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AIMING HIGH - REVISITED

AN UPDATED ASSESSMENT OF THE 3%-TARGET

Andreas Schibany, Gerhard Streicher

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JOANNEUM RESEARCH Forschungsgesellschaft mbH – Institute of Technology and Regional Policy (InTeReg)

Vienna Office:
Haus der Forschung, Sensengasse 1
A-1090 Vienna, Austria
Phone: +43-1-581 75 20
E-Mail: vie@joanneum.at

Graz Office:
Elisabethstraße 20
A-8010 Graz, Austria
Phone: +43-316-876 1488
E-Mail: intereg@joanneum.at

Aiming high - revisited

An updated assessment of the 3 %-target

By

Andreas Schibany

Joanneum Research, Institute of Technology and Regional Policy
Sensengasse1, 1090 Vienna, Austria
e-mail: andreas.schibany@joanneum.at
tel: +43-1-581 75 20/2823

Gerhard Streicher

Joanneum Research, Institute of Technology and Regional Policy
Sensengasse 1, 1090 Vienna, Austria
e-mail: gerhard.streicher@joanneum.at
tel: +43-1-581 75 20/2814

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Abstract:

In Barcelona, the European Union set ambitious targets for the European Research Area, calling for research expenditures equivalent to 3 % of Europe's GDP by 2010. This paper analyses the implications of these targets, assesses the influence of the member states, and examines the role of the private sector in reaching the targets.

Foreword

This paper is a revised and updated version of a paper written in 2003 as a response to the then-new announcement of the European Union that, as part of the Lisbon-process, the Union-wide R&D intensity would be 3 % of total GDP. In that paper (Schibany and Streicher, 2003), a few thought experiments (some definitely of the "tongue-in-cheek" variety) were described, exploring the implications of this goal in terms of R&D expenditures involved. Even then, the probability of meeting the 3 %-goal in 2010 did not exactly look convincing.

Since then, four years have passed and what then merely looked implausible looks patently absurd now: in these past four years, not only has the EU made virtually no progress in the stated direction, the Union-wide R&D intensity has actually shrunk (albeit only slightly: over all 27 member states, average R&D intensity decreased from 1.76 % in 2002 to 1.74 % in 2005; for the EU15 and EU25 "sub-groups", R&D intensities remained roughly stable). As a result, the growth rates in R&D expenditures which would be required to reach the 3 %-goal in 2010 are large indeed. Besides the question of where all this additional money should come from (and we are talking about a near-doubling of nominal R&D expenditures in 2010 as compared with 2006), the main problem would certainly be where it should be spent – current R&D structures are most certainly not able to efficiently absorb such a large influx of extra money in such a short a time span [1]. All this, however, does not keep the Commission from still clinging to this goal: '*The European Council reiterates the importance of spending 3 % of GDP on research and development by 2010*'.[2] This provides the rationale for the following analysis.

Introduction

It is a well-known fact that research and development (R&D) is an important factor in long-term economic growth and productivity (OECD 2001). While the importance and the positive effect on welfare have been asserted by several studies for some time, R&D was never fully incorporated into mainstream economic policy. It therefore would have been unimaginable in the 1980s for a report on R&D and innovation to be discussed and agreed by EU economic and finance ministers at the ECOFIN (EPC 2002). This agreement is an unmistakable indication that the public and political awareness of the important role of R&D has changed considerably in the 1990s.

The evidence of this new interest in science and technology at the European level lies in the various benchmarking, scoreboards or trendchart activities where – among others - numerous indicators and statistics are collected and/or correlated to composite indices. Such reports are booming and their authors are not tiring to stress the fact that these indicators are only one contribution for more important comparative and strategic policy analyses. The question arises, however, whether the desire for quantification, accountability and comparability is a useful policy guidance tool (see Schibany et al. 2007).

The EU summits (Lisbon and Barcelona) at the beginning of this decade have shown two interesting results: first, the new interest of policy makers in science and technology as substantial contributors to the competitiveness of industries; second, the definition of a policy target expressed as a quantifiable input measure. One of the most popular indicators is the R&D intensity of a country, as measured by the amount of R&D it performs divided by its GDP. This indicator has well-known weaknesses, chief among them the fact that it measures only inputs[3] and not the results of R&D. However, R&D expen-

[1] The easiest and surest option would be a doubling of the wages of European scientists and researchers – a policy of which the authors are much in favour.
[2] European Council 8./9. March 2007. Presidency Conclusions.
[3] What is more, it measures inputs on a high level of aggregation

diture is a quantifiable entity that has been widely used in OECD countries. Furthermore, econometric studies have demonstrated a quantifiable (cor)relation with economic growth, providing further justification for efforts to improve economic performance by boosting R&D spending (Guellec 2000).

At their annual summit in Barcelona in March 2002, the European Council adopted the goal of raising the R&D intensity of the EU to a level of 3 % of GDP by 2010, thus setting a quantifiable target. Additionally, in 2010 two thirds of research expenditure should be financed by the private sector. This objective has received considerable attention and gained high visibility. The 3 % target represents an important measure for the realisation of the European Research Area (ERA) and implies several consequences in terms of structural policy reforms. So far, few questions have been asked about the financial implications of achieving these targets. Some of them will be explored in this paper.

- How much additional R&D spending is needed for the achievement of the target? What are the possible effects of the new member countries on the target's attainability?
- How realistic is the achievement of the targets in the context of the development of R&D spending within the last decade?
- What are specific patterns of R&D expenditure which make the target more or less attainable?

A brief history of the 3 % target

After nearly twenty years of *cohabitation* between Community RTDI policy and respective national policies[4], a broad policy debate on a more common rationale in this policy field emerged. The basic arguments of the debate are by no means new, especially in light of the rationale behind the Framework Programmes, which were introduced in the 1980s. The initiative for the European Research Area (ERA), too, was based on a broad comparison of Europe with its main competitors USA and Japan on the basis of some well-known indicators. The European Commission detected 'structural weaknesses' (COM 2000b) leading to a 'negative picture' (COM 2000a) in the field of research and scientific development. This alarming trend 'could lead to a loss of growth and competitiveness in an increasingly global economy' whereby the 'leeway to be made up on the other technological powers in the world will grow still further' (COM 2000a).

Against this background the European Commission proposed the creation of a European Research Area in January 2000. And in March 2000 at the Lisbon European Council, the Heads of State and Government set an ambitious goal for the Union: to become 'the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion' by 2010. Creating the European Research Area is one of the key steps in the Union's path towards achieving that objective. Concerning the question of how to reach the goal the European Council, two years later, found an answer at the summit in Barcelona in March 2002. The Heads of State and Government agreed on the following goals:

- R&D investment in the EU must be increased with the aim of approaching 3 % of GDP by 2010, up from 1.9 % in 2000.
- They also called for an increase of the level of business funding: two-thirds of this R&D-investment should come from the private sector (European Council 2002).

The European Commission states that these twin objectives 'are ambitious but realistic' (COM 2002a). The comparison with the other big economic blocks constitutes the main criterion for the objectives set

[4] See Stampfer, M. (2003)

at Barcelona in order to close the gap in R&D investment between the EU and US. Strengthening the R&D and innovation systems is thus essential in reaching the Lisbon strategic goals.

The 3 % target defined at Barcelona resulted in several action plans, sets of actions and green papers aimed at increasing the level of research investment in Europe. Moreover, since 2003 the 3 %-target has had a mobilizing effect on the EU member states. Nearly all have set their own research investment targets, hoping that their combined effect will bring R&D investment in Europe nearer to the level of the U.S.

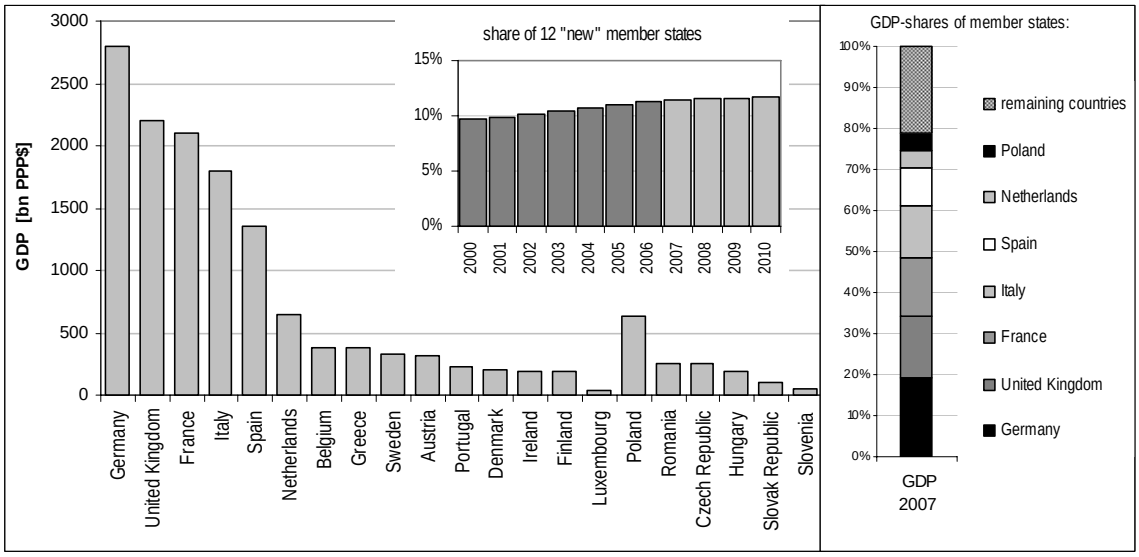
However, the development of the last years has shown that the Barcelona targets were not based on realistic expectations of the attainability of the 3 % R&D intensity at the European level. Although some member countries exhibit impressive growth in their R&D expenditures, the situation at the European level is disappointing. What are the reasons for this?

Some considerations about GDP growth rates until 2010

The EU is quite a heterogeneous entity: it includes old member countries as well as new member countries with quite different growth rates. And as far as European-wide targets are concerned, it is very important to mention that it consists of (very) big and (very) small countries. The following calculations are based on assumptions about GDP growth rates of 1.5 % p.a. for the 'old member states' (EU-15) and 3.5 % for the new member countries[5].

Figure 1 shows, under these assumptions, the status quo in 2007 and forecasts for 2010 of the EU-27

Figure 1: GDP of the EU27, 2007



Source: OECD; own calculations.

Under these assumptions, the share of the new member states in the EU-19-GDP will increase slightly in 2010, to still below 12 % (up from below 10 % in 2000). Only three countries account for almost half of the EU-GDP and the biggest 6 countries cover almost three fourths of it: Germany, UK, France, Italy, Spain and the Netherlands. It is thus obvious that the big countries have a large influence on every number reflecting EU averages - and hence the average R&D intensity of the EU. The develop-

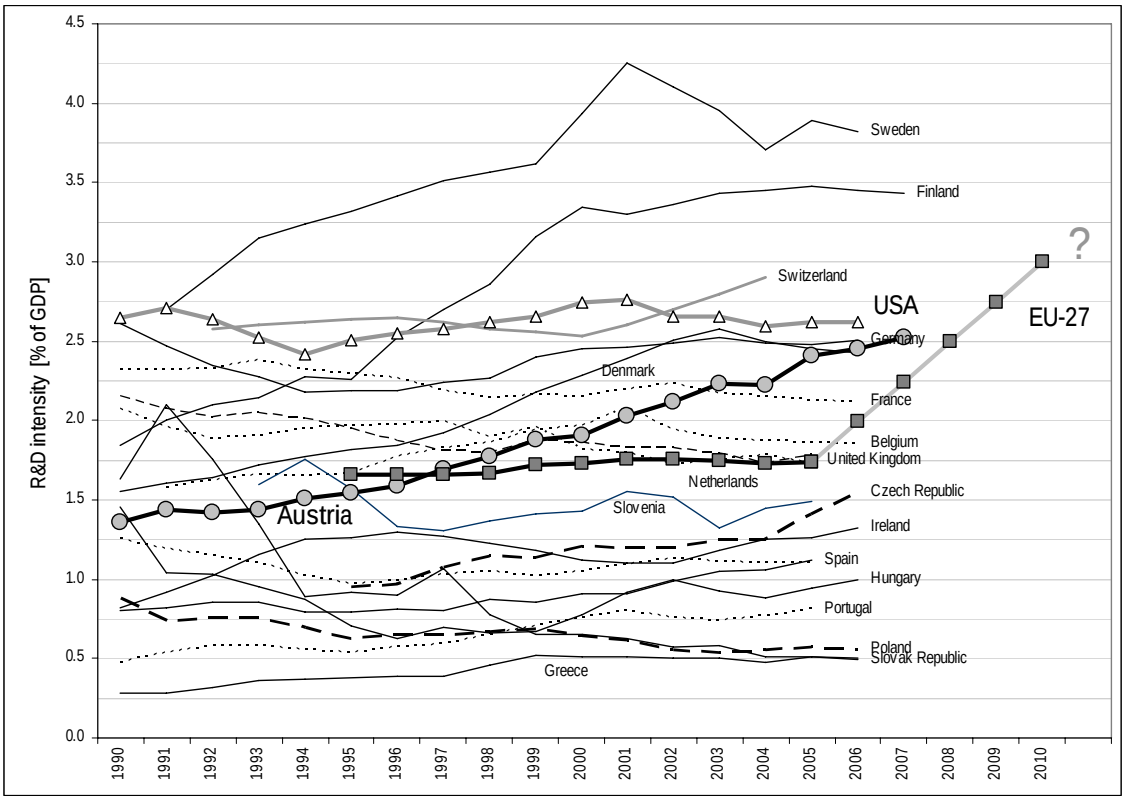
[5] These rates are pure guesswork; even markedly different rates, however, would only marginally influence the probability of the EU reaching the 3 % goal in 2010.

ment of R&D expenditures and the scenarios for its increase will be worked out in the following section.

R&D Expenditures

The following Figure 2 depicts Gross Expenditure on R&D (GERD) as a percentage of GDP for the period 1990 to the most recent year for which data are available.

Figure 2: R&D expenditure as percentage of GDP; 1990 - latest



Source: OECD MSTI, own calculations

Figure 2 shows quite clearly that the R&D share of the EU27 (1.74) is below the level of the USA (as well as far below the 3 % target) and has not changed substantially during the last decade. This is mainly due to the stagnant nature of the R&D intensity of some of the big countries. Except Germany (2.48) and France (2.13), big countries such as Italy (1.1), Spain (1.10), the Netherlands (1.73) and Poland (0.57) [6] exhibit below-average R&D shares. Sweden and Finland on the other hand show a very high R&D-intensity, although the trend over the last year is rather stable (as in the US over the last decades). R&D expenditures are - like other types of investment - subject to the law of diminishing returns. However, a select group of (unfortunately mostly small) countries (Austria, Czech Republic, Finland, Portugal and Spain) saw increases of about 50 % in their R&D intensities; most countries – among them most large countries - however, exhibited flat R&D shares with only minor increases or even decreases.

The recent (2005) R&D intensity of the EU27 is thus 1.74 % (EU15: 1.87%). By the end of the decade, the Barcelona target calls for an R&D intensity of 3 %. How can the target be achieved? It is obvious that the new member countries will not help: their current R&D intensities are below the EU-average.

[6] all countries in 2005

At the same time, due to the small share in GDP, their negative effect on the overall R&D intensity will be minor.[7]

But even for the EU-15, an extrapolation of the trend in R&D intensities emphasizes the need for an increased R&D spending in order to meet the proposed target of 3 %.

Table 1: Extrapolation of the R&D intensities 2010

	rGDP 2010 (est'd)	R&D intensity [%]		
	[Bn 2007-PPP$]	2006 (2005 *)	2010 LT	2010 ST
Austria	333	2.45	2.8	2.9
Belgium	403	1.85	2.0	1.8
Czech Republic	274	1.54	1.6	2.1
Denmark	215	2.43	2.9	2.3
Finland	193	3.45	4.1	3.5
France	2 198	2.12	2.1	2.1
Germany	2 929	2.51	2.7	2.5
Greece	392	0.50	0.6	0.5
Hungary	217	1.00	1.1	1.2
Ireland	196	1.32	1.2	1.5
Italy *	1 885	1.10	1.2	1.1
Luxembourg *	40	1.61	1.6	1.4
Netherlands *	721	1.73	1.6	1.5
Poland	658	0.56	0.5	0.6
Portugal *	242	0.81	1.0	1.0
Romania	278	0.46	0.2	0.6
Slovak Republic	117	0.49	0.2	0.5
Slovenia *	57	1.49	1.5	1.7
Spain *	1 418	1.12	1.3	1.4
Sweden	345	3.82	4.3	4.1
United Kingdom *	2,297	1.78	1.7	2.0
EU-27 *	15,706	1.74	1.8	1.8

Source: OECD; own calculations.

The column '2010 LT' reports the R&D intensities for 2010 based on the long-term trend since 1995, and the column '2010 ST' shows the R&D intensity for 2010 based on the trend of the latest three available years[8]. According to the long-term trend, the EU would approach an R&D intensity of 1.8 % in 2010, which would constitute a virtual stand-still at the level of 2006. The short-term trend corroborates this disappointing result – the 1.8 % in the year 2010 would imply a 40 % shortfall as compared with the official target of 3 %.

It should be clear from these simple calculations that the EU would have to markedly increase its R&D intensity in order to meet the target. How much additional R&D spending does the target imply? What is the estimated growth in R&D spending needed to meet the proposed EU target in 2010? To answer these questions, two scenarios were calculated, which will be presented in the following section.

Scenarios for the 3 % Target

The scenario which is easiest to calculate is based on the assumption that in 2010, all members of the EU should have an R&D intensity of 3 %. Table 2 shows the implications of this assumption for the EU-20 due to data availability.

[7] Despite markedly lower research intensities (the 2001-average for the 5 new members is 0.87 %, against 1.88 % for the EU-14).
[8] R&D data for 2006 are not available for all countries; in the table, these countries are marked with an asterisk (*).

Table 2: Scenario 1: uniform R&D intensity of 3 %

	R&D intensity 2006 (2005 *) [%]	R&D intensity 2010 [%]	[2006=100]	R&D expenditures [real, 2006=100]	increase [% p.a.]
Austria	2.45	3.00	122	130	6.8
Belgium	1.85	3.00	162	172	14.5
Czech Republic	1.54	3.00	195	224	22.3
Denmark	2.43	3.00	123	131	7.0
Finland	3.45	3.00	87	92	-2.0
France	2.12	3.00	142	150	10.7
Germany	2.51	3.00	120	127	6.1
Greece	0.50	3.00	600	637	58.9
Hungary	1.00	3.00	300	344	36.2
Ireland	1.32	3.00	227	241	24.6
Italy *	1.10	3.00	273	289	30.4
Netherlands *	1.73	3.00	173	184	16.5
Poland	0.56	3.00	536	615	57.5
Portugal *	0.81	3.00	370	393	40.8
Romania	0.46	3.00	652	748	65.4
Slovak Republic	0.49	3.00	612	703	62.8
Slovenia *	1.49	3.00	201	231	23.3
Spain *	1.12	3.00	268	284	29.8
Sweden	3.82	3.00	79	83	-4.5
United Kingdom *	1.78	3.00	169	179	15.6
EU-27 *	1.74	3.00	172	183	16.3

Source: OECD; own calculations.

The column 'R&D Intensity 2010' shows the necessary increase of the R&D intensity in relation to the value of 2006[9] in order to achieve the target. Thus, Austria needs an increase in its R&D intensity of 22 % from its current level of 2.45 % to the target level of 3 %. Finland and Sweden are already above target, all other countries would have to raise their R&D intensities – some countries more than sixfold. In the aggregate, a 72 % increase in research intensity would be necessary.

Additionally, by 2010, the reference value for the R&D intensity, Gross Domestic Product, will have grown[10]: this implies that R&D *expenditures* will have to grow by more than the R&D *intensities*; on average, they would nearly have to double (more precisely, they would have to grow by 83 % in real terms, from 245 to 450 billion 2007-$). In the case of Romania and the Slovak Republic, R&D expenditures would have to rise more than sevenfold – that means that these two countries would have to raise their real expenditures on R&D by more than 60 % per year until 2010. For the EU-27 as a whole, an annual increase of 16 % is called for – almost 10 times the assumed rate for GDP growth of 1.8 %[11].

The second scenario assumes that all countries raise their R&D intensities by the same proportion. Table 3 shows the results of this scenario.

[9] Or latest year available.
[10] According to the authors' assumption, in real terms by 1.5 % and 3.5 % annually for the old and new members of the EU-27, respectively.
[11] The assumed 1.5 % for old and 3.5 % for new EU member states imply average GDP growth rates of 1.8 %.

Table 3: Scenario 2: proportional increase

	R&D intensity 2006 (2005 *) [%]	R&D intensity 2010 [%]	[2006=100]	R&D expenditures [real, 2006=100]	increase [% p.a.]
Austria	2.45	4.22	172	183	16.3
Belgium	1.85	3.19	172	183	16.3
Czech Republic	1.54	2.66	172	198	18.6
Denmark	2.43	4.19	172	183	16.3
Finland	3.45	5.95	172	183	16.3
France	2.12	3.66	172	183	16.3
Germany	2.51	4.33	172	183	16.3
Greece	0.50	0.86	172	183	16.3
Hungary	1.00	1.72	172	198	18.6
Ireland	1.32	2.28	172	183	16.3
Italy *	1.10	1.90	172	183	16.3
Netherlands *	1.73	2.98	172	183	16.3
Poland	0.56	0.97	172	198	18.6
Portugal *	0.81	1.40	172	183	16.3
Romania	0.46	0.79	172	198	18.6
Slovak Republic	0.49	0.84	172	198	18.6
Slovenia *	1.49	2.57	172	198	18.6
Spain *	1.12	1.93	172	183	16.3
Sweden	3.82	6.59	172	183	16.3
United Kingdom	1.78	3.07	172	183	16.3
EU-27 *	1.74	3.00	172	183	16.3

Source: OECD; own calculations.

Uniformly, the R&D intensity would have to be raised by 72 %. Due to higher GDP growth rates, for the new members this means an annual 19 % increase in research expenditures until 2010, to almost 200 % of current spending levels. For the old members, until 2010 an annual increase of 16 % to 183 % of 2006's level would be necessary.

The following Table 4 demonstrates the importance of the big countries in achieving EU-wide targets: in essence, GDP-based average numbers for the entire EU - and the Barcelona targets are formulated as such - depend crucially on just a handful of countries, foremost Germany, United Kingdom, France, Italy and Spain.

Table 4: The role of the big countries (and Austria)

	remaining EU 27				
	R&D intensity 2006	R&D intensity 2010		R&D expenditures	
constant R&D intensity for: (R&D intensity in 2006)	[%]	[2006=100]	[%]	2006=100	[%.pa.]
Germany (2.51)	1.56	192	3.15	214	21
Germany (2.51), UK (1.78), France (2.12)	1.35	223	3.88	306	32
Germany (2.51), UK (1.78), France (2.12), Italy (1.10), Spain (1.12)	1.51	199	5.84	410	42
Austria (2.45)	1.72	174	3.02	186	17

Source: OECD; own calculations

In 2006, Germany produced about a fifth of the EU's output and had an R&D intensity of 2.51 %. Without Germany, the remaining EU-27 had an R&D intensity of 1.56 % (appreciably below its actual value of 1.74 %). Thus, in 2010, should Germany's R&D intensity remain at the level of 2006, the remaining member countries would have to compensate with R&D expenditures averaging 3.15 % of their combined GDP, implying annual increases in R&D expenditures of 21 % a year until 2010.

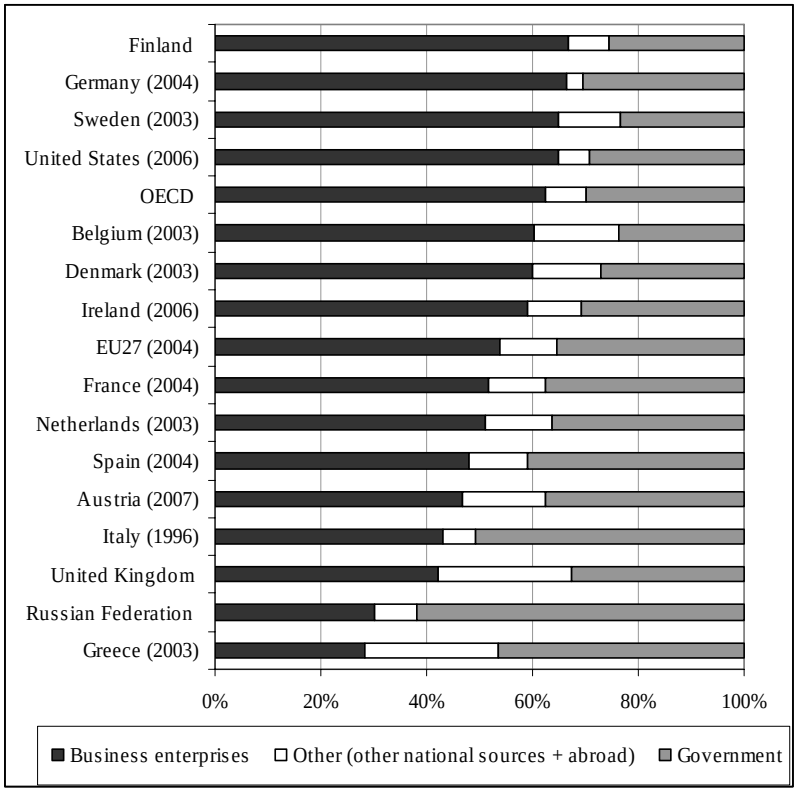
Germany, United Kingdom and France together account for almost half of EU output; a stagnation in R&D intensity for those three would have to be compensated by the rest of the EU countries with average annual research expenditure growth of 32 % to a level of almost 3.9 % of GDP by 2010. Theses values would rise to 42 % per year and a level of close to 6 %, if in addition, Italy and Spain joined the stagnation group (Italy and Spain are perceptibly smaller economies than the 'big three', but their current R&D intensities, at around 1 %, are severely below the big three's 1.9 – 2.5 %)

A small country like Austria, on the other hand, exerts almost no influence on the Union's average (especially as Austria is not that far off target): a tiny rise in the other countries' average R&D intensities from 3.0 to 3.02 % would suffice to make up for Austria's failure to contribute its share.

R&D financing and performance

Apart from the level for R&D intensity of 3 %, the Barcelona accord set a goal for the composition of research funding. This second target called for an increase of industry's share in R&D funding which should rise from its current level of 54 % to two-thirds of the total R&D investment (COM 2002a). The following Figure depicts the structure of R&D financing.

Figure 3: R&D expenditure by source of financing, 2005

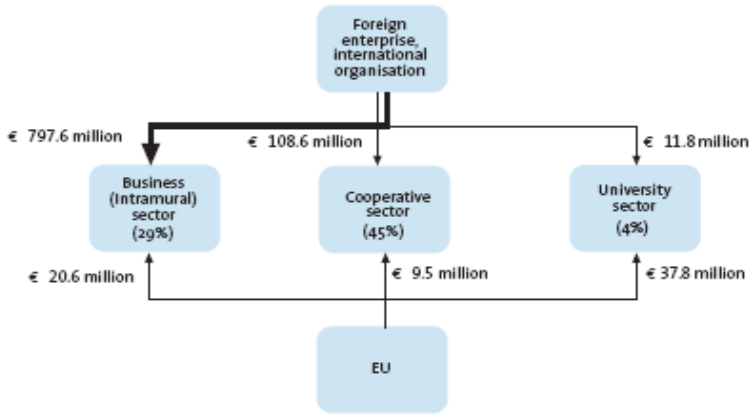


Source: OECD: Science, Technology and Industry Scoreboard 2007

According to the latest figures, the business sector continues to be the major source of financing domestic R&D, although its role in R&D funding differs sharply across the main OECD regions. It funds 65 % in the United States, but only 54 % in the European Union. And since 2000, the share of business funding of R&D has decreased in the United States and remained stable in the EU. In Austria 'only' 46,7 % of the R&D expenditure is financed by the business sector.

However, the meaning of the category 'abroad' is highly unclear in this context. As Figure 3 shows, foreign funding of R&D is an important source of funding in many countries which is an indicator for the ongoing internationalization of R&D. Some countries (Belgium, Denmark and the Netherlands) receive more than 10 % of their R&D funding from abroad. Austria, Greece and the United Kingdom receive about 15 % from abroad. However, this category seems highly questionable for measuring the funding of R&D on an institutional level, which is the target of the second Barcelona target. Who are the foreigners who pay the bill for 15 % of Austrian research?

Figure 4: Foreign financing of R&D in Austria, 2002



Note: The percentages given indicate foreign financing as a proportion of the sector's overall R&D expenditure.
Source: Austrian Research and Technology Report 2006,

In 2002, almost 920 mill. € came from foreign enterprises and international organization and went to enterprises pursuing R&D in Austria (798 mill. €) and another 109 mill. € to the corporative sector[12]. An additional 68 mill. € are the returns form the EU Framework Programme which is thus only a small part of all foreign funds. In other words: it is the share of *domestic* firms which finances 47 % of total R&D expenditures. The share of industry in an institutional sense is much higher and includes most of the funding from abroad. As by far the biggest share of foreign funds is attributable to the business sector, this share increases to 63 % (46,7 % from the business sector + 15,9 from abroad). For the EU, the respective value is (54,0 + 10,6) = 64,6 % in 2004.

The 67 % share of industry is thus already reality (or nearly so) – at the institutional level of industry, if not for the share of *domestic industry*, which the Commission, in formulating this target, has obviously had in mind, as it explicitly mentioned the low level of industry R&D funding. In the light of another EU target - the *Ever Closer Union* - a distinction between foreign and domestic firms seems a bit anachronistic.

Beside the industrial sector, foreign funds gained in importance for some countries. The growing importance of foreign sources of R&D financing in countries such as Austria or the Netherlands is primarily borne by big, multinational firms. It presumably points to comparative advantages if such multinationals decide to perform or commission research abroad. On the other hand, foreign companies can only to a small degree be influenced by national research targets, even less so than domestic firms.

[12] The cooperative sector includes those extra-university reserch facilities that are organised as businesses (such as the Austrian Research Centres, Joanneum Research, the members of the Verband der kooperativen Forschungseinrichtungen der österreichischen Wirtschaft or the K-plus centres).

Especially in view of the growing importance of international (or European) companies does it seem particularly imperative to understand and define the industrial sector in its institutional form – as opposed to its geographic setting. A distinction between *domestic* and *foreign* industry should therefore, and especially in the view of the European Commission, be regarded as obsolete – or at least be redefined with regard to the European Union.

Besides the distinction between domestic and foreign firms, another pattern of industrial R&D makes the second Barcelona target rather unrealistic: the disregard for basic facts. Namely the fact that R&D investment is highly concentrated in relatively few companies in the EU as well as non-EU countries. According to the latest R&D investment Scoreboard (European Commission 2007), the 2000 companies listed in the Scoreboard account for about 80 % of worldwide business enterprise expenditure on R&D (BERD). The 1000 EU companies invested 121 billion € and the Non-EU 1000 companies invested 251 billion € in 2006. However, the interesting fact is that the top 50 companies accounted for 70 % of total R&D expenditure in the EU and for 53 % in the non-EU area.

Table 5: Cumulative share of the top R&D investors, 2006

	EU-1000	Non-EU 1000
top 5	19,8	10,9
top 10	33,3	19,9
top 25	55,6	37,6
top 50	69,1	52,5
top 100	80	66
top 250	91,2	82
Total investment	121	251

Source: European R&D Scoreboard (EC 2007); own calculation

Some European countries exhibit an even higher degree of concentration within the business sector. In Finland the steep rise in research intensity was financed almost entirely by industry. Within the industrial sector, however, it is essentially one company which is responsible for this development: in 2006, 70 % of the Finnish business expenditure on R&D can be attributed to Nokia. Similarly, a high degree of concentration on just a few companies can be found in Sweden as well. In Austria, 30 companies cover about 60 % of all business R&D expenditures (the 10 biggest companies are responsible for 43 %) (Schibany et al. 2005). Although impressive, the high concentration of research activities on just a few companies certainly entails considerable kinds of risk.

Concluding remarks

The present paper aimed at shedding some light on the implications, financial and otherwise, of the Barcelona Targets; when the first version of this paper was written, in 2003, these targets seemed elusive, though not outright impossible. However, during the intervening four or five years, virtually no progress has been made towards these goals: on present trends the target of 3 % for the EU's R&D intensity in 2010 will be missed by an even wider margin than was reckoned in 2003.

At the same time, the paper tried to highlight the difficulties associated with quantitative targets for the European Union as a whole; it is a group of just three countries, Germany, United Kingdom and France, which produce half the EU output, a share which increases to 75 % when additionally, Italy and Spain are taken into account; therefore, they 'make or break' any EU-wide target. Small countries such as Austria, on the other hand, exert almost no influence – which is a pity as it is almost exclusively small countries which have made some progress towards the 3 % goal.

Therefore, it might make sense not to wholly disregard the national level in setting R&D targets – especially as, by taking into account existing structural peculiarities, the attainability of national targets could more easily be ensured.

When policy makers decide that the business sector should bear additional investments in R&D it can at best take the form of an appeal. The private sector consists of individual enterprises and every single enterprise will invest in additional R&D if and only if the expected returns on this investment exceed costs. It can therefore be safely assumed that this kind of business decisions depends on many endogenous and exogenous factors, among them changes in demand for firms' output, sector specific developments, etc. Only to a small degree does it depend on agreements of the European Council or the wishes of the European Commission. Good intentions of policy makers can therefore easily turn out non-effective. Beside 'getting the fundamentals right', policy does have an important role in creating adequate framework conditions to foster innovation-led growth.

The European Union has quite an impressive ability to achieve 'impossible aims'– one only has to think of the Monetary Union or the enlargement of the Union. However, these were basically *political* targets. On the other hand, the record in the implementation of *structural* reforms is somewhat less impressive – witness the quarrel over the Common Agricultural Policy. The 3 % target set at the Barcelona European Council in 2002 is essentially about structural measures – and in light of the scenarios presented in this paper, the attainability of this target seems rather doubtful.

References

EPC (2002),'Report on Research and Development', Economic Policy Committee, Working Group on Research and Development, EPC/ECFIN/01/777-EN Final.

European Commission (2000a), 'Towards a European research area'; COM (2000) 6.

European Commission (2000b), 'Making reality of The European Research Area: Guidelines for EU research activities' (2002-2006); COM (2000) 612 final.

European Commission (2002a), 'More Research for Europe. Towards 3 % of GDP'; COM (2002) 499 final.

European Commission (2002b), 'The European Research Area: Providing New Momentum, Strengtheining – Reorienting – Opening up new perspectives'; COM (2002)565.

European Commission (2007), 'The 2007 EU industrial R&D investment Scoreboard', Luxembourg 2007.

European Council (2002), 'Presidency Conclusions'; Barcelona European Council. 15 and 16 March 2002.

Guellec, Dominique (2000), 'R&D and productivity growth: a panel data analysis of 16 OECD countries', DSTI/EAS/STP/NESTI(2000)40, OECD, Paris.

OECD (2001), 'The new economy beyond the hype. The OECD Growth Project', Paris.

OECD (2002a), 'Targeting R&D', DSTI/STP/TIP(2002)16, Paris.

OECD (2002b), 'Science, Technology and Industry Outlook 2002', Paris.

OECD (2007), 'Main Science and Technology Indicators', Paris

Schibany, A., G. Streicher (2003), Aiming High - An Assessment of the Barcelona Targets; *InTeReg Working Paper No. 06-2003;* February 2003

Schibany, A., L. Jörg, B. Nones (2005), 'Instrumente der Technologieförderung und ihr Mix', *InTeReg Research Report Nr. 37-2005,* Joanneum Research and Technopolis, Vienna.

Schibany, A., G. Streicher, H. Gassler (2007), ‚Der European Innovation Scoreboard: Vom Nutzen und Nachteil indikatorgeleiteter Länderrankings', *InTeReg Research Report Nr. 65-2007*, Joanneum Research, Vienna.

Stampfer, Michael (2003), 'European Research Area: New Roles for National and European RTDI Funding Programmes?'; in: Edler, J., S. Kuhlmann, M. Behrens (Eds.), *Changing Governance of Research and Technology Policy: The 'European Research Area*'; Edward Elgar, Cheltenham.

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JOANNEUM RESEARCH Forschungsgesellschaft mbH – Institute of Technology and Regional Policy (InTeReg)

Vienna Office:
Haus der Forschung, Sensengasse 1
A-1090 Vienna, Austria
Phone: +43-1-581 75 20
E-Mail: vie@joanneum.at

Graz Office:
Elisabethstraße 20
A-8010 Graz, Austria
Phone: +43-316-876 1488
E-Mail: intereg@joanneum.at