. The percentage of the youngest age group (up to 14 years of age) is growing and this means favourable demographic prospects. The Slovak GDP per capita and its growth in 2015 were higher than for Poland and amounted to more than USD 16,000 and 3.7%, respectively. In addition, the GDP growth rate is rising, and more rapidly so each year. Slovakia's economic growth is primarily the result of an increase in demand associated with the decline in prices, deflation, and higher domestic consumption, which was fuelled by the prolonged utilisation of European funds.

13 <http://gpseducation.oecd.org/>

Net foreign investment flows accounted for 1.3% of GDP in 2015. After several years of decline, the investment rate moved into positive territory in 2012. Export is of key importance for the economy – net exports accounted for 93% of GDP in 2015, i.e. one of the highest values among the analysed countries. Poland was Slovakia’s third largest trading partner after Germany and the Czech Republic.

ANALYSIS OF INNOVATION

In 2015, according to OECD data, 79.5% of all households in Slovakia had access to the Internet, and 80.5% had access to a computer, which was the highest percentage among the

countries listed in the report, although these values are still lower than for most countries of the European Union. At the same time, Slovakia exhibits the lowest growth rate of these indices – compared to 2010, access to the Internet improved by 18% and access to a computer improved by 11%. Given the currently highest access percentages, this means that rapid growth in these indices already occurred in previous years. Slovakia’s Global Innovation Index amounts to 41.7 points, which translates to 37th place in the WIPO ranking (higher than Poland).¹⁴ However, Slovakia is ranked 10 places lower than the Czech Republic. This may be to some extent linked to the inefficient use of European funds

14 Global Innovation Index 2016 Report.

SUMMARY OF DATA FOR VISEGRAD GROUP COUNTRIES

	GDP per capita in USD	ICT, Internet Access*	Share of exports in GDP*
Czech Republic	18,326	79.0%	83.0%
Hungary	11,903	75.6%	90.7%
Poland	12,309	75.8%	50.0%
Slovakia	16,648	79.5%	93.0%

Source: World Bank data, OECD

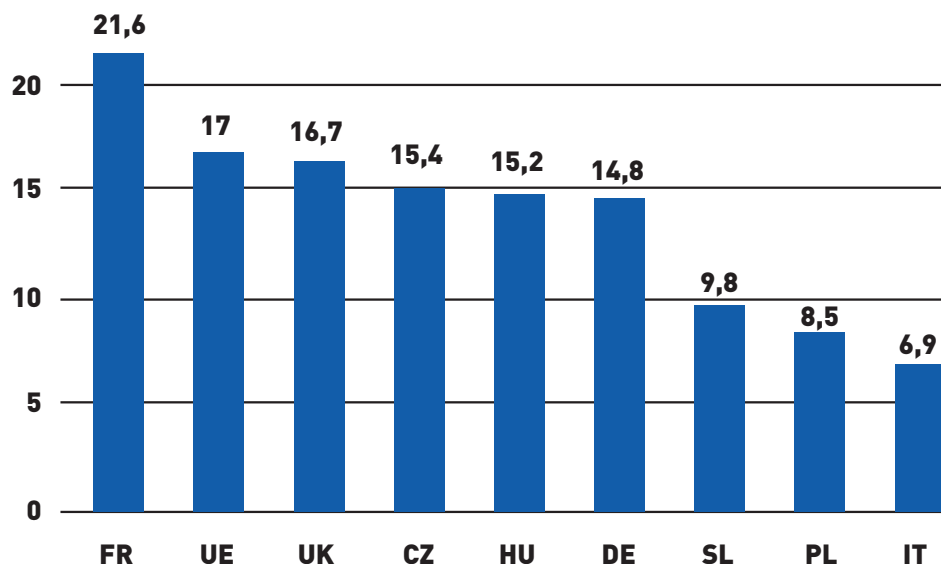
as well as to low spending on research and development,¹⁵ but it stems above all from historical conditions. Only the development of private enterprises could drive Slovak innovation. In the global competitiveness index, Slovakia ranks well below the other countries included in the Visegrad Group. In the World Economic Forum ranking, it scored 4.28 points and was in 65th place,¹⁶ which only confirms the conclusion about the need to develop the private sector, which would contribute to an improvement in the traditional industrial sector. In the latest Heritage Foundation ranking focusing on economic freedom, Slovakia is ranked 57th out of 180 countries with a score of 65.7 points,¹⁷ which means that it is a

moderately free country, like Poland and Hungary. In the 2015 PISA study, Slovak students obtained the lowest scores compared to the other analysed countries. Slovakia is the only country included in the Visegrad Group whose software developers did not make it into HackerRank's top 50.

15 <http://www.instytutobywatelski.pl/22276/lupa-instytutu/czas-wyzwan-dla-slowacji>
 16 The Global Competitiveness Report 2016–2017.
 17 2017 Index of Economic Freedom.

Share of high-tech exports	Global Innovation Index	Value of VC investments in 2015 and 2016 in PLN	IP law quality ranking, global rank	Record HackerRank
15.4%	27	372,403,800	31	9
15.2%	33	295,490,500	49	5
8.0%	39	477,835,000	43	3
9.8%	37	34,720,000	39	not included

SHARE OF HIGH TECHNOLOGY PRODUCT EXPORTS IN TOTAL EXPORTS FOR SELECTED MARKETS IN 2015 (%)



Source: Investeurope.eu 2015 European Invest Europe

The chart showing the share of high-tech exports provides a synthetic image of the economy's ability to produce competitive products for the global market. The analysis of the data available shows that in the case of the Czech Republic and Hungary, their exported products are at the European level.

For Poland and Slovakia, this result is clearly worse. When compared with the share of exports in GDP, Poland's result is by far the worst, which may suggest the weakness of the high-tech industry in Poland.

APPROACH TO ENTREPRENEURSHIP IN THE CONTEXT OF THE OPERATION OF THE VENTURE CAPITAL MARKET

Entrepreneurship is a key factor in the development of the venture capital market; at the same time, entrepreneurship is an outcome of a number of factors – from legal to cultural. Entrepreneurship issues should be analysed from several points of view. The first is adjusting regulations and laws to the entrepreneurs' expectations and hence the ease of doing business, which translates into increased entrepreneurship.

When analysing the report

accompanying the World Bank "Doing Business" ranking concerning the ease of doing business for the period from June 2015 until June 2016, we should take note of several points. Poland has been ranked the highest in history (24th place), which means a jump by as many as 38 places compared to 2012. As a result, it managed to overtake France and Switzerland as well as the Czech Republic, which is ranked 27th.¹⁸

Place in the "Doing Business" ranking

POLAND	CZECH REPUBLIC	HUNGARY	SLOVAKIA
24	27	41	33

Source: OECD 2016

Poland's result is the outcome of regulations introduced in order to encourage entrepreneurs to develop new businesses and make it easier to run them. In Poland, a new restructuring law has been in effect since the beginning of 2016, which

makes it easier for creditors to pursue their claims. Similarly, the process of obtaining building permits has been made easier as it is no longer required to enclose guarantees concerning the delivery of utilities and terms of connection with the basic design.¹⁹

¹⁸ <http://www.doingbusiness.org/~media/WBG/DoingBusiness/Documents/Annual-Reports/English/DB17-Report.pdf>

¹⁹ <http://www.worldbank.org/pl/news/press-release/2016/10/25/world-bank-poland-advances-in-doing-business-ranking>

All these improvements enhance entrepreneurship opportunities, which has been confirmed by Poland's high position in the Doing Business 2017 ranking. Similarly, the Czech Republic has ranked 27th despite the significant drop in the rankings just a few years ago (from 65th in 2013 down to 75th in 2014). In the subsequent three editions of the ranking, the Czech Republic moved up by as many as 48 positions. Hungary is currently ranked 41st and in spite of the fact that it has improved its position year by year, its upward movement has been the slowest. Regulations and laws conducive to running a business are a necessary precondition, which depends on political decisions.

Spending on research and development is another element that has a direct and considerable impact on the VC market since it creates new solutions and technologies and thus provides stimulus for innovation and technological progress. In Poland and in other countries of the Visegrad Group, the majority of universities and other scientific and research establishments are public institutions; as a result, the size of funds allocated to research and development largely

depends on the economic situation of these countries and on the decisions of allocating budget funds to science. Gross domestic spending on research and development as a percentage of GDP is the best indicator when making comparisons. The value of this index in 2015 shows that the Czech Republic invested the most in research and development (1.95% of GDP), followed by Hungary (1.38% of GDP) and Slovakia (1.17% of GDP), while Poland spent just 1% its GDP on an annual basis.²⁰ In the Global Innovation Ranking and in the Global Competitiveness Ranking, the Czech Republic is ranked 24th and 63rd, respectively. Poland is ahead of the Czech Republic, Hungary and Slovakia in the Global Innovation Index ranking (46th place) and also in the ranking that measures the state's attitude towards corruption (using the Corruption Perceptions Index), where it ranks 30th.

20 OECD

R&D expenditure in relation to GDP

POLAND	CZECH REPUBLIC	HUNGARY	SLOVAKIA
1%	1.95%	1.38%	1.17%

Source: OECD 2016

It is worth noting that when analysing innovation, the number of patents as well as scientific and research potential are taken into account. Owing to differences in sizes between individual countries as well as other factors, such comparisons are not entirely reliable, but they may indicate the attitude and policies of the country concerned and serve as probability estimates. On the other hand, we should remember that apart from indices, absolute figures are important as well.

The determinant of the VC funds' success and their aim is finding and acquiring so-called unicorns – projects that will exhibit rapid growth and reach a value exceeding USD 1 billion owing to their attractiveness. A VC fund must first acquire such a project and then be able to develop it and finance its development. The more resources are spent on research, the greater the probability of such a project emerging. Studies conducted in Cambridge clearly

indicate that centres engaging in robust basic research often develop successful application projects as well, which then serve as the basis for the establishment of startup and seed funds on which VC activities are based. When analysing the rankings related to expenditures on research and science, one must also take the baseline level into account. The amount of funding for research in the United Kingdom is many times higher than that in Poland not just because a greater percentage of GDP is allocated to research, but also due to the difference in GDP figures.

Another important factor affecting the development of VC is the small and medium-sized enterprise (SME) sector, which was at very similar levels in all countries of the Visegrad Group in 2015. The highest rate was found in Slovakia where SMEs accounted for 99.88% of all enterprises. The Czech Republic exhibited a slightly lower percentage at 99.85%, and in Hungary it was 99.83%. Poland also came last in this

case, although with a slight gap only, at 99.80% of all enterprises. On the one hand, such a structure of enterprises is favourable because it offers the basis

for VC funds to seek projects and invest in them; on the other hand, it means that the other end of the innovation implementation process is too weak.

Share of small and medium-sized companies in the total number of companies

POLAND	CZECH REPUBLIC	HUNGARY	SLOVAKIA
99.80%	99.85%	99.83%	99.88%

Źródło: OECD 2015

It should be kept in mind that research and development (outside basic research) are carried out in-house by enterprises or commissioned by them. Small and micro-enterprises typically do not have enough capital to conduct such research and they are not attractive partners for VC funds that look for developed companies either. Beyond technological and market risks, the funds must also consider potential scenarios for exiting the investment. There are several possible paths – one of those is selling the company to a large industry player. Where there are few such companies in the economy, the market is growing less quickly.

Social capital is another key aspect from the point of view of entrepreneurship and innovation. A high level of social capital is conducive to the development of the VC market. The level of trust, as well

as experience and local relationships, provide an important stimulus. This makes it difficult to transfer the funds' operations to other regions (in terms of their activities rather than investing). As a result, funds are more willing to seek investment targets abroad than to open branches there.

All studies demonstrate that communication plays a very important role as a condition for prosperity and rapid development. In the Global Competitiveness Report ranking drawn up by the World Economic Forum, Poland ranks very poorly in terms of its quality of social communication. Poland is ranked 97th (out of the 140 countries surveyed) in terms of the level of cooperation in labour-employer relations (according to <http://www3.weforum.org/docs/gcr/2015-2016/POL.pdf>), it ranks 100th in terms of trust in politicians and 70th in terms of

the efficiency of the legal framework in settling disputes. At the same time, Poland occupies 41th place in the ranking globally. Thus it can be assumed that the weakness of communication and lack of trust are factors that hinder economic development and innovation in Poland.

Attention should be paid to the experience of Hungary. Despite its unfavourable macroeconomic situation and low values of individual indices that concern entrepreneurship and innovation, Hungary gained the most venture investments in 2015, which also drove the largest share of Hungary's GDP compared to the other countries surveyed. This has been the result of increased financing of Hungarian VC investments from the European JEREMIE programme, which Hungary joined in early 2009.²¹ Almost 72% of all venture capital investments between 2010 and 2014 were financed from the funds allocated within the framework of that programme.²² The Ministry of National Economy states

that in 2015, almost HUF 130 trillion was invested in more than 350 companies.²³ This serves to explain why the number of venture investments in Hungary has been the highest among Visegrad Group countries.

SUMMARY OF THE MACROECONOMIC SITUATION AND VENTURE CAPITAL MARKET IN POLAND, THE CZECH REPUBLIC, SLOVAKIA AND HUNGARY, AND IN GENERAL IN CEE COUNTRIES.

Summing up the macroeconomic situation of the countries analysed, the Czech Republic exhibits the highest GDP per capita and also the highest GDP growth in percentage terms. In contrast, the lowest values of both indicators can be found in Hungary. As concerns investment flows as a percentage of GDP, Poland is in the lead while Hungary is in negative territory. The situation looks different in terms of net exports – the percentage of net exports in Slovakia is the highest as a percentage of GDP compared to

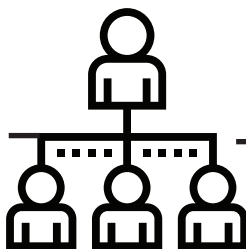
21 <http://www.hvca.hu/wp-content/uploads/2011/12/How-does-the-JEREMIE-program-affect-the-Hungarian-Venture-Capital-Market.pdf>

22 http://bbj.hu/economy/vc-commitments-linked-to-eus-jeremie-program-total-72_91972
http://bbj.hu/business/huf-130-bln-jeremie-funding-for-local-smes_121002

23 http://bbj.hu/business/huf-130-bln-jeremie-funding-for-local-smes_121002

the countries surveyed, while in Poland it is the lowest. The share of high-tech exports is an important indicator as well. As far as this index is concerned, Poland is the worst of Visegrad Group countries. Additionally, its percentage figure is barely higher than half of the percentages reported for the Czech Republic and Hungary. There are at least three explanations for this phenomenon: historical reasons, a large share of food industry products and a large internal market. When support directions are analysed, it becomes clear, however, that industry sectors associated with high technology have to be developed.

As a GDP driver, venture capital investments still account for a negligible part. In 2015, their highest share was recorded in Hungary at 0.2293‰ of GDP; just behind was Slovakia where VC investments accounted for 0.1144‰ of GDP. Poland was further down with 0.0458‰ of GDP, but the lowest share of VC investments in GDP at 0.0101‰ was found in the Czech Republic.²⁴ When the situation in the VC market is compared to 2014, an increase in the share of VC investments as a driver of GDP can be seen only in Slovakia – from 0.0625‰.²⁵ In Hungary, such investments in 2014 accounted for 0.311‰ of GDP, in Poland for 0.0532‰ of GDP, and in the Czech Republic for 0.0585‰ of GDP.



²⁴ http://www.oecd-ilibrary.org/industry-and-services/entrepreneurship-at-a-glance-2016/venture-capital-investments-as-a-percentage-of-gdp_entrepreneur_aag-2016-graph119-en

²⁵ http://www.oecd-ilibrary.org/industry-and-services/entrepreneurship-at-a-glance-2015/venture-capital-investments-as-a-percentage-of-gdp_entrepreneur_aag-2015-graph85-en

	VC investments as percentage of GDP	Poland	Czech Republic	SlovakiaH	ungary
	seed/startup/ early stage	0.0028	0.00189	0.00226	0.0229
	later stage venture	0.00254	0.00396	0.00399	0.0082
2014	Total0	.00534	0.00585	0.00625	0.0311
	seed/startup/ early stage	0.00308	0.00095	0.00792	0.01997
	later stage venture	0.0015	0.00006	0.00352	0.00296
2015	Total0	.00458	0.00101	0.01144	0.02293

Source: Polish Private Equity and Venture Capital Association

In 2015, the total volume of venture capital investments in CEE countries amounted to EUR 84 million, which accounts for 2.2% of total VC investment in Europe. On average, 222 companies benefited from VC financing; 57% of all such companies were startups and the amount of investment allocated to such firms accounted for 65% of total VC investment. In Central and Eastern European countries, the average value of a venture capital investment amounted to EUR 0.38 million; for comparison, across Europe, this average was EUR 1.3 million.²⁶

As concerns the sizes of individual markets, the dominant countries are Hungary and Poland where the total amount of venture investments in 2015 reached almost EUR 25 million and EUR 20 million, respectively. The situation was similar with respect to the number of companies financed by venture capital funds – this was 57 in Hungary and 62 in Poland. The two countries together accounted for almost half of all companies financed by venture capital in 2015 in all Central and Eastern European countries.

²⁶ Based on <https://www.investeurope.eu/media/504370/invest-europe-cee-statistics-2015.pdf>

PRIVATE EQUITY FUNDS AND FUNDS OF FUNDS

Private equity is a type of capital investment that provides a source of external financing for companies that have not been admitted to public trading. The funds provided to companies may be based on equity financing as well as on hybrid financing, which combines equity and debt financing. Apart from the financial contribution, within the framework of private equity financing, a company may receive support from the investor in various areas such as e.g. legal, tax and organisational advice.

A private equity investor, which is usually a fund that manages third-party assets, does not focus on maximising short-term company profits and recovering the capital invested rapidly but is rather interested in increasing the company's value in the long term in order to achieve the profit desired when selling its shares in the future. The duration of a typical private equity investment ranges from 5 to 7 years. In the case of private equity investments, the investor bears an elevated risk in exchange for a relatively higher potential return on the capital invested. Over the years, private equity

funds can generate returns of 20% annually, and sometimes even more, on their investment portfolio. They are also much more resilient to an unfavourable climate in the stock market than traditional mutual funds that invest in equities. Moreover, they are not overly constrained in their approach to investments. As a result, this industry has flourished for many years now, in Poland as well.

The pace at which the industry is developing is best evidenced by the size of its investment portfolios. In the 1980s, the largest private equity fund (Kravis Roberts) managed assets amounting to USD 135 million. Currently, there are funds whose assets under management are counted in billions of dollars. The value of the investment portfolio of the four largest PE funds exceeds USD 100 billion, and the overall size of the PE fund market is above USD 4.6 trillion. The increase in portfolio size is not only the result of the emergence of new investors—it also reflects good investment performance as illustrated by the chart below.

PrEQUIn Buyout Index, WIG Polish broad market index, DAX and S&P 500 Total Return from 31 Dec 2000 to 31 Dec 2014

When analysing transactions and the PE market in Visegrad Group countries from 2005 to 2014, one may note that PE funds invest primarily in mid-cap companies. From 2005 to 2014, the sum total of transactions was as follows:

However, the numbers of transactions that make up these results differ significantly:

This is because in the Czech Republic and Hungary each, two large transactions were completed at that time whose value accounted for about half of the overall transaction value.

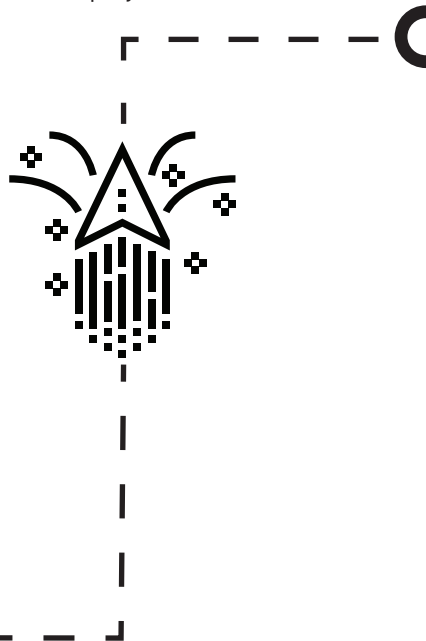
This translates to the following average value per transaction:

- Poland – EUR 17.2 million
- Czech Republic – EUR 16.7 million
- Hungary – EUR 23 million

A completely different phenomenon are so-called funds of funds, i.e. investment vehicles dedicated to investing not in specific companies (investment targets), but rather in VC funds which further invest their funds. This investment model is used, inter alia, by so-called family offices, i.e. entities that manage the capital of a group of private individuals or even of single individuals. This is done in order to diversify and mitigate risk and also to avoid the need for industry expertise. Another group that uses this model are corporations that are interested in market analysis and having access to innovative companies but do not have the competences required to manage the fund and to develop small companies that focus on research and implementation. For some time, this model has also been leveraged by public authorities in order to influence the market by taking part in it. This model has been used by the EU (through the EIF) as well as by authorities in

individual countries, e.g. in Poland Polski Fundusz Rozwoju/Polish Development Fund manages a group of funds of funds.

This manner of interacting with, and stimulating, the VC market in order to boost its potential has a positive impact on the economy while not leading to any disturbances in market equilibrium at the same time because it is not based on direct support but rather on co-investment, forcing beneficiaries to act as market players.



EXAMPLES OF FUNDS OF FUNDS IN THE CENTRAL AND EASTERN EUROPEAN REGION

POLAND

Polski Fundusz Rozwoju/Polish Development Fund is a financial group of Polish institutions that support development. The PFR Group ensures a better coordination of development programmes within the framework of an integrated business model and channels for contacting entrepreneurs, local governments, and individual clients. As a result, it facilitates access to ongoing development programmes that are tailored to market needs. In 2016, PFR established the largest venture capital platform in Central Europe (PFR Ventures) with a value of almost PLN 2.8 billion. The PFR Starter, PFR Otwarte Innowacje, PFR Biznest, PFR BridgeCVC and PFR KOFFI funds provide financing for all venture capital market segments starting with the pre-seed and seed phases until the expansion phase; they also engage in technology transfer projects and are active in the business angel segment. The programme is implemented in the fund of funds model.

CZECH REPUBLIC

The Czech ESIF is the first early stage equity fund of funds in the Czech Republic, established in January under an agreement between the European Investment Fund and the Czech Minister of Industry and Trade. The Fund will be financed from the European Cohesion Fund, which promotes sustainable growth. It will invest primarily in early stage, seed and venture investments. It is possible that its investments will also include accelerators. All the fund's measures are aimed at supporting and developing Czech projects with a high growth potential. The Fund has already obtained a EUR 40 million contribution from the ERDF Operational Programme Enterprise and Innovation for Competitiveness 2014–2020, which is managed by MIT, and will additionally obtain EUR 10 million as co-investment for selected European Investment Fund intermediaries.²⁷

SLOVAKIA

The Slovak Investment Holding (SIH) is a fund of funds that implements financing sources based on the European Structural and Investment

27 http://www.eif.org/what_we_do/equity/news/2017/czech_republic_fund_of_funds.htm

Funds. It was established upon an initiative of the Ministry of Finance in order to promote domestic investment. Its purpose is to allocate funds from the JEREMIE programme run by the European Investment Fund. The main manager of the fund is SZRB Asset Management, a company responsible for the management of SIH funds and sub-funds.²⁸

The fund's main objectives include improving access to finance for main operators in fields such as transport, energy, resource management, support for the social economy, and support for small and medium-sized enterprises. For each investment area, an appropriate financial instrument has been proposed, taking into account the specific features of the area in question in order to improve financing conditions as much as possible. The instruments implemented by the fund include all kinds of guarantees, loans, and equity participation.²⁹

HUNGARY

Széchenyi Venture Capital Fund (SZTA), founded in 2011, is the largest venture capital fund in Hungary that

specialises in the financing of small and medium-sized enterprises, both those present on the market for many years and those just starting to conquer it, i.e. startups. It is fully funded by the state-owned Széchenyi Venture Capital Fund Management Zrt; as the first venture capital fund in Hungary, it has been licensed by the European Commission to implement its investment programme for small enterprises on a large scale. It is the only fund of this kind in Central and Eastern Europe.³⁰ The Fund may allocate capital in cooperation with private investors and may also extend the range of investment opportunities and thresholds. This makes it possible to supplement financing instruments for small and medium-sized enterprises in Hungary with other capital-based, repayable funding.³¹

During its venture capital programme, SZTA accumulated nearly HUF 14 trillion and is the most invested venture capital in Hungary; to date, it has focused primarily on the manufacturing sector, but in recent years, given the growing problem

28 Funding of Investment Opportunities in Slovakia; EUIP.

29 <http://www.szrbam.sk/en/sih>

30 <http://www.szta.hu/english/>

31 https://www.palyazat.gov.hu/special_permission_from_the_eu_to_extend_the_venture_capital_programme_in_hungary

of the lack of opportunities for obtaining venture financing in other industries, it has also invested in other areas such as the medical, environmental protection and technological industries; it has also invested part of its resources in the fashion and design industries.

Széchenyi Venture Capital Fund Management Zrt – a fund that invests in micro-, small and medium-sized Hungarian enterprises. Investment amounts range from EUR 100,000 to EUR 500,000; after an investment has been made, the fund monitors whether the capital is used appropriately. It focuses on enterprises that already have significant market shares and want to use the capital for viable product quality, capacity or market development purposes, investing alone or co-investing with a private partner.³²

CONCLUSIONS

1 All over Europe, a clear trend is combining public funds with private ones on arm's-length terms or on terms close to arm's-length ones. The main objective of such support is to increase the funds' investment capacities.

2 Within the European Union, a plan has been developed to attract assets to venture capital funds. The European Commission has decided to channel public money to private sector funds, which will then be matched by a similar amount from the private sector. Since fund management companies have contacts with major investors, such as Canadian pension funds, Asian sovereign wealth funds, and European insurance companies, they will be able to obtain funding from them, which will allow them to invest in tranches of over EUR 20 million.

3 PE and VC markets in the U.S. and in Western Europe owe their development, inter alia, to investments by pension funds. The pension funds' activities also contribute to the development of the stock exchange, which provides a natural exit (disinvestment) route for funds and makes it possible to measure their effectiveness.

4 The conclusion for CEE countries is as follows: there is a need to independently develop the local VC and PE market. Due to its market size and activity scale,

³² <https://ec.europa.eu/growth/tools-databases/dem/initiatives/2399/sz%C3%A9chenyi-capital-fund-management-zrt>

the region still lacks competence and strong players who could attract major institutional investors and could also support portfolio companies and develop them globally.

5 In Western Europe, the science sector is far better developed and it develops ideas on the basis of public funds, its own assets and funds from private investors to reach more advanced stages of development. In Poland, owing to the financial weakness of scientific establishments, ideas are commercialised at a very early stage (most often proof of principle or proof of concept).

6 The Central and Eastern European region still has not developed a clear competitive advantage in any area. There are some areas where we are competent (IT, agriculture, food, automotive and wood industries), but we still have a few companies of global significance in these areas. When analysing the sectors that are worth supporting, we should take into account those where large production companies operate or growing demand for their products (e.g. buses, foodstuffs) can be anticipated.

7 A clear trend in Western Europe and in the U.S. is the establishment by large industrial companies of their own funds (so-called CVCs). There are several forms of these funds, and their main objective is to seek and develop innovation. This trend is due to the gap between the culture typical of large manufacturing and trading enterprises and the development of new technologies and businesses, which requires speed, agility and rapid adaptation to the effects and signals coming from the market.

8 Corporate VC funds may be an instrument that supports retaining and attracting talent and also fostering corporate entrepreneurship. An example of such an effect is the Xerox company, which set up such a fund (Xerox Technology Ventures – XTV) more than 25 years ago, mainly to retain employees with innovative ideas within the company. Xerox analysed the idea of starting the production of portable, battery-powered photocopiers for 10 years. Finally, Xerox Technology Ventures (which was established for that purpose) invested in the idea together with Taiwan Advanced Scientific Corporation.

9 The emergence of CVC funds and their considerable role in the implementation of technological innovation indicate that it is advisable to support such initiatives in the CEE region. Due to the size of existing enterprises, their horizontal and/or vertical integration should be supported as well. Such actions not only strengthen the development of these companies and industries but also support the development of the VC market by facilitating the implementation of new solutions and technologies.

10 A study of existing CVCs carried out by Toby Lewis (the publisher of the Global Corporate Venturing magazine) and presented at the GCV Symposium in London indicates that nearly 42% of corporate funds achieved an internal rate of return (IRR) in excess of 10% on their investment portfolio, and half of them achieved IRRs exceeding 20%.

11 The purpose of investments by corporations in innovative startups is to acquire innovation, the key element of gaining or maintaining a competitive advantage. It is also a good way of monitoring signals of upcoming disruptive changes in the market, which could threaten the position of certain technologies and their creators.

Innovation is seen by most CEOs as the main factor governing the growth of their companies, and as many of 44% of CEOs worldwide plan to seek access to innovation by cooperating with startups. While Western companies focus on breakthrough innovations that bestow competitive advantage, in Poland, despite some glorious exceptions, incremental innovations dominate, i.e. perfecting existing solutions in order to achieve operational efficiencies and pure economies.

12 It may be claimed that having one's own VC fund allows corporations to keep up with, or rather surpass, the pace at which their external environment changes. With innovation, agile responses are important. Agility requires a flexible business model, and it is precisely startups that enable corporations to respond quicker, also giving them the ability to "safely" test an idea on the market. Otherwise, there would be a good chance of a new business idea being stuck somewhere in the organisation's procedures.

OVERVIEW OF VENTURE CAPITAL FUNDS IN THE REGION – PFR STUDY

Obtaining data on VC investments is not easy because of the different levels of detail at which information is disclosed (from fully transparent funds to ones that do not disclose any data at all) and diversified information policies – not all funds update information on investments on their websites, and some funds and startups update such information in databases such as Crunchbase. Therefore we adopted a method for data collection that combines the analysis of public data with acquiring them directly from stakeholders. We have used the experience of Inovo, which VC analysts obtained during their analyses of the Polish market.³⁴

Lists of VC funds in individual countries of the Visegrad Group and of their investments have been compiled on the basis of publicly available information sources: the Crunchbase and Dealroom databases as well as the websites of individual funds and companies in which they have invested

as well as of other VC market players (e.g. KFK and PSIK for Poland, HVCA for Hungary or CVCA for the Czech Republic). We have also asked people who know capital markets in the specific analysed countries to suggest any additions. The lists compiled in this manner were then discussed with the funds themselves. We sent requests to them to supplement the details in e-mails directed to the contact addresses available on their websites. 25 of the 119 funds asked (21%) responded to our requests to submit additional data. Given the method adopted, the low response rate was not a critical problem as publicly available sources were the main source of data. After the data had been supplemented, we compiled the final rankings.

We took into account all investments irrespective of their size; the smallest one we found was an investment made by two co-investors with a total amount of USD 10,000. We did not differentiate between investments based on capital

³⁴ After: <https://medium.com/@micharokosz/polish-vc-market-size-and-structure-inovo-vc-estimates-54bf-047c3a6e#.nikwfflyf>

increases, which were much more numerous, and those involving the sale of existing shares, either.

For many investments, we only had confirmation that they had been made, without specific amounts.

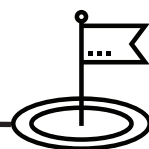
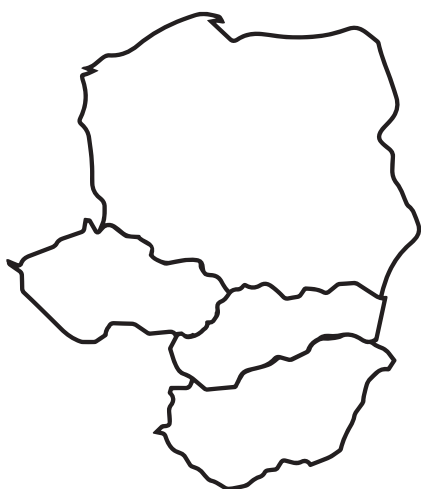
For co-investments where the total amount of investment was known but the shares of individual funds were not made public, we assumed the following distribution, which was of course just an approximation: If there was a Lead Investor, we assigned 50% of the amount to it and divided the rest proportionally among others. If there was no Lead Investor, the investment amount was divided proportionally among all participants.

Where the investment was made in tranches, we used the investment amount stated, which was usually the total figure. An exception here were situations where the funds stated the current value of the investment directly, with the possibility of obtaining more tranches.

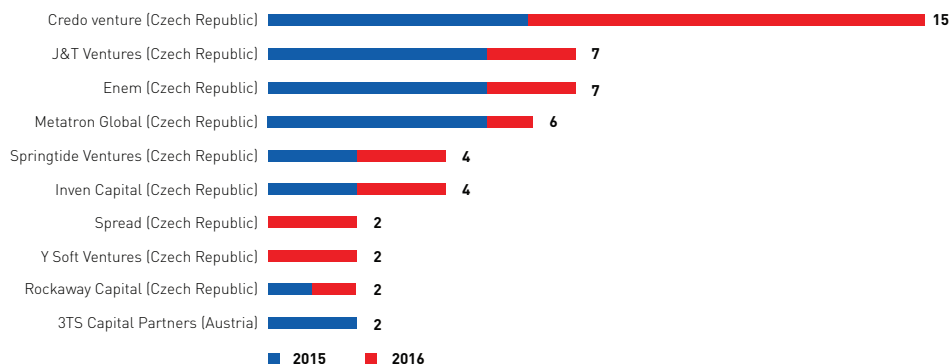
In the absence of official information on fund capitalisation, we decided not to estimate such information, hence the large number of missing data items in the list.

The classification of funds as VC was determined on the basis of their self-descriptions on their websites or in databases.

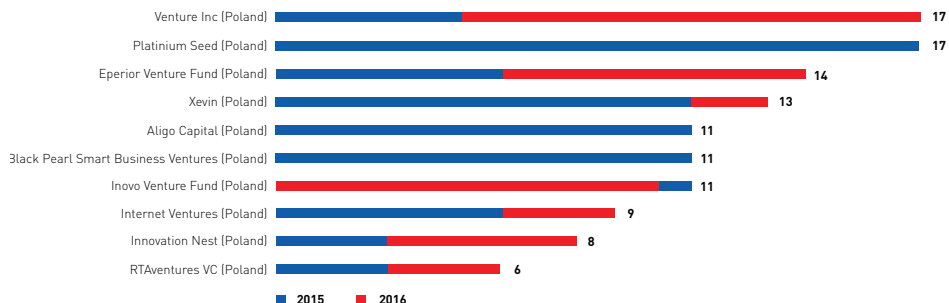
In additional lists, we also included those private equity funds that sometimes made VC-type investments but had no separate entities that would specialise in such investments. However, we did not include accelerators or business angels.



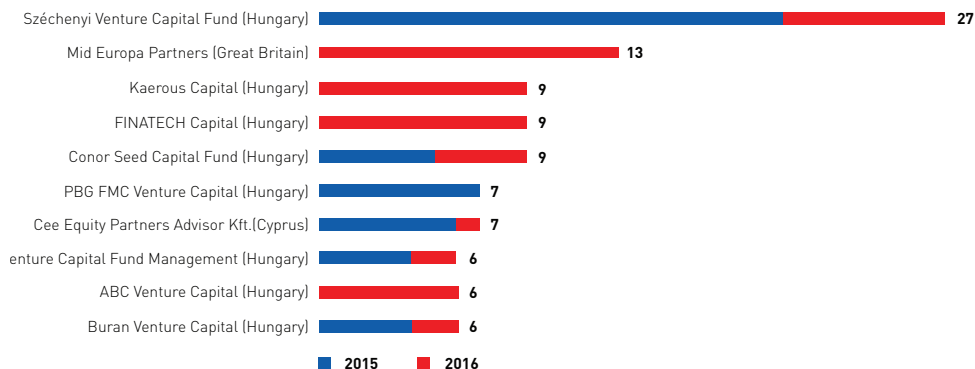
Top 10 VC funds by number of investments in the Czech market in 2015-2016



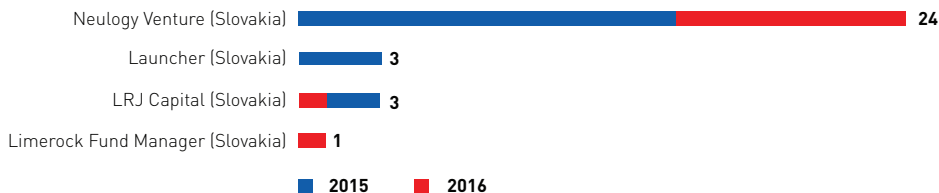
Top 10 VC funds by number of investments in the Polish market in 2015-2016



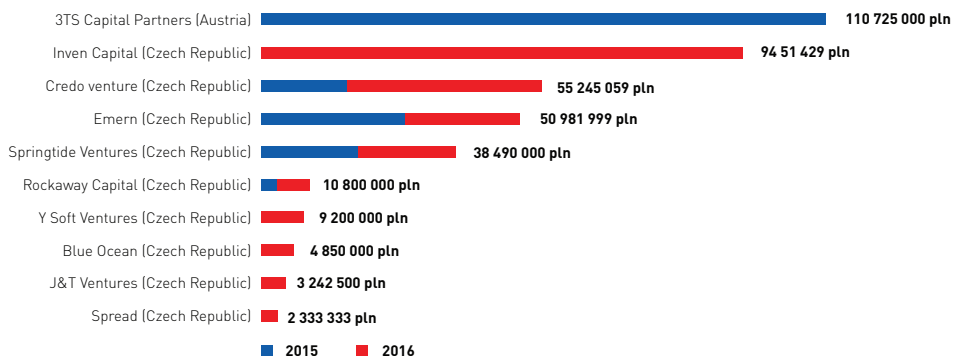
Top 10 VC funds by number of investments in the Hungarian market in 2015-2016



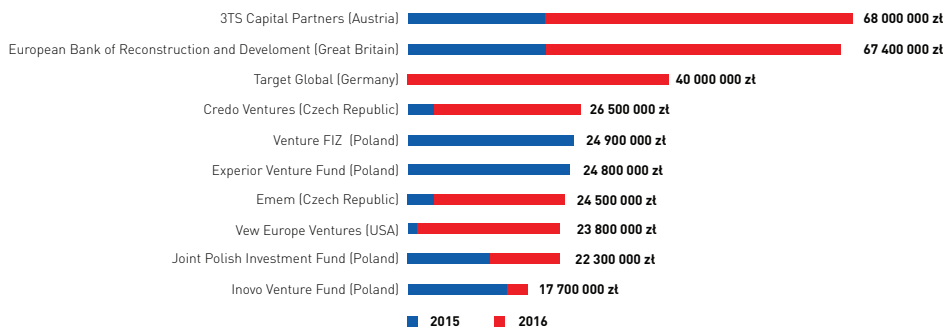
Top 10 VC funds by number of investments in the Slovak market in 2015-2016



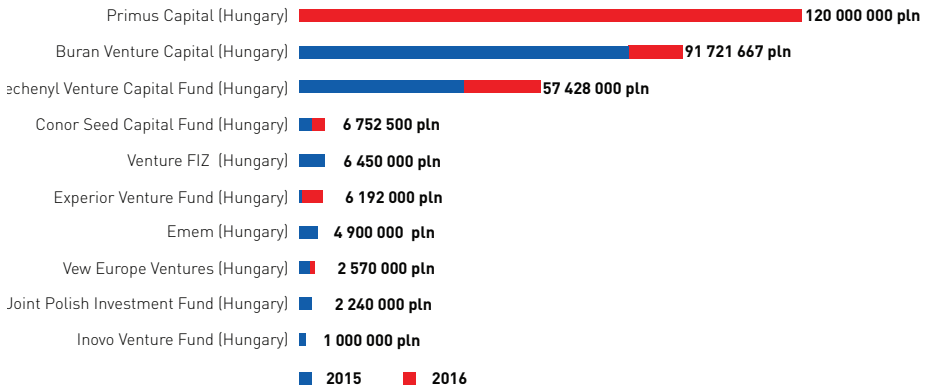
Top 10 VC funds by value of investments in the Czech Republic market in 2015-2016



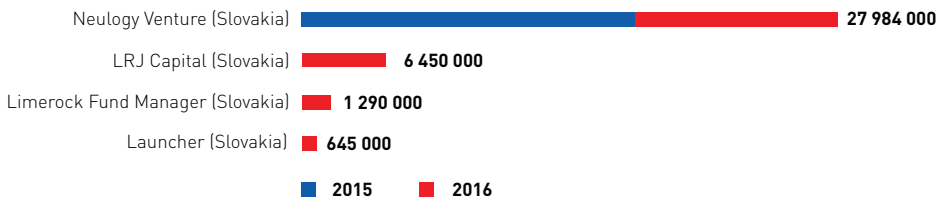
Top 10 VC funds by value of investments in the Polish market in 2015-2016



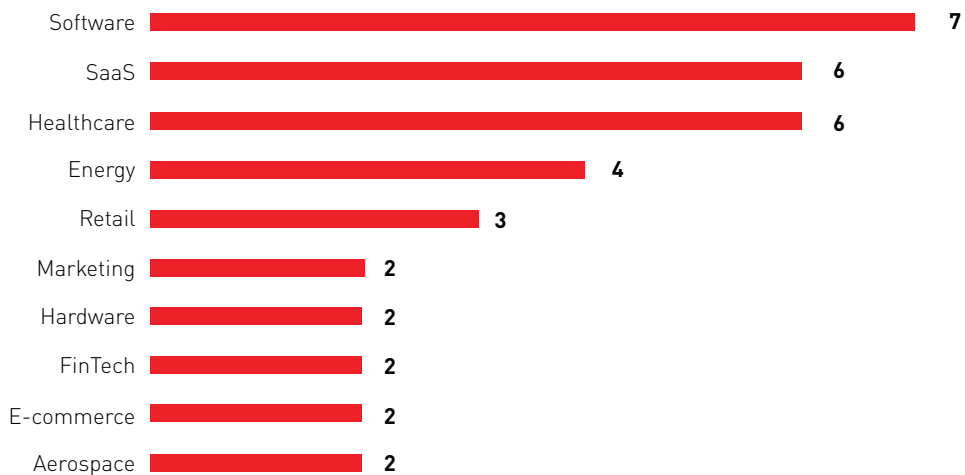
Top 10 VC funds by value of investments in the Hungarian market in 2015-2016



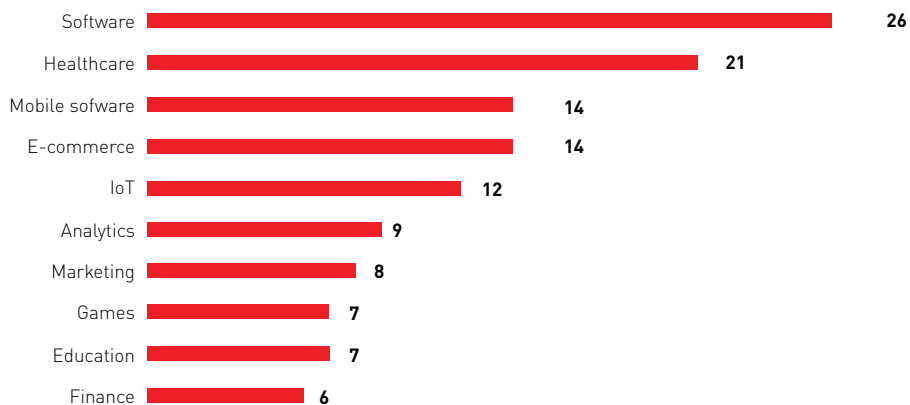
Top 10 VC funds by value of investments in the Slovak market in 2015-2016



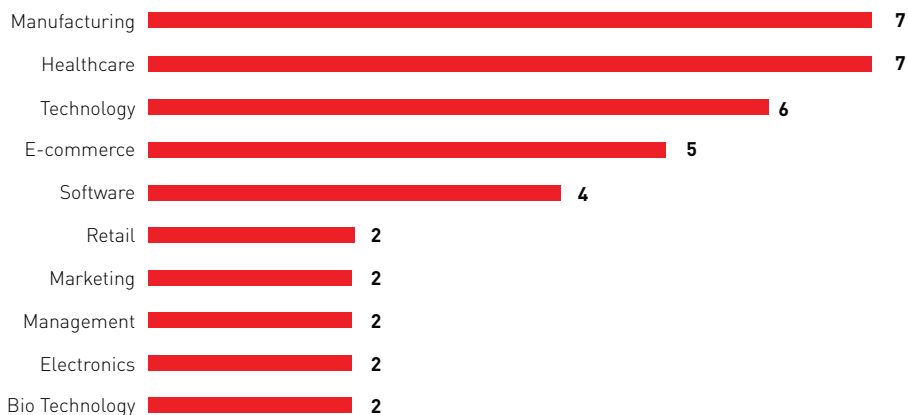
Top 10 investment categories in the Czech market in 2015-2016



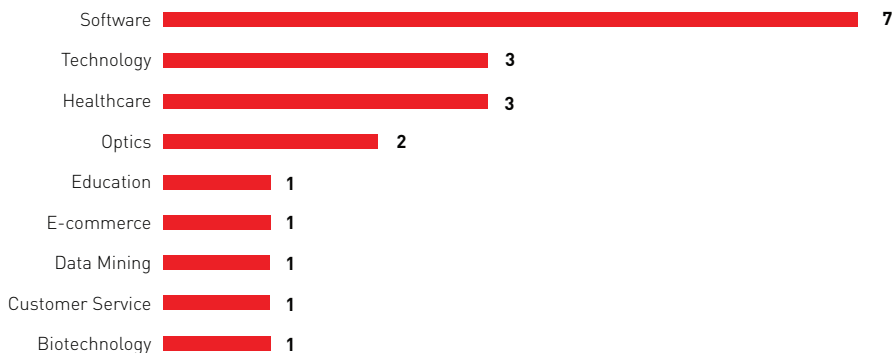
Top 10 investment categories in the Polish market in 2015-2016



Top 10 investment categories in the Hungarian market in 2015-2016



Top 10 investment categories in the Slovak market in 2015-2016



Note: the classification was not exclusive, and thus a single investment could be assigned to several categories

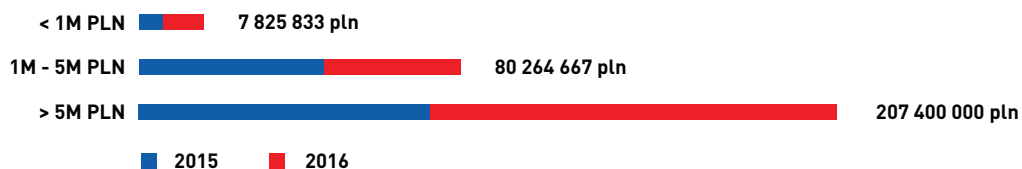
Breakdown of investments by size in the Czech market in 2015-2016



Breakdown of investments by size in the Polish market in 2015-2016



Breakdown of investments by size in the Hungarian market in 2015-2016



Breakdown of investments by size in the Slovak market in 2015-2016



Report by Polski Fundusz Rozwoju (Polish Development Fund)

Report prepared under the direction of Eliza Kruczkowska

Macroeconomic analysis:

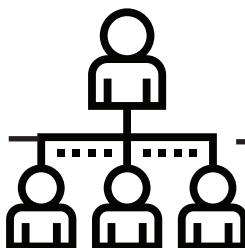
Tomasz Poniński, Institute for Market,
Consumption and Business Cycles Research

Quantitative data:

Karol Gileta,
Jacek Rzepka,
Bernadeta Szybisty (Sotrender),
Jan Zając (Sotrender and University of Warsaw).

Consultation:

Jacek Libucha (Boston Consulting Group),
Wiktor Namysł (McKinsey & Company),
Michał Owerczuk (Boston Consulting Group),
Magdalena Olczak (SGH),
Michał Rokosz (Inovo),
Bartosz Sobota (Inovo).





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