The Participation of Austria and Hungary in the Framework Programmes for Research and Technological Development of the European Union. A Comparative Analysis

Ágota Dávid[1]

Abstract: *The significance of the framework programmes for research and technological development of the European Union is constantly increasing. Horizon 2020, the Eighth Framework Programme with its 80 billion euro budget is a very important player in science funding. At the same time, due to the economic crisis and limited state budget for research and technology, national governments gladly encourage their scientists to apply for funds on the European level. Especially if they want to cooperate and carry out research internationally. So, as a surprising result, increasing amounts for funding result in more fierce competition. How do new and old Member States perform in this competition? The study will show this through the example of the performance of one old Member State – Austria – and one new Member State – Hungary. In the paper, first the history of framework programmes will be summarised, then the analysis of STI statistics about participation, success rates and financial contribution in retained proposals will follow. The difference in success rates might derive from various factors, including public and business expenditure on R&D, number of researchers, governmental support schemes or the more active involvement of innovative small and medium-sized enterprises.*

Keywords*: research and development, Horizon 2020, 7th Framework Programme, research funding*

The significance of the framework programmes for research and technological development of the European Union is constantly increasing. In Horizon 2020, the current framework programme of the EU, 80 billion euro will be distributed among researchers based on scientific excellence. Unlike in the agricultural or structural policy of the Union, where funds are mainly distributed based on previously defined quotas, framework programmes for research and development (R&D) are strictly competitive. As a result of the economic crisis and budgetary restrictions, the competition for such funds is constantly

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increasing. All the Member States and associated countries of Horizon 2020[2] are aiming at the largest possible share of available funds, which is also encouraged on government level. Such EU provided funds can ideally supplement government expenditure on R&D.

The first 15 Member States of the European Union, the so called EU15 or old Member States usually perform much better than the "new" member states, which have joined the EU in or after 2004 (EU13). I will compare the performance and participation data of one EU15 country – Austria – with one EU13 country – Hungary. I try to find an answer to the question: why is Austria more successful in the framework programmes of the European Union than Hungary? After a short overview of the history of the framework programmes for research and technological development I will compare the participation data and success rates of Hungarian and Austrian researchers in the framework programmes (number of projects, size of budget). Finally I will mention some reasons why Austria is more successful than its eastern neighbour, Hungary.

Historical overview of the framework programmes for research and technological development

There is no broad academic literature on the emergence and development of Framework Programmes for Research and Technological Development of the European Union. Guzzetti[3] and Krige[4] are authors of two general historical overviews about the origins and growth of the European Framework Programmes. In 1957, in the Treaties of Rome, no collaborative mandate was given in the area of science and technology outside nuclear energy. In the mid-1960s even EURATOM had to abandon its original objective of Europe-wide cooperation – it seemed as if the European countries would cooperate only outside the Community framework if at all.[5] From the early 1970s sectorial programmes with the aim of closing the "technology gap" were launched.[6] Authors like Sandholtz[7] or Papon[8] emphasise the importance of such programmes mainly aimed at increasing competitiveness in specific sectors, well in line with international trends of science policy, to focus on innovation and applicability of research efforts. These initiatives still lacked the ambition to maintain or develop a broad research base in Europe. A typical

[2] All the Member States of the European Union are automatically members of the framework programmes, too. As of 29 April 2016, the following countries are associated to Horizon 2020: Iceland, Norway, Albania, Bosnia and Herzegovina, FYROM, Montenegro, Serbia, Turkey, Israel, Republic of Moldova, Switzerland (partial association), Faeroe Islands, Ukraine, Tunisia, Georgia. The Association Agreement with Armenia was also signed on 19 May 2016, but it has not entered into force yet.

[3] Luca Guzzetti: A Brief History of European Union Research Policy. Luxembourg, Office for the Official Publication of the European Communities, 1995.

[4] John Krige, Luca Guzzetti (Eds.): History of European Scientific and Technological Cooperation. Luxembourg, Office for the Official Publication of the European Communities, 1997.

[5] Margaret Sharp, Claire Shearman: European Technological Cooperation. London, Routledge, 1987.

[6] Edgar Grande, Anke Peschke: Transnational cooperation and policy networks in European science policy-making in Research Policy Vol. 28, 1999, pp. 43–61.

[7] Wayne Sandholtz: High-Tech Europe: The Politics of International Cooperation. Berkeley, University of California Press, 1992.

[8] Pierre Papon: European Scientific Cooperation and Research Infrastructures: Past Tendencies and Future Prospects in Minerva Vol. 42, 2004, pp. 61-76.

example for such a sectorial programme was ESPRIT, the "flagship" programme for the promotion of R&D in the information technology industry, launched in the early 1980s. In the following years, both the EC budget devoted to R&D and the legal framework were significantly expanded. Nevertheless, Reger and Kuhlmann[9] emphasise that this tendency did not mean that the EU would have replaced national policies – if we compare the R&D budget of the Member States to the EU budget, the latter is still relatively small. Increased amounts of funding could not overcome the so-called "European Paradox" either. As Georghiou[10] explains, in spite of a generally high level of investment in science, the technological and commercial performance in Europe has worsened since the mid-1980s.

Other authors put the emphasis on analysing the role of the European Commission in setting the agenda of science policy in Europe. Peterson[11] sees the emergence of the Framework Programme as the result of the interplay between developing stakeholder networks and senior-level Commissioners. While Citi[12] sees the emergence of policy ideas as the realm of high politics and treats the Commission as a reactive policy entrepreneur not seriously involved in the initiation and specification of the issue in its early phases, Edler and James[13] assign the role of an active policy entrepreneur to the EC. Unlike Peterson who stresses the role of senior-level Commissioners, Edler and James say that "it was individual mid-ranking Commission officials who identified a window of opportunity to put the theme on the agenda and mobilised the political and financial resources" of the European Commission. "In doing so, the Commission gained the credibility to be the venue for science and technology policy."

The significance of European research policy started to grow in the 1980's. The First Framework Programme was also created in 1984 with the general aim of defining goals, fields and related funding of European science policy. The First Framework Programme lasted for four years. In order to establish a Europe-wide scientific platform for the cooperation of national research institutes and universities it mainly supported cooperative research projects on key scientific areas of mutual interest. Collaborative research is even today the most common form of scientific cooperation on European level.

Based on the success of the First Framework Programme, the Single European Act devoted a separate chapter for research and development in 1986. The Act declared that science policy of the European Communities can be implemented via framework programmes for research and development. This declaration set the legal basis for R&D

[9] Guido Reger, Stephan Kuhlmann: Europäische Technologiepolitik in Deutschland. Heidelberg, Physica, 1995.

[10] Luke Georghiou: Evolving frameworks for European collaboration in research and technology in Research Policy, Vol. 30, 2001, pp. 891–903.

[11] John Peterson: EU research policy: the politics of expertise in: Carolyn Rhodes, Sonia Mazey, (Eds.): The State of the European Union: Building a European Polity? Lynne Rienner, Boulder CO, 1995, pp. 391–412 and John Peterson: Technology policy in Europe: explaining the framework programme and EUREKA in theory and practice in Journal of Common Market Studies Vol. 29, No. 3, 1991, pp. 269–290.

[12] Manuele Citi: Revisiting creeping competences in the EU: the case of security R&D policy in Journal of European Integration, Vol. 36, No. 2, 2014, pp. 135–151.

[13] Jakob Edler, Andrew D. James: Understanding the emergence of new science and technology policies: Policy entrepreneurship, agenda setting and the development of the European Framework Programme in Research Policy Vol. 44, 2015, pp. 1252-1265.

activities on community level.[14]

The first two framework programmes were mainly focusing on energy and information and communication technologies in order to establish a solid technology base for industry. A turning point in science policy was the acceptance of the White Paper on Growth, Competitiveness and Employment[15] and the Green Paper on Innovation[16]. Both strategies had the aim to increase the competitiveness of the European Union, to increase employment and to coordinate national research policies. A special focus was given to innovation, to the efficient use of scientific results while developing products or services, as well as to the role of education in economic growth. The Fifth Framework Programme was built on the results and conclusions of previous framework programmes – it emphasized the importance of competitiveness and growing employment as well as the significance of European added value in project proposals. This latter means that the proposed activities could not have been carried out by one country, so proposals had to be submitted by consortia formed by scientists coming from various European countries. Not only wide participation, but also European-level impact was a prerequisite for funding.

Table 1. Duration and budget of framework programmes

Framework Programme	Duration	Budget (billion ECU[17]/ euro)
First	1984-1987	3.8
Second	1987-1991	5.4
Third	1990-1994	6.6
Fourth	1994-1998	13.2
Fifth	1998-2002	15
Sixth	2002-2006	17.9
Seventh	2007-2013	50.5
Horizon 2020	2014-2020	80

Source: Official Journal 1983, 1987, 1990, 1994, 1999, 2002; EUR-Lex

Based on the targets of the Lisbon Strategy and the Barcelona objectives, the Sixth Framework Programme was another turning point in the history of European science policy. Being set out during the European Council in Lisbon the Strategy's aim was to make the EU "the most competitive and dynamic knowledge-based economy in the world

[14] Single European Act 1987: Treaties Establishing the European Communities. Treaties Amending these Treaties. Brussels – Luxembourg, Office for Official Publications of the European Communities pp. 335-343.
[15] European Commission: White Paper on Growth, Competitiveness, Employment. The Challenges and Ways Forward into the 21st Century. Brussels – Luxembourg, Office for Official Publications of the European Communities, 1993.
[16] European Commission: Green Paper on Innovation. Brussels – Luxembourg, Office for Official Publications of the European Communities, 1995.
[17] European Currency Unit, a basket of the currencies of the European Community member states between 1979 and 1999, used as the unit of account of the European Community before being replaced by the euro.

capable of sustainable economic growth with more and better jobs and greater social cohesion", by 2010.[18]

Two years later, back to back with the launching of the Sixth Framework Programme, the Barcelona European Council, which reviewed progress towards the Lisbon goals, agreed that national investment in European research and development must be increased with the aim of approaching 3 % of GDP by 2010. It also called for an increase of the level of business funding to two-thirds of total R&D investment.[19] As these ambitious objectives could not have been reached until 2010 they have also become part of the Europe 2020 strategy.[20]

The Seventh Framework Programme (FP7) reflected the growth and employment targets of the EU. The four separate programmes of FP7 represented the four main objectives of the Framework Programme: "Cooperation", "Ideas", "People" and "Capacities". Cooperation programme was the core of FP7, representing two thirds of the overall budget. Its aim was to foster collaborative research across Europe and other third countries through projects carried out by transnational consortia on the following thematic fields: Health; Food, agriculture and fisheries, and biotechnology; Information and communication technologies; Nanosciences, nanotechnologies, materials and new production, technologies; Energy; Environment (including climate change); Transport (including aeronautics); Socio-economic sciences and the humanities; Space; Security. The Ideas programme supported frontier research solely on the basis of scientific excellence. It was implemented via the newly established European Research Council (ERC). The People programme provided support for researcher mobility via the Marie Curie actions. The Capacities programme strengthened the research capacities of Europe. It supported *inter alia* SMEs, the establishment and operation of research infrastructures or some special activities of international cooperation. Nuclear research (EURATOM) remained a separate field with two programmes: one on fusion energy research and one on the activities of the Joint Research Centre (JRC).

FP7 represented a budget of more than 50 billion euro, which is about 3% of total R&D expenditure in Europe or 25% of competitive funding. Over its seven years duration, more than 139 000 research proposals were submitted, out of which 25 000 projects of highest quality were selected and received funding. Universities were the most important group participating in FP7, by receiving 44% of FP7 funding. They were followed by research and technology organizations (27%), large private companies (11%) and SMEs (13%), while the public sector (3%) and civil society organizations (2%) played a minor role.[21]

Horizon 2020 is the currently running Eighth Framework Programme with a budget of 80 billion euro for 7 years (2014-2020). By coupling research and innovation, Horizon

[18] European Council: Lisbon European Council 23 and 24 March 2000. Presidency Conclusions, p.3.
[19] European Council: Barcelona European Council 15 and 16 March 2002, Presidency Conclusions p. 20.
[20] Europe 2020 strategy is a 10-year strategy proposed by the European Commission on 3 March 2010 for advancement of the economy of the European Union.
[21] Louise O. Fresco: Commitment and Coherence. Essential Ingredients for Success in Science and Innovation. Ex-Post Evaluation of the 7th EU Framework Programme (2007-2013). 2015, p.5.

2020 puts emphasis on excellent science, industrial leadership and tackling societal challenges. Compared to previous framework programmes it offers a unified framework of R&D funding on EU level. It has also introduced a number of simplification measures to make the application procedure quicker, more simple and transparent. Horizon 2020 is also the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness.

The first pillar, called "Excellent science" has a budget of 24.4 billion euro. It consists of four programmes: the European Research Council (ERC) supports frontier research, inter and cross disciplinary ideas based on scientific excellence. The actions in the programme Future and Emerging Technologies are expected to initiate radically new lines of technology through unexplored collaborations between advanced multidisciplinary science and cutting-edge engineering. Similarly to FP7, Horizon 2020 also supports researchers' mobility via the Marie Skłodowska-Curie Actions (MSCA). The support of research infrastructures, including e-infrastructures also belongs to this pillar. The second pillar, "Industrial Leadership" disposes of a budget of 17 billion euro. This pillar aims to speed up development of the technologies and innovations that will foster European economic growth. One of its tools, the so-called SME instrument provides funds for SMEs for product/service development, marketing and commercialization. The third pillar consists of seven multidisciplinary "Societal Challenges":

1. Health, demographic change and wellbeing;
2. Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bioeconomy;
3. Secure, clean and efficient energy;
4. Smart, green and integrated transport;
5. Climate action, environment, resource efficiency and raw materials;
6. Europe in a changing world – inclusive, innovative and reflective societies;
7. Secure societies – protecting freedom and security of Europe and its citizens.

The budget of this pillar is about 30 billion euro.[22]

Hungarian and Austrian participation in the framework programmes

R&D expenditure in Hungary considerably decreased after the system change: while 1.6% of the GDP was spent on R&D in 1990, the same ratio was 0.63% in 1996. Gross domestic expenditure on R&D (GERD) as a percentage of GDP started to grow slowly after 2000. It reached 1.41% in 2013[23], which is still not only far from the general 3% target of the Europe 2020 strategy, but also from the national target of 1.8%.[24] Concerning the ratio between government and industry financed R&D, the dominance of government funding was characteristic for Hungary until 2007-2008. As the stagnation of government expenditure was coupled by a quick growth of industry financing, the trend started to

[22] European Commission: Fact sheet: Horizon 2020 budget, 2013.
[23] Hungarian Central Statistical Office.
[24] European Commission: Europe 2020 targets (translated into national targets), 2013.

change around 2008. In 2014 the percentage of GERD financed by the government was 33.49% while the share of industry was 48.28%.[25] We can also see from these numbers that international funds, as a third component play an important role in the funding of R&D in Hungary.

Hungarian researchers first took part in the Fourth Framework Programme. Their participation was only built on personal connections though; they were invited into some international consortia by their partners. Hungarian researchers were already able to participate in the Fifth Framework Programme (1998-2002). The country had to pay a certain contribution into the budget of the Framework Programme in return. From the very beginning of the Sixth Framework Programme (2002-2006) Hungarian researchers were able to participate and apply with the same rights as their partners in EU Member States. After the accession of Hungary in 2004 it was not a question any more to be a member state in FPs.

Hungary received a preferential rate when financially contributing to the Fifth Framework Programme (FP5). A considerable share of this contribution could have been paid by the PHARE instrument[26] (see Table 2.). Based on data from November 2004 there were Hungarian participants in 817 retained proposals in FP5, who received 64.19 million euro funding in total.[27] If we compare real government expenditure with received EU funding then Hungary's participation in FP5 can be considered successful. If Hungary did not have a preferential rate and the possibility to partly use PHARE funds to pay its contribution the result would have been much less favourable: Hungary could have retrieved about three-quarters of its contribution.

Table 2. Hungarian contribution to the Fifths Framework Programme (1999-2002)

	1999	**2000**	**2001**	**2002**	**Total**
Full Hungarian contribution (million euro)	19.05	19.88	21.53	22.14	82.60
Real contribution. reduced by the preferential rate (%)	40	60	80	100	71.31
Real, payable contribution (million euro)	7.62	11.71	17.18	22.14	58.91
Government contribution (million euro)	4.05	6.28	9.22	11.73	31.22
PHARE contribution (million euro)	3.53	5.43	7.96	10.41	27.69

Source: Nyiri Lajos: Vitorlázunk, vitorlázgatunk... in Magyar Tudomány, Volume CLXXIII., 2002/1., p. 96.

In the Sixth Framework Programme (FP6) Hungary enjoyed the same rights as all the other Member States of the European Union. There were 1185 successful Hungarian

[25] OECD S&T indicators.

[26] A PHARE (Poland and Hungary Assistance for the Reconstruction of the Economy) a pre-accession instrument financed by the European Union to assist the applicant countries of Central and Eastern Europe – among others Hungary – in their preparations for joining the European Union.

[27] Jeney Nóra: A kutatás-fejlesztés és technológiai innováció helyzete az Európai Unióban és Magyarországon – különös tekintettel a K+F finanszírozására, 2006, p. 90 (MA thesis).

applicants in FP6, which was 1.59% of all the successful applicants. These 1185 researchers were granted 149.765 million euro support by the EU, which was only 0.9% of the total budget of FP6.[28]

Table 3 shows Hungary's performance in the Seventh Framework Programme (FP7). As there are still some running projects that started during the lifetime of FP7, final data is still not available. Such unfinished projects provide an explanation also for the lower numbers in 2013. As Hungary has been a member of the European Union since 2004 it was also automatically a full-right member of FP7.

Table 3. Hungarian and EU participation in the Seventh Framework Programme

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Total**	**Success rate**
Successful participants (Hungary)	307	200	229	202	209	222	131	1500	20.3%
Successful participants (EU)	19242	12412	17592	15174	17493	19031	11454	112398	21.6%
Received funding (Hungary, million euro)	46.6	37.1	40.5	34.8	41	46.1	33	278.9	15%
Received funding (EU, million euro)	5881	4340	5306	4999	5705	6794	4261	37289	19.2%

Source: European Commission: Seventh FP7 Monitoring Report, 2015.

There is a huge difference between Hungarian success rates concerning the number of successful applicants and received budget: while the success rate for applicants is 20.3%, which is slightly below the EU average of 21.6% , Hungary considerably lags behind the EU average (19.2%) concerning received budget with its success rate of 15%. Nevertheless, Hungary has the 16th position on the list of EU Member States both in terms of successful participants and received budget, which can be considered as a good result especially among new Member States; only Poland ranked before Hungary. It is also interesting to note that the funding intensity of proposals has been growing from FP6 to FP7: the average support per project has grown from 126 000 to 186 000 euro.

[28] European Commission: FP6 Final Review. Subscription, Implementation, Participation. Brussels, European Commission, Research Directorate-General 2008, p. 19.

GERD/GDP ratio in Austria has been constantly growing since 2000. The originally high rate of 1.89% has grown to 3.1% until 2015.[29] Although Austria has reached the general Europe 2020 target this way, they were even more ambitious while planning their own national GERD/GDP target: Austria plans to spend 3.76% of its GDP on R&D by 2020[30]. Concerning the ratio between government and industry financed R&D, government expenditure ran to 32% of the GERD while industrial expenditure (including sources from abroad) reached 62%, so Austria has also fulfilled the BERD[31] objective of Europe 2020.[32]

Austria joined the European Union on 1 January 1995, so it has automatically become a member of the Fourth Framework Programme (FP4) starting in 1994. Austria performed well in the framework programmes from the very beginning (see Table 4.), although in FP4 government expenditure has still exceeded obtained EU funds. In FP5 government contribution and received EU funds were in balance. This tendency continued: in FP6 and FP7 obtained EU funds significantly exceeded Austria's financial contribution to the FPs. In FP7 125% of the national contribution was "applied back" by Austrian scientists (see Figure 3.).

Table 4. Austrian participation in the Fourth, Fifth and Sixth Framework Programmes

	FP4	**FP5**	**FP6**
Successful participants (Austrian)	1 923	1 987	1 972
Share of successful Austrian proposals (compared to total)	2.3%	2.4%	2.6%
Number of Austrian coordinators	270	267	213
Share of Austrian coordinators	1.7%	2.8%	3.3%
Received funding (million euro)	194	292	425.2
Share of received funding (compared to total)	1.99%	2.38%	2.56%
Received funding in percentage of Austrian contribution to the FPs	70%	104%	117%

Source: Margit Ehardt-Schmiederer et al.: 6. EU-Rahmenprogramm für Forschung, technologische Entwicklung und Demonstration (2002-2006). PROVISO-Bericht, 2009, p. 47.

In the Seventh Framework Programme Austria performed above the average both in terms of successful participants (Austria: 22.3%, EU average: 21.6%) both in terms of received budget (Austria: 20.9%, EU average: 19.2%). Just like in the case of Hungary funding intensity has been growing: in FP6 the average support per retained proposals was 216 000 euro, in FP7 this amount reached 331 000 euro. As we can see in both cases

[29] OECD S&T indicators.
[30] European Commission: Europe 2020 targets (translated into national targets), 2013.
[31] BERD: Business enterprise R&D expenditure.
[32] Wolfgang Polt et al.: Austrian Research and Technology Report. Vienna, Peter Sachartschenko & Susanne Spreitzer OEG, 2015, p. 3.

the average received funding by Austrian scientists were almost twice as much as the funding available for their Hungarian colleagues.

Table 5. Austrian participation in the Seventh Framework Programme

	2007	2008	2009	2010	2011	2012	2013	Total	Success rate
Successful participants	577	350	546	462	557	542	334	3368	22.3%
Received funding (million euro)	177.4	144.6	164.2	144	179	169.2	116.6	1115	20.9%

Source: European Commission: Seventh FP7 Monitoring Report, 2015

If we compare the participation of Austrian and Hungarian researchers in the Seventh Framework Programme (see Table 6.) we can see the following: although the success rate of applicants is similar (Austria: 22.3%, Hungary: 20.3%), there is a huge difference in the success rate of received funding (Austria: 20.9%, Hungary: 15%). One of the reasons is simple: researchers' salaries are higher in Austria. Another reason might be the much higher inclination of Austrian scientists to take up the role of a project coordinator: three times as many Austrians were project coordinators as Hungarians. And project coordination not only means a larger share of work, but also a larger share of budget.

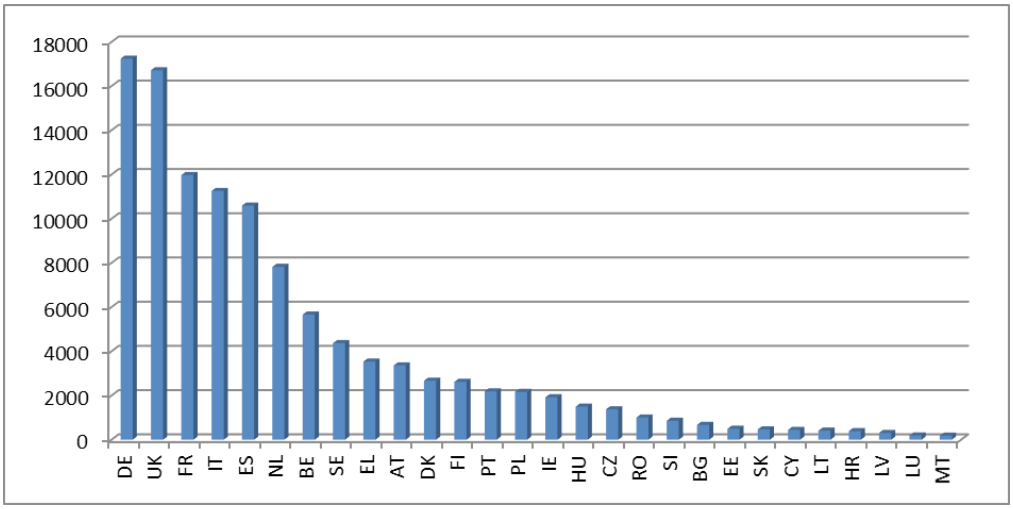
Table 6. Austrian and Hungarian participation in the Seventh Framework Programme

	Austria	Hungary	EU28
Number of applicants	15057	7391	519997
Requested EU contribution (million euro)	5333	1858	194371
Successful applicants	3368	1500	112398
Received funding (million euro)	1115	278.9	37289
Success rate (applicants)	22.3%	20.3%	21.6%
Success rate (funding)	20.9%	15%	19.2%
Number of coordinators	675	207	22473

Source: European Commission: Seventh FP7 Monitoring Report, 2015

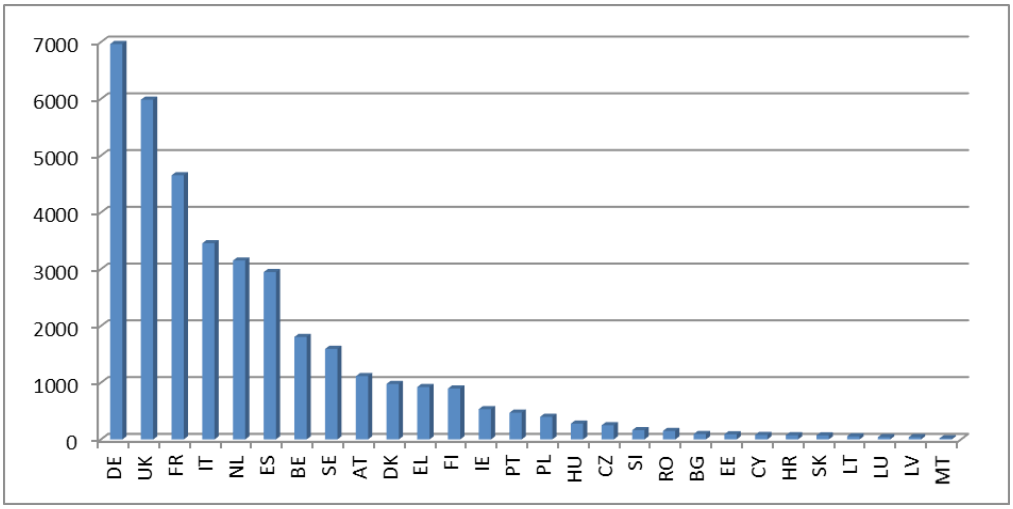
In order to see Austrian and Hungarian results in a wider context, successful applicants and received funding in each Member State are presented in the below figures. It clearly shows that the 15 old Member States performed much better both in terms of successful applicants and in terms of received funding than countries, which joined the EU in or after 2004. There are only old Member States on the first 13/14 places of the ranking lists respectively. The results for new Member States would be even less favourable if we compared the concrete numbers: the most successful old Member States received about twenty times as much funding as Hungary did.

Figure 1. Number of successful applicants in the Seventh Framework Programme



Source: European Commission: Seventh FP7 Monitoring Report, 2015.

Figure 2. Received funding in the Seventh Framework Programme (million euro)



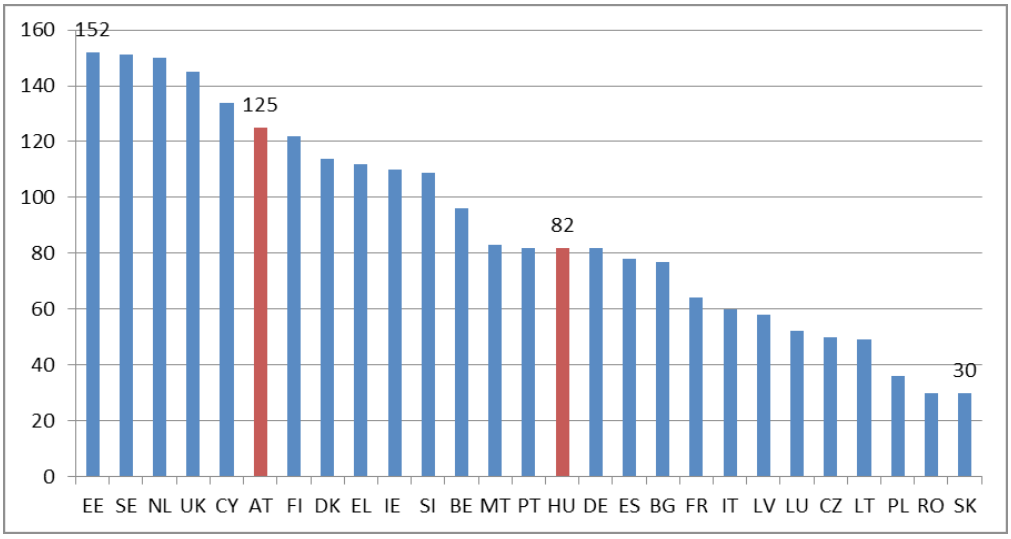
Source: European Commission: Seventh FP7 Monitoring Report, 2015.

Although in absolute numbers Germany, the UK and France are leading the ranking lists in FP7 both in terms of successful applicants and received funding, the result is quite different if we compare received funding with Member States' contributions to

the Framework Programme (see Figure 3.). As we have already mentioned, Austria is a net beneficiary of the framework programmes since 1998 – in FP7 Austrian scientists received 25% more resources than the contribution paid by Austria. Although Hungary received only 82% of its contribution, this data is equal with the – in absolute terms leading – German rate. Surprisingly, a new Member State, Estonia, has the best ratio in this comparison: received funding exceeds national contribution by 50%. Otherwise most of the new Member States lag behind; only Estonia, Cyprus, Slovenia and Malta had better ratios than Hungary.

When analysing this indicator we should take into consideration the large differences in national contributions. Countries with a lower GNI and a lower national contribution might have disproportionately better results, which will automatically change with economic growth, growing GNI and growing national contributions. Considering this remark, the result of Austria, which is already a net contributor of the European Union's budget, is even more remarkable.

Figure 3. Ratio of received funding and national contribution to the Seventh Framework Programme

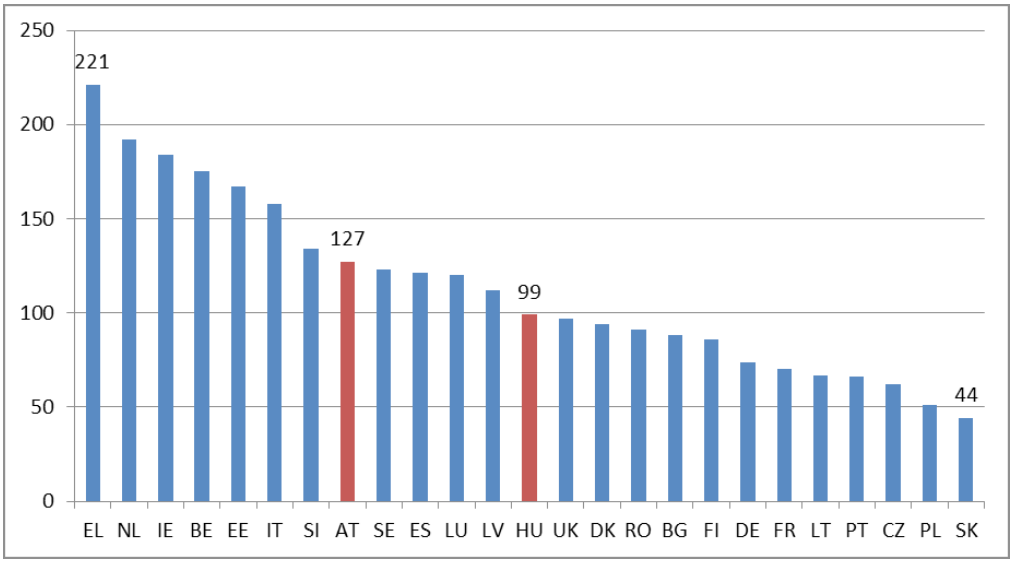


Source: Margit Ehardt-Schmiederer: 7. EU-Rahmenprogramm für Forschung, technologische Entwicklung und Demonstration (2007–2013). PROVISO-Bericht, 2014, p. 58

The ranking list is again different if we compare the number of successful applicants with the number of full-time researchers employed in a given country (see Figure 4.). This latter indicator is calculated as a share of the total number of researchers employed full-time in the European Union, which is considered as 100%. This data shows the

performance of Member States from a different angle, it shows the activity of the research community compared to its size.

Figure 4. Success rates related to the number of researchers (FTE[33]) in the Seventh Framework Programme



Source: Margit Ehardt-Schmiederer: 7. EU-Rahmenprogramm für Forschung, technologische Entwicklung und Demonstration (2007–2013). PROVISO-Bericht, 2014, p. 56, (no data was available for Cyprus and Malta).

Regarding this indicator Austria performs again better than the EU average. Hungary's share in retained proposals is in balance with the number of FTE researchers in the country (99%). When analysing this indicator we have to be aware of the distortion effect of the number of scientists; countries with a high number of scientists (e.g. Scandinavian countries, Germany, France) – which is a positive indicator in itself – might have worse results than countries with a small research community. Except the Baltic countries and Slovenia, new Member States perform below the average also in this regard. It is interesting to see though that Greece, which is far ahead of all the other countries in the ranking, employs 7.49 researchers per thousand total employment, which rate is hardly below the EU average of 7.72.[34] So the success of Greek scientists is definitely a result of their engagement.

Currently available data about Horizon 2020 (H2020) participation of 30 October 2015 can only show us some first results (see Table 7.), which cannot be considered as relevant for the whole lifetime of the programme. Nevertheless, it can already be

[33] FTE: Full Time Equivalent: one FTE is equivalent to one employee working full-time.
[34] OECD S&T Indicators.

seen that competition has grown further compared to previous framework programmes. The number of submitted proposals is constantly increasing, which results in decreasing success rates in each Member State. Generally speaking, success rates are lower by 7-8% than they were in FP7. Hungary performs even worse: compared to the success rate in FP7, which was 20.3%, currently only 10.1% of Hungarian applications are successful, which is below the EU average of 13.8%. Austrian applicants perform above the EU average again – 15.5% of their applications are successful. As we have already seen in the case of previous framework programmes, the difference between Austria and Hungary in received budget is even larger than the difference in successful applicants. One of the reasons might be again the high number of coordinated projects by Austrian scientists.

Table 7. Austrian, Hungarian and EU28 participation in Horizon 2020

	Austria	**Hungary**	**EU28**
Successful applicants	795	255	24987
Received funding (million euro)	320.18	67.54	10879
Success rate (applicants)	15.5%	10.1%	13.8%
Number of coordinators	144	49	5472

Source: Österreichische Forschungsförderungsgesellschaft (FFG) 2015: Österreich in Horizon 2020, Cockpitbericht zum Datenstand 30. Oktober 2015.

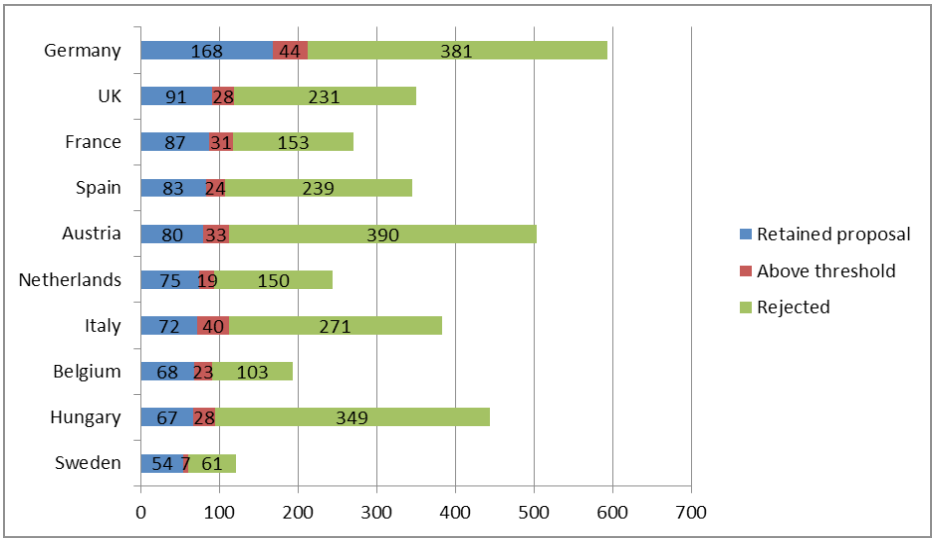
If we only focus on such successful proposals which were submitted by a consortium with joint Austrian-Hungarian participation, Hungarian success rates change significantly. In these joint proposals 67 Hungarian and 80 Austrian scientists took part.[35] In addition to success rates we also wanted to investigate the composition of these consortia.

If we calculate success rates based on the numbers in the above figure, we can see that the Hungarian success rate (15.1%) and the Austrian success rate (15.9%) in jointly submitted proposals are quite similar. Hungarian success rate in such proposals is by 5% higher than in retained H2020 proposals in general. It is also interesting to see that the ten most successful countries in such consortia are all old Member States, where Germany, the UK and France are playing a leading role. As old Member States usually have better results, new Member States have also better chances to win if they join forces with EU15 countries.

While the number of successful Hungarian applicants (67) and Austrian applicants (80) is quite similar, there is a huge difference between the received funds (see Figure 6.). Austrian scientists have received almost three times as much funding as their Hungarian colleagues. Although the ranking is different, there are only old Member States to be found on this list again. All in all we might conclude that even if new Member States are taken on board, they receive a quite limited budget in the consortium.

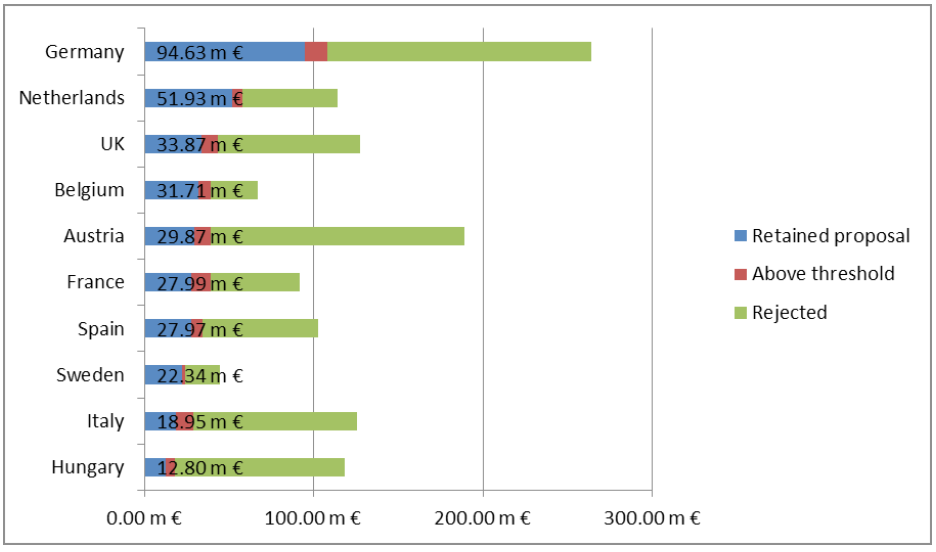
[35] Higher number of Austrian participants can be explained by the fact that there can be more applicants from the same country in the same consortium.

Figure 5. Participating countries in successful consortia with joint Austrian-Hungarian participation (ten most successful countries)



Source: ECORDA database

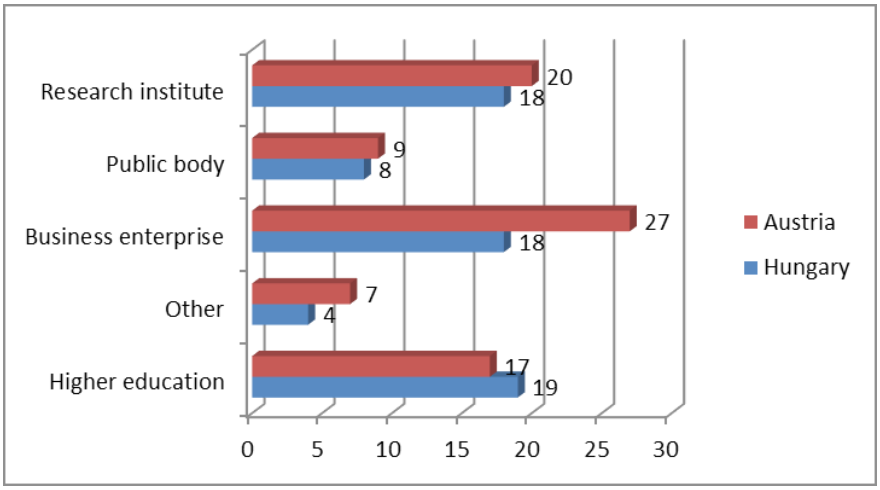
Figure 6. Received funding in successful Austrian-Hungarian project proposals (ten most successful countries)



Source: ECORDA database.

It is worth analysing the type of organisations in jointly submitted retained proposals, too. As Figure 7 shows research institutes, business enterprises and higher education institutes are equally important in Hungary. At the same time business enterprises prevail in the Austrian case. Just like the higher percentage of business funded expenditure on R&D, the different organisational structure also shows the more active role and engagement of Austrian enterprises in conducting research.

Figure 7. Type of organisations in jointly submitted Austrian-Hungarian retained proposals



Source: ECORDA database

Conclusions

Innovation and the application of scientific results are considered to be among the main factors in facilitating sustainable economic growth. No wonder that since their establishment in 1984 the importance of the framework programmes for research and technological development of the European Union has been constantly increasing. Parallel to increasing funding possibilities the competition for these financial resources has been also increasing. After losing the advantage of the benefits of preferential treatment before becoming full-right members, the new Member States of the European Union had to prove their scientific excellence to obtain their share of these highly competitive funds.

Most of the EU15 countries are economically developed countries with high GERD/GDP ratios, long-established scientific organisations, high-quality infrastructures that guarantee scientific excellence. During the years of integration they have learned to closely work together, to build up networks of trust and cooperation. New Member States are often confronted with difficulties when trying to join consortia mainly formed by old Member States. They not only lack the scientific excellence, but also the well-established networks for cooperation.

What are the possibilities for new Member States? How can they improve their performance in the framework programmes? Firstly, it should be highlighted that scientific excellence also exists in these countries. Well-known researchers are able to join or even form scientific consortia without any difficulties. This kind of excellence should be also supported nationally: excellent scientists should be motivated to volunteer for the role of a project coordinator.

One way of motivating excellent, but not successful applicants is a kind of grant provided for scientists with highly evaluated but rejected proposals. Such grants guarantee funding for high quality proposals in any case and can increase the success rates in framework programmes by encouraging a second application after further development of project proposals by national financial resources. There are already such running programmes in various countries; a good example is the Hungarian programme for the support of ERC Starting Grant, Consolidator Grant and Advanced Grant applicants.

Researchers and institutions with less reputation should work on building up their networks and become members of consortia coordinated by more experienced institutions. National governments can support this process not only by providing mobility funds and supporting researchers to join international consortia but also by joining and co-founding ERA-Nets and other European joint programmes, initiatives (e.g. Joint Technology Initiatives, Public-Private Partnerships, Knowledge and Innovation Communities etc.). In addition to scientific matchmaking these initiatives often serve as discussion and proposal-making fora with significant lobby power, which can influence programming and decision making on European level.

Another way of networking could and should be the cooperation on regional level. Single Eastern and Central European countries hardly have the capacity and lobby power to influence European decision making. A critical mass around shared concerns and competencies should be built on regional level. Such an attempt is the strategic partnership of the Visegrád 4 countries, which is occasionally open for further partner countries.

Governments can also facilitate the preparation and successful application of national scientists by a strategic alignment and coordination between national and European programmes. National priorities should be set, national support programmes should be planned in accordance with European priorities and programmes.

As we have seen the real problem is not so much the number of successful applicants, but rather the received funding by these applicants. There are already ongoing negotiations about possible compensation for Member States with much lower wages for scientists. But increasing allowances should be coupled by increasing levels of scientific excellence. Otherwise the inclusion of researchers from new Member States will become even less attractive. Taking up the role of a coordinator is always the best way to receive additional support.

Last but not least, research performing SMEs and large enterprises should play an important role both in investing into science and performing research and development, which should be facilitated by tailor-made government programmes and professional advice.

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