



SPECIAL ANALYSIS

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Erste Corporate Banking's Innovation Barometer 2015

Jan Jedlička, Vít Macháček

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Corporate Banking

Introduction

Another year has passed since the economic crisis of 2008 and in many member states structural and innovative changes are taking place. Efforts to kick start and sustain economic growth are clearly visible. One of the most important steps toward sustainable growth is the innovative character of economies and their competitiveness.

Erste Corporate Banking's Innovation Barometer focuses on monitoring these capabilities and the area of competitiveness in European Union states. How is the Czech Republic doing and who is at the cutting edge?

"We have to be competitive" is a phrase that every economist and politician swears by. But the question is what competitiveness actually means in the 21st century. How do you know that one country is more competitive than the other? Is Vietnam more competitive than Sweden? We don't offer an answer to the last question, but we are convinced that the primary goal of Czech business, politicians and civil society must be competitiveness in the Swedish style. České spořitelna's EU Office therefore offers a tool that shows how the Czech Republic stands in regard to "competitiveness to innovate". And it clearly shows that we have a lot to catch up on – the Czech Republic stands at the crossroads. Either it will remain an excellent manufacturing economy in Eastern Europe, or it will break through the "glass ceiling" and rank among the innovative, high-income economies of the north-west of the European Union. High incomes will not just appear, however, they are a reward for added value, for new ideas and technology introduced into practice and their successful sale abroad.

If we want to succeed over the long term in international competition we have to concentrate on innovation, research and development, the information society, the knowledge economy and products with high added value. It is this very Barometer that measures how successful this effort is.

Part of the report is also a more detailed look at some aspects – the more detailed statistics show what problems are troubling Czech research and development, and we also look in detail at how Czech education works.

Innovation Barometer Erste Corporate Banking

The Innovation Barometer consists of nine statistics that determine the innovative potential, competitiveness and future prosperity of a country. An important part of the Innovation Barometer is also its dynamic dimension – it's possible to evaluate on the basis of its results whether the innovative potential in a given country evolved in a positive way, or, conversely, negative aspects prevailed. For these purposes, the index was calculated back as far as 2010.

Monitored areas

As mentioned above, the Innovation Barometer consists of nine indicators.

Their selection is governed by several rules. It is a given that statistics must be relevant from the point of view of the competitiveness of an economy. Several areas were identified that determine the innovative potential of each economy and among them were found the most representative statistics possible.

An important role was also played during the choice of statistics by their availability in all 28 member states of the EU, the possibility of regularly updating them and especially their high credibility – all statistics must come from a reputable institution so that the data are unquestionable.

The indicators ultimately included in the report are:

The list of included variables

Variable	Description	Unit	Source
Expenditure on R&D	Overall expenditure on research and development per GDP	%	Eurostat
Patents	Number of submitted applications for patents per 1,000 inhabitants in the applicant's country of origin	per item	WIPO
Graduates	Number of university graduates from technical disciplines per 1,000 inhabitants aged 20-29 years	per item	Eurostat

Publications	Number of cited scientific publications per 1,000 inhabitants	per item	SCImago
Venture Capital	Investment of venture capital funds in seed and start-up companies per GDP	%	EVCA
Broadband internet	Proportion of households with access to a broadband internet connection	%	Eurostat
Expenditure on education	Expenditure on education per GDP	%	Eurostat
High-tech export	Proportion of high-tech product exports per country exports	%	Eurostat
E-Government	Proportion of people communicating with government in an electronic form	%	Eurostat

WIPO = World Intellectual Property Organization, SCImago = agency SCImago Journal Rank & Country Rank, EVCA = European Private Venture Capital Association

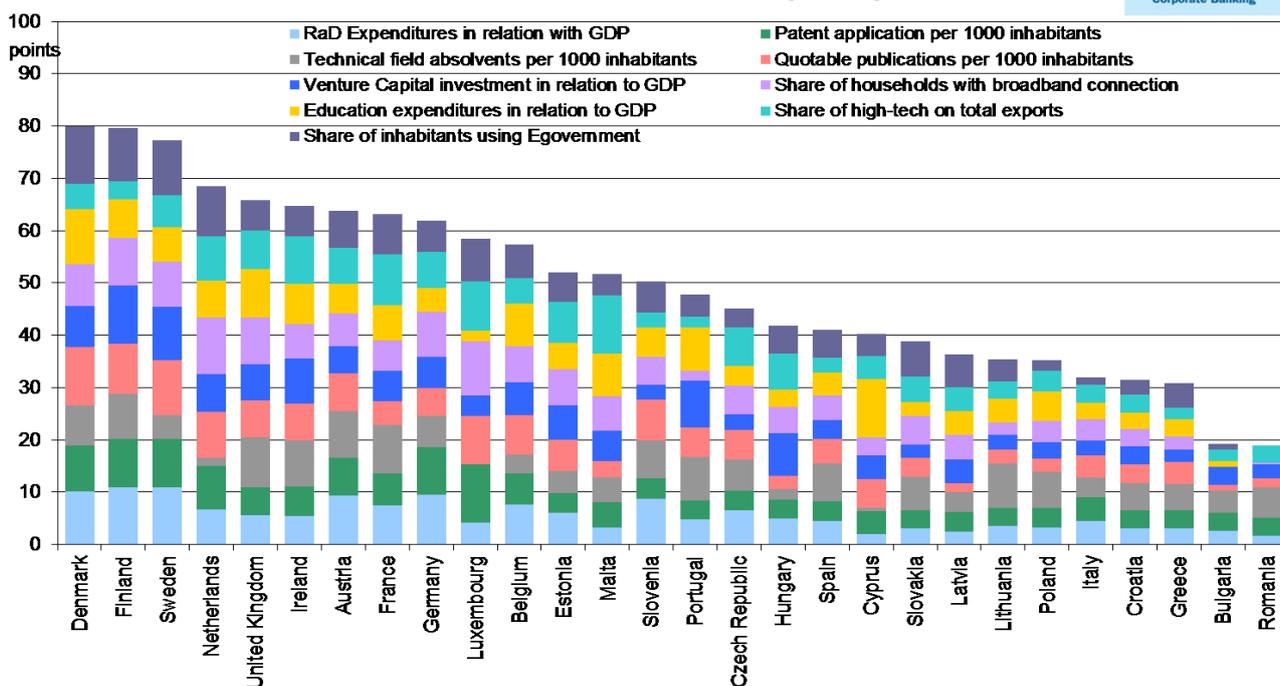
According to the results, states in the Erste Innovation Barometer can be divided into three groups:

The winning group is comprised of Scandinavian states that maintain a place in the upper half of the rankings in a large majority of the indicators, some of which they also lead. Scandinavia benefits from high investments in R&D, which are, however, also effectively allocated. This is demonstrated in the good results in patent activity and very active publications. What may be surprising is the lower amount of high-tech exports per overall exports.

The second group is the “industrial base of Europe” – the group of states surrounding the United Kingdom, the mother of the Industrial Revolution, and Germany, today’s industrial great power.

The Benelux states, Austria and France also belong to this group. These countries also invest a relatively large amount in research and development from private and public sources and this corresponds with the results – patents and scientific publications.

Innovation Barometer (2015)



The last and biggest group is comprised of countries “under the glass ceiling”. These states are in the best case converging economies from the former Soviet bloc, and in the worst case are the macro-economically unstable states of Southern Europe – Greece, Italy, Spain, Cyprus and Portugal. These countries are characterised in particular by weak infrastructure – they have bad connections to the internet and communication with local administrations tends to be in a traditional, personal way rather than electronically.

Results for the Czech Republic

In 2015, the Czech Republic was in 16th place and maintained its position from the previous year. Despite this we achieved a slight improvement – 45 points (out of a possible 100) is the best result since 2010 when data became available.

We are doing the best of all the four Visegrad countries and of the countries of the former Soviet bloc we are bettered only by Slovenia. We are also better placed than “West European” Spain and Italy (who are bound up in problems). However, the results are still not particularly staggering – we obtained above-average values in only four indicators and rather narrowly at that.

More than 15 % of our exports are comprised of high-tech products which puts us in 8th place in the EU.

We are also placed in the upper half of the rankings in expenditure on research and development and in the number of publications per capita. We were also placed midway in the rankings, i.e. in 14th place, in the number of technical graduates and the development of internet infrastructure. Thanks to these results we may arrive at these key conclusions

Low effectivity of Research and Development

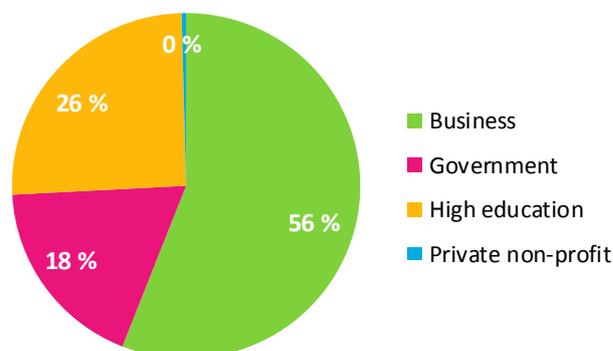
Three indicators are included in the Erste Innovation Barometer which relate to the effectiveness of local research and development: expenditure on R&D, number of patents per 1,000 inhabitants, and number of cited publications per 1,000 inhabitants. As already mentioned, expenditure on research and development in the Czech Republic is nearly 2% of GDP, which makes it 10th in the European Union. There is hence enough money, but the question is what results it brings.

We are way behind in patent activity per the EU average. While approximately 0.2 patents per 1,000 inhabitants are registered in the Czech Republic, the European Union average is five times that amount – Czech scientists and companies (together with their fellow travellers from the former Soviet bloc it should be added) register few patents – and in all Scandinavian countries 10x more patents are registered per capita. Why are so few patents registered in the Czech Republic? Are there so few inventors or is there a lack of will? On the other hand, we're not so bad in publishing activities – more articles are written in the Czech Republic than the EU average. The question of course is what the quality of these articles is, what proportion of them is published in quality impacted journals, and, conversely, how many of them are printed in periodicals of local importance.

Czech research and development must therefore undergo a transformation that will force universities, research institutes and companies to be more active within the framework of applied research. There isn't a lack of money in the system, but it is necessary to improve its allocation – cooperation has to improve between science and business, and companies have to be motivated to invest in science and the publication of their inventions. Czech science and business needs not only institutional reforms, but also greater motivation and ambition. It's not enough to be the best performing economy of the CEE region; but what could be sufficient for us in the meantime to really compete with western countries is research, development and innovation.

The question therefore is what money is allocated for research and development in the Czech Republic.

RaD Expenditures by sectors (total 85 bln CZK)



Source: CZSO

Approximately CZK 47 billion (56%) of the money invested in research and development in the Czech Republic is invested in companies, and of that 85% comes from their own resources, 10% comes from state grants and 5% comes from new sources: European funds, which we're only gradually learning to use over time.

A quarter of the total amount expended on R&D (more than CZK 20 billion) is spent by universities and of this the overwhelming majority is public universities. Ninety-five percent of expenditure on R&D in the university sector is from public sources (61% from domestic sources and 33% from EU funds).

A total of CZK 15 billion (18% of expenditure on research and development) is targeted at research and development activities in the state sector, especially the Academy of Sciences (CZK 12 billion), but also in the research centre sector etc.

It should also be mentioned that expenditure on research and development in the Czech Republic has been growing over the long term – it is currently more than twice as much as it was in 2005. Half of the additional new investment in research and development comes from the private sector. Another quarter comes from new European fund sources and another approximately 23% from state sources.

Nevertheless, it's clear from international comparisons that investment in business sector R&D is still undervalued in the Czech Republic (but at the same time is also on a strong growth trajectory despite the crisis). While companies in the Czech Republic invest 56% of overall expenditure on research and development, in the Scandinavian economies, which are the leaders not only in the Innovation Barometer, companies contribute up to 70% of research financing. It is also clear from this that in the European context there is an unusually high proportion of state expenditure on R&D – it is not so usual in western economies to depend so much on state research institutions – investment from grants tends to be directed toward companies or universities.

Nearly CZK 27 billion (56% of expenditure on research and development in the business sector) is given in the Czech Republic by private companies under foreign ownership and another 37% from private companies under domestic ownership. Only a little less than 6% is provided by publicly owned enterprises.

Of business investment in R&D the great majority (nearly 84%) goes on normal expenses – wages, rentals, etc. More than CZK 7 billion (16%) is expenditure of an investment nature.

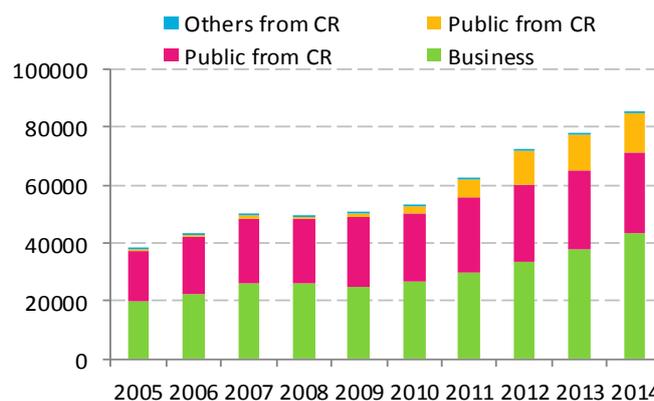
Around 60% of business investment in research and development occurs over the long run in industry and the building sector, and another 20% is invested in professional, scientific and technical activities – the NACE sectors that affiliate activities requiring high levels of expert knowledge – particularly legal and managerial services, architectonic and engineering activities, and companies themselves specialising in research and development or advertising. Research and development has also grown in recent years targeted at companies focusing on ICT technologies – in 2014 these comprised 16% of total business R&D.

Czech research and development is on course toward international competitiveness – investment in it has been growing over the long term and the increasing amount of research in companies shows that is also heading in relatively the right direction. However, it is clear from international comparisons that the allocation is not the best – a large amount is lost in the Czech Republic on science with questionable results, and a substantial part of the funds is allocated from state sources. At the current time, the beginning economic boom offers an ideal opportunity to the Czech Republic to move from a regime of “A lot of primary research for state money” toward the opposite pole that can be characterised as “Specialised applied research in which the private sector is also participating extensively”.

Lack of technical education

Competitiveness from our point of view means the ability to create and apply new ideas and technology, together with the ability to sell this innovation on the international competitive market. This idea about competitiveness clearly demonstrates the key role of the education system – it shapes young people and enables them to develop themselves or

RaD Expenditures by source of finance



Source: CZSO

conversely prevents them from blossoming. Its impact on the competitiveness of a country is thus delayed, but it influences development with greater power.

The Czech economy is to a considerable extent dependent on industry, which on the one hand creates an opportunity, and on the other a challenge. If we would be able to meet the challenges head on, which is expected by industry in the form of Industry 4.0, it may greatly help us break the "glass ceiling". If we are unable to get to grips with these changes we can expect huge structural problems associated with uncompetitive industry.

The first measure of an education system that is perhaps more important than quantity, is the quality of the people who graduate from Czech education. Unfortunately, there are no relevant data available for university graduates, but despite this we are able to list the results of the comparative PISA tests collected by the OECD. The PISA research is conducted in a total of 65 states around the world among 15-year-old students. The results show that in regard to quality primary education in the Czech Republic it does not do at all badly – in the rankings of EU countries it comes in 10th place. Czechs are placed very similarly in all three tests that PISA consists of – mathematics, reading comprehension and scientific disciplines.

It's not good news, however, that over time Czech students leaving primary schools are failing. While in 2000, when the PISA tests were first conducted, Czechs achieved an average of 17th place in the world, 12 years later they were in 24th position. One of the reasons may be simple arithmetic – while 41 countries participated in the PISA tests in 2000, in 2012 there were 65. Another reason is the rapid growth in East Asia which has enabled countries from the region to demonstrate their potential – while in 2000 Hong Kong, Japan and South Korea were placed ahead of us, today there are other countries included that are ahead of us in the rankings – Taiwan, Vietnam, Singapore and mainland China (research is conducted only in Shanghai).

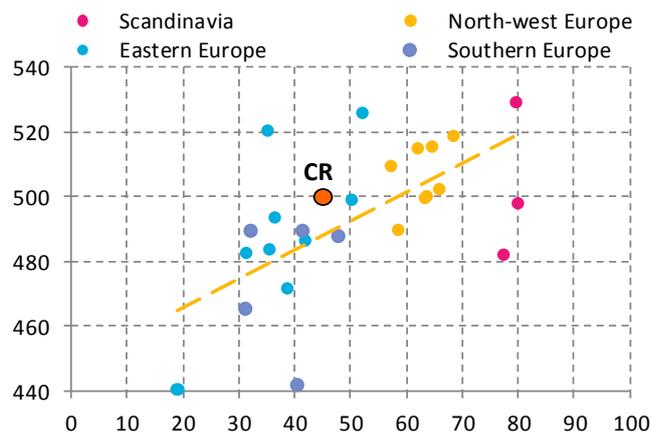
Let's also look at university education – which is vital for the development of innovative thinking because it produces experts on various themes. The bluntest measure is the number of university students – in the Czech Republic 38% of people from the current generation aged between 20 – 24 study, which we rate among the most successful and which even surpasses many western countries. The technical and natural sciences in the Czech Republic have long produced relatively sufficient numbers of natural science and technical graduates and this number has even been growing in recent years. It is nevertheless necessary to bear in mind the considerably more industrial character of the Czech economy than in the rest of the EU – 15 percentage points more people work in industry than the EU average.

However, this growth tends to be due to the fact that the overall number of graduates is growing in a dramatic way. While in 1998, 22,000 students had completed their studies within the Czech population, in 2012 this figure was 100,000. The proportion of graduates from the natural sciences and technical disciplines decreased from 28% to 23%.

A relative decline has appeared in particular in the technical sciences and disciplines – categories which include engineering and metallurgy, electronics and automatization, chemical production and automobiles, ships and planes.

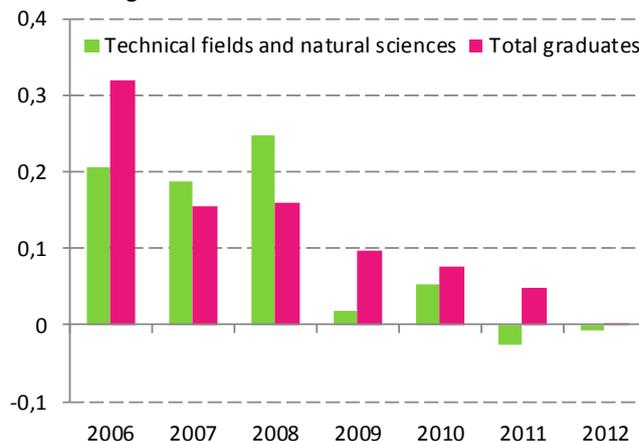
The relative share of these categories declined by nearly a half – from 13% of the total number of graduates to 7%. Technical schools therefore have to take in and educate substantially more applicants.

Average PISA and Innovation Barometer



Source: EU Office and OECD, points in PISA are on the Y-axis points in Innovation Barometer are on the X-axis

Growth of graduates in technical fields



Source: OECD, own calculation

The continuation in the trend of a relative decline in graduates from technical universities would further deepen the mismatch in the labour market where at present there is a lack of highly qualified engineers, machinists, and IT specialists, etc.

The education system in the Czech Republic is not simply good or bad – it produces a relatively sufficient amount of graduates and even graduates in the technical disciplines. However, comparison with European economies is not completely in order in view of the considerably high concentration of industry in the Czech Republic and the differing needs of the labour market that ensues from this. And in relative numbers, the number of graduates from the technical disciplines is declining in relation to others.

Lack of venture capital

Skilled and well-educated people are a necessary condition for the ability to succeed in the 21st century, but it is unfortunately not sufficient. In order to succeed on the international market it is therefore also necessary for the most dynamic and most enterprising of us to have the right start – so that their willingness to go out on a wing on the market doesn't come up against a reluctance to accommodate new ideas. This concerns not only finance, although it is an essential part, but also consultancy services that make it easier for young and inexperienced people to start businesses, and last but not least groups of enthusiastic people who support each other on the path to success. These things should ideally be created by venture capital funds.

In the context of the Czech Republic, however, venture capital is slow – according to data from the European Venture Capital Association, it's less than EUR 3,000,000. In relation to GDP it's a mere thousandth of a percent. Now here in Europe does venture capital comprise an important part of GDP, although in Finland it forms not a thousandth of a percent, but four hundredths – in comparison with the Czech Republic more than 20x more money goes on risky investments.

But we are falling behind not only the Scandinavian states – in the amount of venture capital per GDP we come 20th out of 25 EU countries (there were no relevant data available for Malta, Croatia and Cyprus). The evidence that nothing is impossible is shown by the success of Hungary, which is in 5th place – venture capital there was 12x more than in the Czech Republic. It's not expensive to create an accommodating environment for businesspeople just starting out and to begin to support venture projects. The very successful Yozma programme run by the Israeli government, which helped develop Israel's current fame as a centre of world technology, could perhaps serve as inspiration for us.

Conclusions

It's clear from the results of the ECB Innovation Barometer that the most successful and most competitive economies are also the most innovative. It also shows that there is an invisible barrier both in incomes per capita and in the innovativeness of economies – we have called this barrier the “glass ceiling”. Gaps in innovativeness and in the ability to create sufficient new products, technologies and innovative services holds Eastern European states back from achieving the luxury of high income economies.

The Czech research and development environment is overly reliant on planning, state investment and primary research. Thanks to this, an above average amount of scientific publications has been established, but real bankable results – patents – are a weak point in the Czech Republic. This is due to lower participation by companies in research and development and a lower degree of cooperation between the state sector, universities and business.

The Czech education system in the context of Europe is of relatively good quality and at present there are a relatively sufficient number of university students here. Unfortunately, the number of technically educated students is declining. However, the Czech Republic is a country that is very strongly focused on industry. If we are able to make use of this focus and effectively respond to the challenges of the 21st century then the Czech Republic may become one of the economically most successful countries in Europe.

One of the ways how to respond flexibly to potential structural changes is by supporting competent young businesspeople who are seeking their own path to success. There are venture capital funds in the Czech Republic, but in comparison with the rest of Europe there are very few of them. Support for start-ups, however, is not an expensive matter at all, and is in the order of a tenth of a percent of GDP. But it tends to be relatively demanding in terms of management.

We are making use of the opportunities and building an environment for our start-up businesspeople. Let's make use of European Funds and get inspired by the best – thanks to the Yozma programme in the 1990s, the Israelis were transformed into a world technological leader. We can be, too. But to succeed we will need able minds and entrepreneurial spirit.

EU OFFICE / KNOWLEDGE CENTRE - Česká spořitelna, a.s.

Budějovická 1518/13a, 140 00 Praha 4

tel.: +420 956 718 012

e-mail: eu_office@csas.cz<http://www.csas.cz/eu>**Tomáš Kozelský – manager**e-mail: tkozelsky@csas.cz

tel.: +420 956 718 014

Jan Jedličkae-mail: jjedlicka@csas.cztel: [+420 956 718 013](tel:+420956718013)**Tereza Hrtúsová**e-mail: thrtusova@csas.cz

tel: +420 956 718 012

Max Wandlere-mail: mwandler@csas.cz

tel: +420 956 714 291

Radek Nováke-mail: radeknovak@csas.cz

tel: +420 956 718 015