involved.[6] Yet, there is no such thing as an automatism for a positive trend; in these new global settings, Germany can only reach or maintain a competitive edge if its innovation system continually generates new knowledge and flexibly adopts fresh impetus while transforming it into innovation on the market.

The German industries that perform best in terms of exports are those that are innovative and research-intensive.[7] In the view of the Expert Commission, national R&D intensity is not a perfect means of measuring an economy's knowledge intensity; it is however a useful means. From an academic point of view, there is no reason for questioning the indicator of R&D expenditures as an important benchmark for policy, and this is in spite of remarkable innovations in sectors with a low R&D intensity. Hence, the three-percent target for 2015 and a new target for the consecutive years can be significant milestones for assessing Germany's political and economic performance.

A 2 ENHANCING INNOVATION AND PRODUCTIVITY IN ALL EU MEMBER STATES

The current debt crisis clearly illustrates that the member states of the European Union display extremely divergent levels of economic power. The EU member states as a whole are less productive than the US federal states, and the productivity level of the EU-27 currently lies at less than 80 percent of the United States' productivity level. Compared with the US, the EU member states are also much more heterogeneous than the US states.[8] The EU is faced with significant challenges, which, in the medium term, cannot be overcome on the basis of monetary and fiscal measures alone.

The last few decades have been characterised by a convergence process between Europe and the United States. Since the 1990s, this process has slowed down and has at least partially reversed. Back in the 1970s, the productivity level of the continental European countries was still 30 percent lower than that of the US. In the years that followed, they managed to continuously narrow this gap, and in the mid-1990s they even surpassed the United States in productivity. Since then, productivity growth in Europe has slowed down again, with a current productivity level falling behind that of the US by 10 percent. While the Scandinavian countries underwent a comparable development, the Southern European countries also narrowed the gap but experienced another significant downturn in productivity from the mid-1990s. Today, the productivity level of these countries amounts to a mere two thirds of the productivity level of the US. Finally, the new EU member states, starting at a relatively low level in the early 1990s, managed to improve their performance and currently have a productivity level that amounts to a good 40 percent of the US' productivity level.[9]

Above all, the disparity in economic strength between individual EU member states is of particular concern since it proves to be a very persistent pattern. In 1975, the European Union established its European Regional Development Fund, and 1994 saw the launch of the Cohesion Fund for the promotion of structurally weak regions ("convergence regions"). In spite of considerable funding allocations of more than EUR 800 billion since 1994, income disparities between member states – an additional means of measuring differences in productivity – have not significantly decreased in the course of the last 15 years.[10] A commonly used measure for assessing income heterogeneity has shown that the EU-27 countries display three times the value than that of the United States. For Europe and the US alike, heterogeneity[11] within the respective region has remained largely unchanged over the last 15 years. In short, Europe as a whole did not manage to catch up with the US, and neither did it succeed in sustainably reducing inner-European differences in economic development.

This heterogeneous pattern is also reflected in the innovation-related activities of the individual countries. The EU aims at an R&D intensity of 3 percent of GDP for each member state, with the aim of increasing the innovative power of the EU as a whole. Two thirds of this is due to be financed by the private sector and one third by the public sector. Currently the average R&D expenditures within the EU are below 2 percent. This average however covers up vast disparities in terms of individual R&D efforts: thus the Scandinavian countries, Germany and Austria are leading with more

than 3 percent and slightly less than 3 percent respectively. These are followed by France, Slovenia, Belgium, the Netherlands, Ireland, Great Britain, Luxembourg and Estonia, with slightly over 2 percent on average. With an average of 1 percent, the Southern and Eastern European countries can be considered mildly innovative, while Lithuania, Poland, Malta, Slovakia, Bulgaria, Latvia, Cyprus and Romania are at the bottom of the innovation list with less than 1 percent.[12] This means that, on average, Southern and Eastern European countries invest less than half of what the leading R&D countries invest. A similar trend can be observed when comparing the number of researchers and R&D personnel, or the number of patent applications.[13]

Effectively, on an EU average, one third of R&D expenditures are covered by public funding, and two thirds are covered by the private sector, as specified in the objective. It is striking however that the countries with the highest R&D proportion of GDP in fact finance the smallest part via public funds. In the Scandinavian countries and Germany for instance, the proportion of publicly funded R&D expenditures amounts to a good quarter.[14] A particularly high proportion of public funding however can be found in countries that display very low R&D figures – among them the new member states and Greece; countries in which public R&D expenditures make up a good half and even more of the overall R&D expenditures. This goes to show that these countries have deficits particularly in the field of private R&D investments. Those few private investments that can be observed are largely attributable to multinational foreign enterprises. Notably in the new member states, multinational corporations are, on average, responsible for 50 percent of private R&D expenditure.[15] Against this background, it is hardly surprising that the new member states are characterised by a significant productivity gap between foreign-owned companies and private domestic businesses.[16]

In the current situation, currency adjustments as a means of increasing international competitiveness of the less productive European countries are not a given option anymore. Therefore, the focus should be increasingly placed on non-monetary measures that aim at improving productivity.[17] These measures however will have to be enforced in the very countries that are at the low end of the productivity scale. So far, European policy-makers have failed in addressing this issue. In the Southern European regions, it is still the industries with a low added value that are most dominant. With the current rate of exchange, these countries are not able to compete on a global scale, given the increase in unit labour costs in these regions. What is more, businesses in these regions are usually less innovative than comparable businesses in other European countries.

Based on what can be observed in the new member states, one could conclude that foreign direct investment plays a major role in boosting the innovative power of the respective region. Innovation would be enhanced directly via the transfer of capital and know-how, but also indirectly as foreign investment will generate competitive pressure for domestic companies. However, a certain amount of skepticism is advised as it is yet unclear if this path can also be successfully applied to Southern European countries such as Greece. Over the last few years, wage increases in Southern European countries have exceeded productivity growth. This obviously has a discouraging effect on direct investments.[18] The issue is even more pressing for countries that are lacking qualified skilled workers and attractive co-operation partners from local research institutions, which would allow companies to develop new technologies in collaboration with domestic partners. Finally, recent cutbacks that have become necessary, and the decline in consumption that accompanies them, make investments in many of the Southern European countries an unattractive scenario for those who want to invest with a view to opening up new markets.

Against this background, infrastructural measures in the educational sector play a major role in increasing innovative power. The innovation environment of the Southern European countries would greatly benefit from a broader differentiation in their education and training system and a stronger focus on universities of applied sciences and vocational training centres. It is also essential that educational and research organisations on the one hand and private companies on the other hand intensify co-operation, which would strengthen weak innovation-related activities in the private sector. Yet, as a prerequisite for successfully promoting knowledge and technology transfer on both a national and international

level, a strong national science system is required. The ultimate aim is to develop a national innovation strategy that defines targets that can be duly implemented and measured. Standards such as the three-percent target for R&D expenditures of EU countries, as discussed above, are of little use to countries that so far have fallen short of the specified target by more than half. For these countries, the three-percent target should be replaced by more realistic objectives.

Improved efficiency in administrative structures and simplified bureaucratic structures, e.g. with regard to planning and permission procedures, could help to successfully commercialise innovations. What is more, they are also a prerequisite for applying resources provided by the EU Structural Funds in a sustainable, efficient way. From the outset of allocating funds to structurally weak regions, it is vital to ensure that the resources allocated contribute to an increase in productivity. On the part of the EU, it is imperative to introduce a suitable monitoring system that will safeguard the designated utilisation of funds.

Finally, the institutional environment in these countries will have to be improved. Transparency International's corruption indicator suggests that for some of the Southern European countries corruption continues to be a massive problem.[19] Other indicators, which aim at assessing the overall institutional environment for companies, also testify to a poor track record for some of these regions.[20] Without the necessary legal certainty and institutional framework conditions, it will not be possible to attract foreign investors, and neither will it be possible to persuade domestic investors to invest in regional enterprises.

CONTINUALLY IMPROVING THE ATTRACTIVENESS OF GERMANY AS AN R&D LOCATION A 3

Over the last decade, the economies of all OECD countries have undergone a development towards a knowledge-based economy. As regards value added, export and employment, there is a continuous increase in the proportion of industries and service areas that are characterised by a high degree of knowledge intensity. This process is accompanied by a structural shift towards research-intensive goods, a growing proportion of highly qualified personnel, and an increasing relevance of patents and other forms of securing intellectual property.

The individual OECD countries pursue different strategies for growth and specialisation. The United States, Great Britain and Canada, as well as several Scandinavian countries, are focussing on cutting-edge technologies and on continuously developing their services sector. In some cases – in the US and Great Britain for example – this also implied that national governments knowingly accepted redundancies in the industrial sector. Other countries decided to maintain and modernise their traditional industrial structures. Germany in particular, but also Japan, thus embarked on modernisation strategies in their manufacturing industries. Since 1990, and even more so since 2000, Germany has been attaching great importance to high-value technologies, and this has lead to significant improvements in its competitive position. However, in cutting-edge technology fields with particularly strong international growth, Germany continues to display deficiencies.[21]

Challenges posed by new producer countries for cutting-edge technology

For R&D-intensive goods and cutting-edge technologies in particular, global competition has intensified considerably. Not only do the leading industrialised countries compete with each other – they are also increasingly exposed to competition from emerging economies that have for the last few years been pursuing offensive innovation strategies. Notably in the area of cutting-edge technology more and more Asian countries are positioning themselves on the market. In fact 35 percent of the worldwide value added in this highly competitive segment of manufacturing