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From stagnation to acceleration

Proposed guidelines for a European research policy

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Summary

Three mega trends are currently shaping the global research landscape. Total investment in research has increased substantially. A number of new, strong research nations are gaining ground rapidly. China is about to take the lead role in global research.

As a whole, the EU area is less research intensive today than either the USA or China. A number of measures are required if we are to avoid a European knowledge crisis. The most important one is to close the research gap between Europe and the rest of the world. A high-cost economy must also be a high-tech economy. Halving the EU's agricultural and regional subsidies would free up resources which would help improve Europe's position significantly.

Europe is home to many world-leading and research-intensive companies, but as a whole, the business sector is less research intensive than in the USA, China and Japan. This is a major concern. The size and geographical flows of business investments are, perhaps, the best indicator of a country's or a region's ability to compete in the knowledge economy. The reason for this is simple: international companies prefer to focus research where they believe the opportunities are best. For Europe to compete for knowledge-intensive investments, the conditions for carrying out research must be as good as, or better, than they are in the rest of the world.

The EU's research programme should include strong incentives for increased enterprise in Europe. An innovation premium could be trialled in the European research system, by rewarding research organisations which adopt a proactive approach to utilising research results.

Europe has too few top-class universities. Consequently, the EU should focus its research policy on increased quality and relevance. An elite programme aimed at young, promising European researchers is of particular importance, since it would provide support for the stars of the future.

One explanation for the American universities' lead over their European counterparts is the high level of mobility. It is rare for researchers to go from student to professor at one and the same university. Here too, the EU can play an important part in stimulating both increased intra- and extra-European mobility for researchers, as well as greater mobility between academia and the business sector.

Introduction

The first thing that comes to mind about Singapore and Jamaica may not be the great similarities. Rather, it's the contrast between skyscrapers and shopping paradise and tropical beaches and reggae.

But once you get past this, it turns out that the two island nations have a lot in common, not least historically. Both used to be British colonies. Both have English as their official language. Both are also small, tropical islands nations with a population of less than five million. During a period in the 1960s, after gaining independence from Great Britain, both countries even had the same level of prosperity, measured as GNP per capita. Both nations had the same level of poverty and faced similar social challenges. Jamaica, which was slightly better off, was believed to be in a better position due to its ability to attract tourism and its great natural resources.

Today, the trends show us that the countries, despite the fact that they started virtually from the same point, took very different paths. In half a century, Singapore has grown at an amazing rate and is currently one of the world's richest nations. In contrast, Jamaica is still one of the world's poorest countries, despite its apparently excellent potential.

So why did Singapore succeed? A major piece of the puzzle is the fact that Singapore, unlike Jamaica, was quick to make major infrastructure investments and focused its economy on exports and free trade. But another factor is Singapore's extremely focused and long-term investment in education, research and innovation. Today, Singapore performs well in PISA studies and the country's scientific articles are among the most cited in the world. Many international companies have set up operations in the country. For example, 9 of the 10 major pharmaceuticals companies in the world now carry out research or other operations in Singapore.

Just as with Singapore and Jamaica, Europe's current investment in knowledge is the major factor in determining future prosperity levels. Europe is not a small, tropical island nation. But nor is Europe completely immune from the competition in the global economy.

Recently, new EU parliamentarians were elected to represent the people of Europe for five years. During their term in the European parliament, the development of the EU's next research programme will begin. In this report, the Confederation of Swedish Enterprise is taking an early opportunity to present a few important guidelines which the Confederation believes should form the basis for drafting the common research policy, an area which currently makes up a minor proportion of the EU budget but which, in the long term, will play an increasingly significant part in the future prosperity of Europe.

Three mega trends in the global research landscape

Over the past 100 years, different regions have, at different times, dominated research around the world. Before World War II, the focus was on Europe. But a divided world, much of it in ruins, provided a great opportunity for an unaffected USA to seize the initiative in the post-war years. We are now seeing yet another geographical shift as, in parallel with the huge economic growth in Asia, the centre of gravity of global research is now increasingly moving towards Asia.

In a longer perspective, it may well be that the large Asian countries have finally reduced the head start which first Europe and then the USA enjoyed due to the industrial revolutions of the 19th Century. China and other large economies are now regaining their more natural significance in the world economy, and this is also reflected in greater investment in knowledge.

But global research today is not only carried out on a broader geographical arena. There are two other mega trends which fundamentally change the landscape: total research investment (with a growing proportion of business R&D) has increased considerably across the world while, at the same time, China as a single nation is about to take a leading role in R&D.

Significant increase in global research

Total R&D investment around the world has doubled in the past ten years. The National Science Foundation (NSF) in the USA estimates that total investment in research around the world in 2011 was USD 1,435 billion.[1] In comparison, total research investment in 2001 was USD 753 billion.[2] This is equivalent to an average annual increase of 6.7 percent. The large increase in global investment suggests two things. Firstly, rising prosperity also means that greater resources are available for research. Secondly, the increase indicates a growing ambition among many countries and businesses to compete in the knowledge-intensive areas of the world economy.

New research nations are gaining ground

Substantial levels of research investment are no longer restricted to the traditional knowledge economies of the USA and Western Europe. Instead, we are seeing massive increases in Asia, and not just in China. Countries such as Japan, Taiwan, South Korea, India and Singapore have significantly increased their investment in R&D. Eastern and South-Eastern Asia's share of global investment has risen from 25 percent in 2001 to 34 percent in 2011. As a region, they have overtaken both the USA and Europe, where the proportion has fallen to 32 and 24 percent respectively.[3]

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[1] National Science Foundation (2014)
[2] Current PPP US$
[3] Ibid.

Clearly, the centre of gravity is shifting towards Asia. The bipolar world of research, consisting of the USA and Europe, has now become multipolar with many new, strong players. At the same time, the global investment in research remains highly concentrated. The seven largest research nations in the world are jointly responsible for 72 percent of all research. Africa and large parts of South and Central America still remain blank areas with a very small share of the world's research. Sweden, with just over 9 million people, invests more in research than the whole of Africa, which has over a billion inhabitants. With continued strong economic growth in Africa, this scenario will probably change quickly, and the international research landscape may well broaden further.

China's road to dominance

China's rise as a research nation is unequalled in the history of the world, and is therefore, a megatrend in its own right. Total annual research investment of more than USD 200 billion makes China the world's largest research nation after the USA. China has also surpassed the research intensity of the EU.[4] Forecasts suggest that, if the current trend continues, China will overtake the USA as the world's largest research nation in the next decade.[5] This is a historic shift.

In absolute figures, Chinese research investment has increased by more than 20 percent annually since 2001. Research investment has increased more than the rise in GNP, which stands at 10 percent a year. In comparison, research investment in the USA increased by 4.3 percent over the same period, and by 3–6 percent per year in the largest EU countries.[6]

[4] OECD
[5] Washington Times (2014)
[6] National Science Foundation (2014)

Europe as a research region

It is a rule rather than an exception that prosperous countries also are research intensive countries, not least in the business sector. As the American economist Gregory Tassel puts it: *"The high wage economy must be the high tech economy"*.[7]

So how does Europe perform as a research region? A partial answer to this question can be read between the lines in the review of global research trends. But to find a more complete answer, we should really look at the aspects of research which impact directly on research competitiveness as a whole.

Is Europe sufficiently research intensive?

The proportion of the economy reinvested in research and development has long been used as a yardstick in comparing the knowledge intensity of different economies.

In 2012, research intensity for the EU-28 stood at just below 2 percent of GNP. This represents a slight increase from just under 1.8 percent of GNP over the past ten years. During the same period, the USA has moved from just over 2.5 percent to 2.8 percent of GNP, putting it approximately one percentage point above Europe. In comparison, China has doubled its research intensity from just under 1 percent to 2 percent of GNP in 2012.[8]

No less than ten American states have a research intensity higher than 4 percent. In Europe, no single country stands at this level. To give an example, California and Massachusetts have a research intensity equivalent to 4.2 and 5.5 of GNP respectively.[9]

Many American states do, however, have a very low research intensity, and ten states invest less than 1 percent of GNP in R&D. This puts the research intensity in these states on par with the weaker research countries in Europe (Romania, Bulgaria and the Baltic States). Despite this, the comparison is slightly skewed since the American states with low research intensity have a significantly higher GNP. In absolute terms, this means that, per capita, they invest more in research.

In both the USA and Europe, but more so in the USA, research tends to be concentrated in certain geographical locations. This applies both to publicly-funded research and clusters of research-intensive companies.

Is European research up to scratch?

The quality of research is also an important measure of its competitiveness. But how do you measure quality?

There is no straightforward answer to this question. In the academic world, peer reviews are common, with researchers assessing research in areas close to their own

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[7] Tassey G (2007)
[8] OECD
[9] National Science Foundation (2014)

subject areas. This is a method frequently used, for example, in assessing applications to research councils or in reviewing research at universities. At a higher national level, quantitative indicators are more commonly used.

The most common indicator, by far, are various measures of citations. This approach is based on the hypothesis that there is a link between how often a scientific publication is cited and its quality (a large number of citations indicates high quality). There are some objections to this. For example, a publication which many researchers regard as of low scientific value may still be cited frequently. Despite this, the approach has been generally accepted, and is currently used by many countries as an indicator in allocating national research funds to universities.

Globally, the USA is in the lead with the highest average number of scientific publications cited. The EU is some way behind. Several individual European countries have, however, experienced an extremely positive trend. Research in Great Britain, the Netherlands and Denmark, for example is very close to the American citation level.[10]

To complement citations in academic publications, it is interesting to see how Europe performs in the international rankings of universities which attract a certain amount of media attention every year. The two principal rankings are the World University Ranking by the Times Higher Education, a British publication, and the Academic Ranking of World Universities carried out by the Center for World Class Universities at Shanghai Jiao Tong University.

Both rankings show that American universities dominate the top rankings almost completely. According to the 2013 Shanghai ranking, all bar three of the top universities in the world were in the USA. The other three were two British universities and one Swiss university.

Out of the top 20 universities ranked by Times Higher Education in 2013–2014, 15 were in the USA.

In this ranking, too, British and Swiss universities are the exceptions that confirm American dominance.

A reasonable analysis is that, while Europe produces excellent research, the USA has a much larger leading edge of elite research carried out by some of the very best universities in the world.

Is Europe sufficiently attractive to businesses?

The size and geographical flows of business sector investment in R&D is perhaps the best indicator of a country's or a region's ability to compete in the knowledge economy since, quite simply, international companies focus research in areas which provide the best conditions. There is a certain amount of inertia associated with existing investments, but in the long term, market forces drive a geographical shift from less attractive countries and regions to more attractive ones.

One important associated issue is what factors businesses regard as significant in selecting a location for new research operations. A survey carried out by the Confederation of Swedish Enterprise among global heads of research at international companies

[10] The Swedish Research council (2012)

shows that the most important factors are the availability of knowledge and skilled staff, as well as new business opportunities. Two in three heads of research taking part in the study regard collaboration with universities as important or very important.[11]

In the EU, the business sector is responsible for just over 60 percent of total research investment. This is a relatively low proportion compared with the USA, Japan and China, where the business sector is responsible for more than 70 percent of research.[12] Between 2001 and 2011, there was a slight increase in research investment by the business sector in the EU, as a proportion of the economy, from 1.21 percent to 1.29 percent of GNP[13]. In comparison, business sector research investment more than doubled in China during the same period, from 0.57 percent to 1.36 percent of GNP.

Europe's relatively low level of private research is also reflected in the number of researchers who choose a career outside academia. Only 50 percent of Europe's researchers work in the business sector, compared with more than 80 percent in the USA and almost 70 percent in Japan.[14] Lower knowledge intensity in the European business sector compared with the rest of the world may have serious consequences in the future. International research literature shows that investment in R&D by businesses has a significant impact on productivity. A study of the importance of major companies to Sweden shows, for example, that the 20 largest multinational companies in Sweden are responsible for 24 percent of employment in industry and for 80 percent of the country's goods exports in high-tech industries.[15]

Europe's low level of company-level research can be viewed in several ways. One interpretation is that the European business sector as a whole is, quite simply, less knowledge intensive than that of, for example, the USA and Japan. This, in turn, is based on how enterprise is viewed in Europe. A lack of understanding of the importance of the business sector for prosperity and growth means that the conditions faced by entrepreneurs are worse than in the rest of the world, and this has a negative impact on investment in research.

Until the start of the new millennium, virtually all research carried out in international companies was concentrated in the USA, Europe and Japan. European companies invested in the USA, and American companies invested in Europe and, to some extent, in Japan. Countries such as China and India were responsible for a large net inflow of talented scientists, primarily to the USA, but few companies chose to base their research in these countries. Since the start of the new millennium, the pendulum has swung rapidly in the opposite direction. Several studies have revealed a dramatic shift in investment, away from the USA, Europe and Japan towards the rapidly-growing economies in Asia. Singapore, South Korea and Taiwan have all joined China and India. A study shows that between 2002 and 2005, Eastern and Southern Asia received almost 58 percent of all foreign direct investment in R&D by multinational companies. [16]

The shift in investment by international companies from Europe and the USA to China is confirmed by interviews with heads of research at international companies carried out as part of a study commissioned by the Confederation of Swedish Enterprise.[17]

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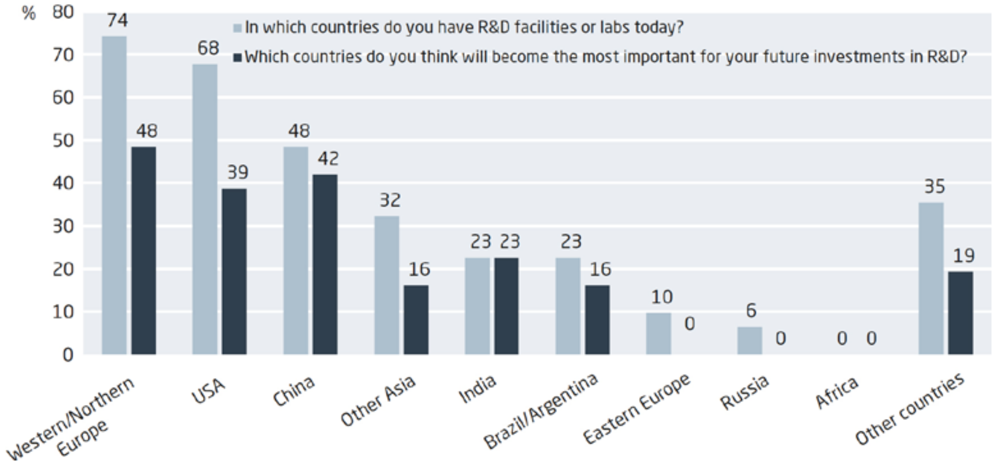
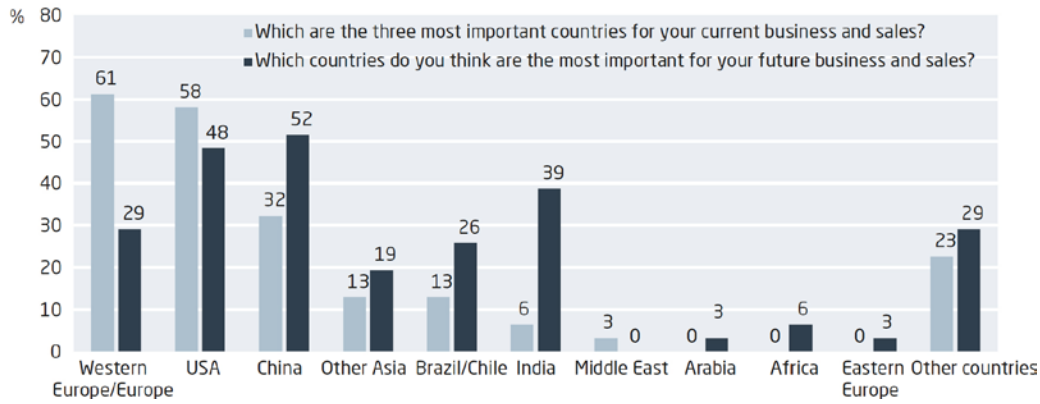
[11] Görnerup E (2012)
[12] OECD, figures for EU27
[13] Eurostat
[14] European Commission (2003)
[15] Andersson et al (2012)
[16] Bruche G (2009)
[17] Görnerup E (2012)

- In which countries do you have R&D facilities or labs today?
- Which countries do you think will become the most important for your future investments in R&D?



The lower bars showing the responses to the question on which countries will be most important for future investment in R&D are the result of every respondent listing fewer countries than the number of countries in which the company is currently carrying on research. If the indication that future research will move to Asia is clear, then the response to the question on which countries will become the most important markets in the future paints an even more dramatic picture. The overall picture is that the USA and Asia are and will be the most important markets of the future. The view on Europe is rather more pessimistic and perhaps a reflection of low European growth levels. India stands out as a country with enormous future market potential.

- Which are the three most important countries for your current business and sales? (attn: 3 answers possible)
- Which countries do you think are the most important for your future business and sales?



This puts Europe in a very unfortunate position, where the business sector's contribution to total research investment is relatively low while the centre of gravity of new investment in research by international companies is increasingly moving towards the rapidly-growing economies in Asia.

EU research policy: From cutting-edge research to regional support

In May 2009, the EU's research ministers decided on the construction of a pan-European research facility, the European Spallation Source (ESS) in Lund, with Sweden and Denmark as joint host nations. The decision will provide Europe with access to a world-class research institute. The world's strongest neutron source will be used in ground-breaking research in areas such as health, energy and fundamental physics.

The ESS is an excellent example of the benefit of pan-European research. The pooling of resources has given Europe access to a world-leading research institute in a way which would not have been financially possible for an individual member state.

The EU is a highly-significant research player. The recently-completed seventh EU framework programme for research (FP7) is one of the world's largest research programmes, worth EUR 53 billion over a seven-year period. In 2010, for instance, FP7 was the second-largest source of public financing for research in Sweden, surpassed only by the Swedish Research Council but ahead, for example, of Vinnova.

The EU has recently launched a new programme cycle for its new research and innovation programme, Horizon 2020, which will run from 2014 to 2020. The total budget has increased to EUR 70 billion (at constant prices). The objective is to "contribute to growth and meet social challenges". Similarly broad goals have also been adopted for Sweden's national research policy, which is aimed at "contributing to the well-being of the people, the progress of society, the competitiveness of the business sector and sustainable development". The EU's research policy is also a component of one of the flagship initiatives – the innovation union – established by the EU for the period until 2020.

One of the EU's goals in the current long-term strategy is to increase total investment in research until 2020, to a rate equivalent to 3 percent of GNP. This goal was also part of the previous Lisbon strategy, which covered the years 2000 to 2010.

Somewhat surprisingly, the EU's research framework programme is not the largest investment in research in the EU's budget. The investment by the regional funds is, in fact, even greater. In the EU's previous long-term budget for the period 2007–2013, the cost of regional support totalled EUR 347 billion. A common view is that around 25 percent of regional support goes to research. This corresponds rather closely to the compilation of regional support carried out by the EU, which states that, between 2007 and 2014, a total of EUR 86.4 billion went to research and research-related activities.[18] This is well above the total budget for FP7, which was EUR 53 billion.

A closer examination, however, shows that there is a relatively broad definition of what precisely constitutes investment in research. Of the total investment of EUR 86.4 billion, EUR 52.8 billion represents investment in research and innovation in a stricter and more easily compared sense, i.e. almost exactly the same amount as FP7.

[18] European Commission: Cohesion Policy and Research and Innovation

A comparison with the USA

The first light-emitting diode (LED) producing visible light was invented by the American scientist Nick Holonyak of General Electric in the 1960s, as a result of research financed by the US Department of Defence.[19] Initially, the light emitted was weak, and it was only in the 1980s that the technology had moved on to make outdoor lighting in sunlight possible. Today, the technology has matured and the world is in the middle of a technological revolution with respect to artificial light: inefficient incandescent technology is almost a thing of the past, as it is being replaced by LED and other low-energy sources.

In the USA, the highest political leadership is also very much aware of the importance of education, research and innovation. For example, in January 2014, President Obama stated in his State of the Union speech that *"The nation that goes all-in on innovation today will own the global economy tomorrow"*. The consequences of the USA's falling relative share of global research and the world economy are subjects frequently discussed. There is no immediate threat to the USA's dominant position, but there are concerns about the country's long-term competitiveness and economic growth. The emergence of China as a knowledge nation and economic superpower, and the consequences this may have, is discussed to a much greater extent than in Europe.

The starting point for American research policy is different from that in Europe. The view is rarely that research should be carried out just for its own sake. Instead, knowledge is explicitly regarded as the foundation for US competitiveness. The USA should *"out-educate"* and *"out-innovate"* the rest of the world.

The principal financiers of research in the USA are the business sector and the federal government. Together, they are responsible for more than 90 percent of all funding. Only one percent of funds originate at state level.

This means that to understand US research, you also have to understand federal research. Perhaps the greatest difference compared with Europe is the significant proportion of defence research. Around half of all federal research is carried out on behalf of the US Department of Defence. Around 95 percent of defence research involves applied science or pure development.

Another difference between the USA and Europe is that R&D investment is not a joint budget. Instead, R&D is one of several posts in each department's budget, and is, therefore, considered in light of other funding needs within each department's area of responsibility.

Most of the federal research is carried out by the business sector (40 percent), universities (just over 20 percent) and federal research institutes (just over 20 percent). There are also semi-federal research institutes which are run as public/private partnerships. One example of this is the famous Los Alamos laboratory. The semi-federal institutes carry out just under 10 percent of federal research. A large proportion of private/federally-financed research is carried out in the aerospace industry and other parts of the defence industry.

[19] Singer P (2014)

Around half of the non defence-related research focuses on health. Other large federal research budgets include the energy area. About half of the funding goes to basic research, and half to applied research. Another major federal financier is the National Science Foundation (NSF), which primarily funds basic research in many different areas.

All federally-funded basic research is pure research, without clear a practical application. But this does not mean that, with respect to academic research at universities, it corresponds to the Swedish and European tradition of distributing grants directly to universities without any requirement on the focus of research. All federally-funded basic research is, as mentioned above, focused on general areas which are regarded as being of strategic importance to the nation. In addition, all federal research funding is allocated in competition, often using a peer review procedure.[20]

In the USA, academic research is concentrated in only 200 research universities. Of these, the 100 most research-intensive universities are responsible for 80 percent of academic research.[21] Europe, in comparison, has more than 3,000 universities and university colleges, a very large proportion of which carries out research. This difference deserves a deeper analysis, since the economies of scale for research are not completely clear-cut. But the success of US research and its massive lead over Europe during the post-war era suggest that a concentration of resources has created excellent opportunities for world-class research. In this analysis, Europe has too few leading universities with sufficient critical mass of both resources and excellent researchers.

[20] Sehlstedt K (2008)
[21] ITIF (2004)

Proposal for guidelines for a European research policy

Is it realistic to talk about a renaissance in European research? The answer to this question is "yes". The EU is still one of the three main regional economies in the world (the USA and China/Asia being the other two). There is also a solid base of respected universities and world-leading, research-intensive companies. The EU in general, and the EU's research policy in particular, plays and will continue to play an important role in Europe's competitiveness. In the final chapter of the report, the Confederation of Swedish Enterprise would like to present proposals for guidelines which should form the basis of the EU's research policy.

More research

In the long term, Europe is at risk of suffering the consequences of lower research intensity than the rest of the world. A high-cost economy must also be a high-knowledge economy. The first step for Europe should, therefore, be to increase its investment in research to the same level as the USA. The 3-percent target is vital for Europe's ability to compete in a world of increasing global investment in R&D. In parallel with increased investment in research, it is essential that publicly-funded research is strongly encouraged to focus on quality and relevance. Investment in research does not automatically generate jobs and increased prosperity.

The EU's investment in research is highly significant. The EU's current framework programme for research, Horizon 2020, involves a substantial increase in the budget compared with previous programmes. Despite this, the costs of regional and agricultural subsidies in the current long-term budget are ten times that of Horizon 2020. This prioritisation is wrong.

So by how much will the EU have to increase its investment to achieve the same research intensity as the USA? Today, the difference is 0.8 percent of GNP. This is equivalent to just over EUR 100 billion, which is in the same region as the annual cost to the EU budget of regional and agricultural subsidies.[22] If the national co-financing in these programmes is taken into account, halving the EU's agricultural and regional subsidies would, therefore, have the potential to free up sufficient resources to make a significant difference in closing the research gap between the EU and the USA.

An increase in the EU's research intensity must not and should not be funded purely from public funds, but also through increased private investment. The rule of thumb should be that around two-thirds of research should be carried out by the business sector. This means that achieving the same research intensity as the USA would require just over EUR 30 billion in increased public research investment, provided that the joint investment by the business sector increases by just under EUR 70 billion.

[22] According to the OECD, GNP in 2012 was EUR 13,075 billion for the EU-27

Even if, in principle, the entire increase of EUR 30 billion in public funding ended up at EU level (which is not likely or even desirable, since the majority of public investment within the EU takes places at member state level), this would still be equivalent to less than a third of what is currently spent on regional and agricultural subsidies.[23]

A European research intensity on a par with the USA today should not, therefore, be viewed as a distant dream. Instead, it is a matter of moving away from current erroneous priorities which are based on an historical link to a largely outdated agricultural past.

More research companies

Europe has, to some extent, been confined to the backseat: the business sector's share of total research is lower than in the USA, China and Japan, and the flow of new investment has shifted towards Asia in recent years.

To enable Europe to compete for knowledge-intensive investments, the conditions for carrying out research must be at least as good as, if not better than, in the rest of the world. Many factors affect this and, ultimately, national reforms are required since the opportunities at member state level vary significantly. What is needed is a good business climate, competitive taxes and a set of rules that facilitate enterprise.

Both in Sweden and at EU level, politicians stress the importance of future innovations and growth. These are also used as general targets for research policy. When it comes to turning political ambitions into actual politics, however, there are few reforms aimed at bridging the gap between, on the one hand, research and, on the other hand, more innovations and increased enterprise. In the academic world, collaboration and utilisation are given little weight compared with internal academic goals, such as publication and citation.

The EU's research programme should be drafted with a strong emphasis on increased collaboration and enterprise in Europe. The Confederation of Swedish Enterprise has proposed the introduction of an innovation premium in the Swedish research funding system. A similar method should be trialled for the European research system, with the aim of rewarding research organisations which actively encourage research partnerships with industry and other areas of the business sector and adopt a proactive approach to utilising research results.

The Swedish government has recently decided to make it easier for foreign students and researchers to remain in Sweden. The same rules are required across Europe to attract foreign talent and satisfy future needs for people such as scientists and engineers.

More world-class universities

With respect to university rankings, Europe is lagging a long way behind the USA, and has done so for a long time. One explanation is that the USA has relatively few research universities. Quite simply, this concentration of research resources facilitates world-leading research at world-leading universities. It is not in the EU's remit to express views on the number of research universities in individual member states. But through its research programmes, the EU can promote stable long term conditions and a critical mass in research. The EU should also clearly focus its research funding on quality and relevance.

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[23] European Commission (2013): Multiannual financial Framework 2014–2020 an EU budget 2014

In this context, research financing should be aimed at the very best research, which, consequently, helps to attract the best researchers in the world. Of special importance are elite programmes aimed at young, promising European researchers, which are designed to support the stars of the future. Through its full coverage of all aspects of the European research area, the EU is particularly well-placed for investments aimed at elite research. The best researchers and research teams in Europe will be given the opportunity to compete against each other, which creates the driving force necessary to improve quality. Funding elite research has another important effect. It increases the interest among other skilled and experienced researchers around the world to seek out research teams and European universities to pursue cutting-edge research. It also improves the opportunities for an expansion in research partnerships with the business sector.

Another explanation for the US universities' lead over their European counterparts is the very high level of mobility between centres of learning. It is rare for researchers to progress their careers from student to professor at one and the same university. In Europe, however, the situation is the opposite – here, there is a much lower level of mobility. In this respect, the EU can play an important role in stimulating increased mobility for European researchers inside and outside Europe.

A large proportion of EU research funding is allocated via the regional funds. The result is research which is largely governed by regional policy considerations rather than quality and relevance. Fundamentally, it is a mistake to confuse concepts such as quality, relevance and geography. Research is research, and regional support is regional support. Instead, the EU should take overall control of all research funding and ensure that it is always allocated to the best research.

References

Andersson M, Dieden S, Ejermo O (2012): Sverige som kunskapsnation – klarar sig Sverige utan storföretagen? [Sweden as a knowledge nation – Can Sweden manage without the big companies?].

Bergstrand M (2012): Med Sverige på läktaren? En antologi om forskningspolitiska utmaningar i akademisk brytningstid [*Sweden on the sidelines? An anthology of research policy challenges in a time of academic upheaval*].

Bruche G (2009): The Emergence of China and India as New Competitors in MNCs' Innovation Networks.

Business Europe (2014): Reform Barometer.

European Commission (2003): The role of universities in the Europe of knowledge.

European Commission (2013): Multiannual financial framework 2014–2020 and EU-budget 2014 – the figures.

European Commission: Cohesion Policy and Research and Innovation, http://ec.europa.eu/regional_policy/activity/research/index_en.cfm#2

Eurostat: Science, technology and innovation, http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/introduction

Görnerup E (2012): Still in the game? Sweden and the new geography of business R&D.

Kennedy J (2012): The Sources and Uses of U.S. Science Funding.

National Center for Science and Engineering Statistics (2013): U.S. R&D Resumes Growth in 2011 and 2012, Ahead of the Pace of the Gross Domestic Product.

National Center for Science and Engineering Statistics (2013): U.S. R&D Spending Resumes Growth in 2010 and 2011 but Still Lags Behind the Pace of Expansion of the National Economy.

National Science Foundation (2014): Science and Engineering Indicators 2014.

OECD: Main Science and Technology Indicators Database.

Shanghai Jiao Tong University (2013): Academic Ranking of World Universities.

Sehlstedt K (2008): Forsknings- och innovationspolitik i USA – näringslivets fem roller [Research and innovation policy in the USA – the five roles of the business sector].

Singer P (2014): Federally Supported Innovations: 22 Examples of Major Technology Advances That Stem From Federal Research Support.

Statistics Sweden: R&D expenditures in Sweden

Tassey G (2007): The Technology Imperative.

Tillväxtanalys (2011): Forskningspolitik och internationalisering – USA [Research policy and internationalisation – the USA].

Times Higher Education (2014): University Rankings.

The Swedish Research Council (2012): The Swedish production of highly cited papers.

Washington Times (2014): Lawmakers worry China will top U.S. in scientific research.

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Arkitektkopia AB, Bromma, 2014