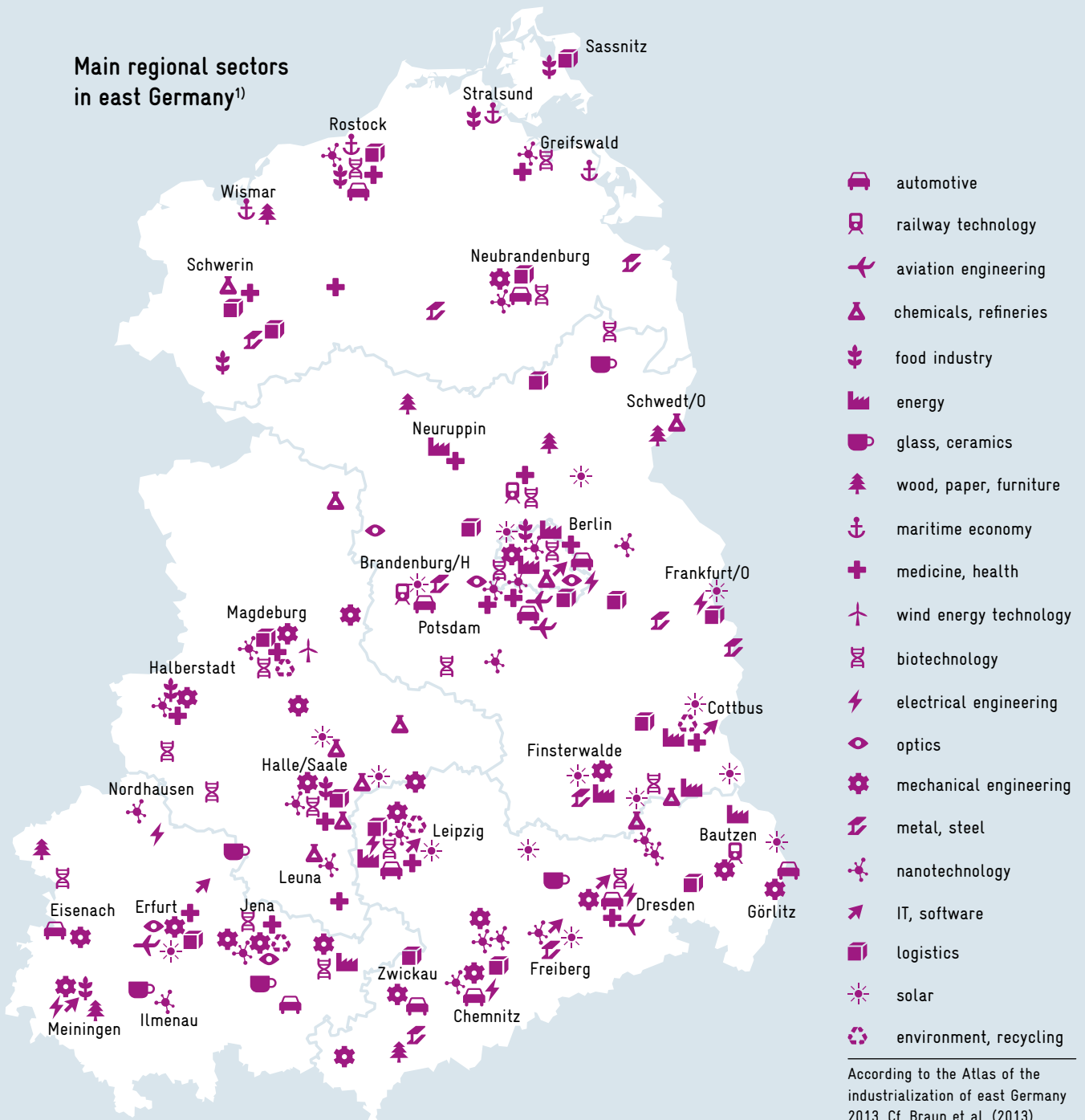


# B 1 East Germany as a location for innovation – 30 years after reunification

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There are still major structural differences between east and west Germany which impact inter alia on corporate innovation activities. A comparison of structurally similar companies shows that the level of innovation activity in east German companies has converged with that of west German companies in recent years.

Main regional sectors in east Germany<sup>1)</sup>



According to the Atlas of the industrialization of east Germany 2013. Cf. Braun et al. (2013).

### Comparison of east and west German companies with similar structures<sup>2)</sup>

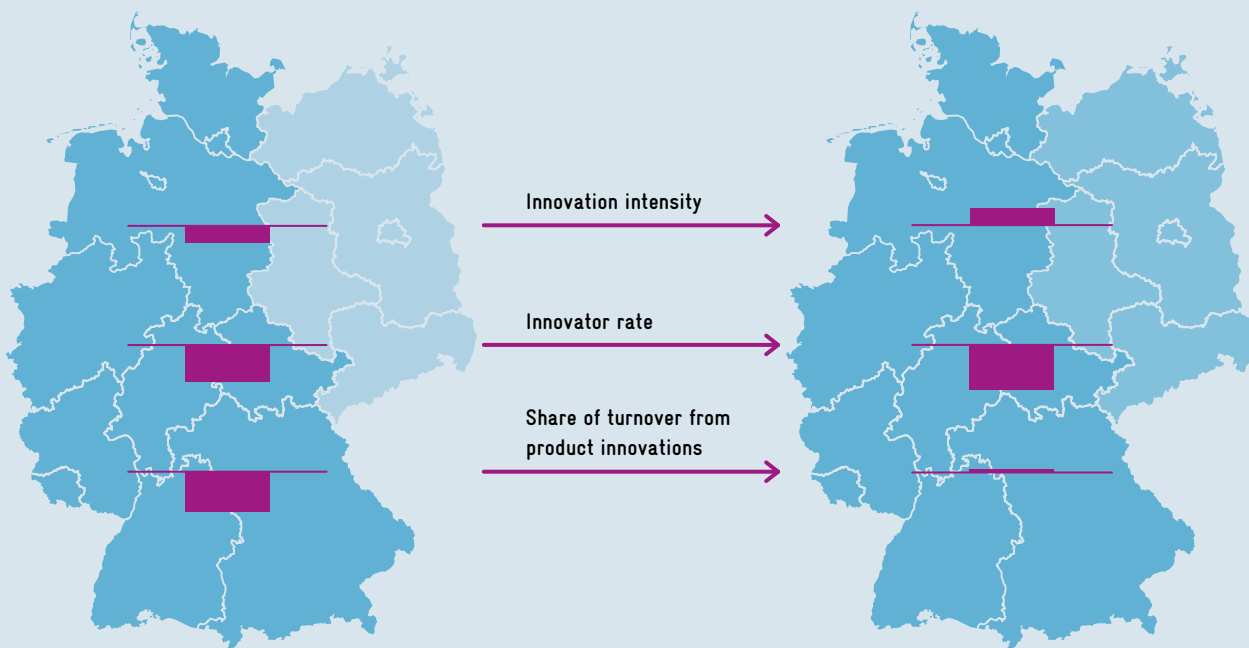
A 'matching' approach is used to identify those differences in innovation activities between east and west German companies that are not attributable to regional differences in the observable structural features. For this purpose, observable structural features such as the companies' size, sector and age are taken into account, i.e. only companies in east and west with similar observable structural features are compared.

#### Non-structurally adjusted deviation

Deviation of companies in east Germany compared to companies in west Germany

#### Structurally adjusted deviation

Deviation of companies in east Germany compared to companies in west Germany



#### Legend

While figures that have not been structurally adjusted show that the share of turnover from product innovations is currently lower in east German companies than in west German companies, structurally adjusted figures show hardly any differences between east and west German companies in this field.

See chapter D 7 for a list of sources of infocharts.

## B 1 East Germany as a location for innovation – 30 years after reunification

This chapter reflects on the 30th anniversary of German reunification by highlighting east Germany's current innovation performance and its development in this field in recent years – especially in comparison to west Germany. Innovation is regarded as an important driver of overall economic productivity and thus of the development of income and welfare in an economy.<sup>56</sup> Studies show that east Germany has been able to considerably close the productivity gap between east and west Germany since reunification:<sup>57</sup> in 1991, productivity in east Germany was around 45 percent of the west German level; by 2018 it had reached about 83 percent.<sup>58</sup> After a considerable narrowing of the gap in the first years after reunification, however, the adjustment has slowed down markedly.<sup>59</sup> This is attributed primarily to structural differences between the east German and west German economies.<sup>60</sup>

East Germany differs structurally from west Germany primarily in the following aspects: the widespread lack of corporate headquarters of large multinational corporate groups; a comparatively high share of young small and medium-sized enterprises (SMEs) engaged in all economic activities; a disproportionate fraction of non-research-intensive industry; and a relatively high share of non-knowledge-intensive corporate services. At the same time, however, the east German economy is also characterized by a disproportionately high share of cutting-edge technology sectors,<sup>61</sup> including, for example, aerospace and pharmaceuticals.<sup>62</sup> In addition, there are more regions that are structurally weak in east Germany, where location conditions for innovation activities are comparatively unfavourable, inter alia in terms of the technical and knowledge infrastructure (e.g. broadband, transport, linkages to scientific institutions).<sup>63</sup>

This chapter examines the innovation activity of companies in east and west Germany, taking structural differences into account. In addition, the development

of patent applications and start-ups, the cooperation activities of innovation-active companies, and the promotion of research and innovation (R&I) in east Germany are examined.

### Development of innovation activity among east German companies

Based on data from the Stifterverband and a study conducted for the Commission of Experts by the Leibniz Centre for European Economic Research (ZEW – Leibniz-Zentrum für Europäische Wirtschaftsforschung), this section compares the development of innovation activity by companies in east Germany over the last 20 years (in most cases from 1997 to 2017) with that of west German companies. In this analysis, east Germany includes all the new Länder (i.e. the former German Democratic Republic) plus Berlin; Berlin plays a special role within east Germany. West Germany includes the old federal states excluding Berlin.

Research and development (R&D) are fundamental to innovation. Measured in terms of R&D expenditure and employment in R&D, R&D-based innovation activities in east Germany lagged behind those in west Germany in the period from 1997 to 2017 (cf. box B 1-1).<sup>64</sup>

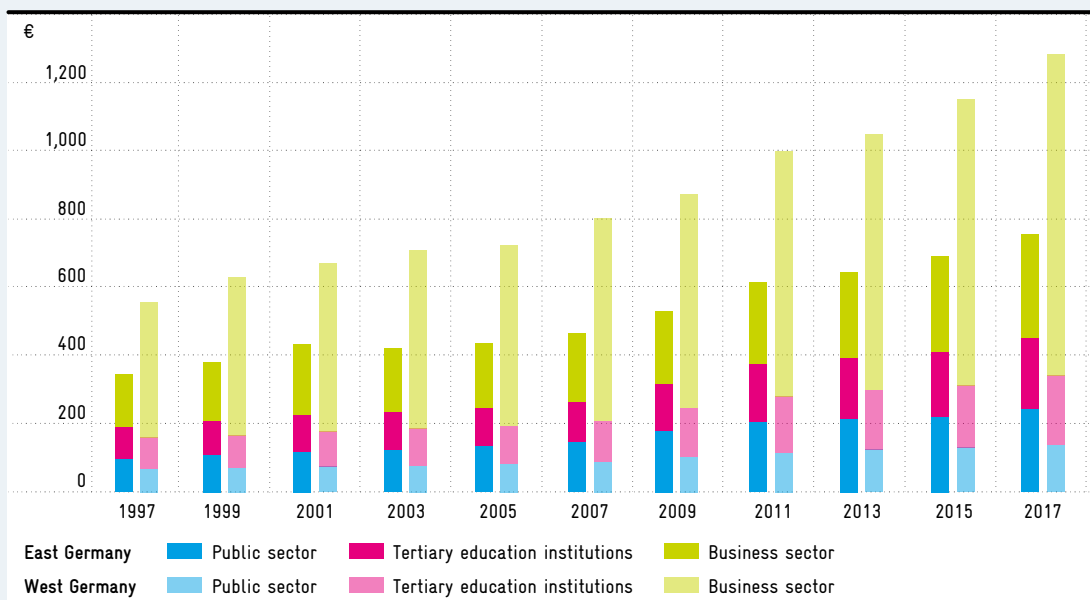
The following examines in detail two types of indicators – relating on the one hand to inputs and on the other to the output or success of innovation activity (see box B 1-3 for definitions).<sup>65</sup> On the input side, the study examines the share of companies with continuous R&D activities, the share of innovation-active companies, and the expenditure on innovation as a percentage of turnover (innovation intensity). The measures used to determine the output or success of innovation are the share of companies that have introduced at least one product or process innovation (innovator rate), and the share of turnover

### R&D in east Germany<sup>66</sup>

Per capita R&D expenditure more than doubled between 1997 and 2017 in east Germany, rising from €353 to €768 (cf. figure B 1-2). At €1,305 in 2017, Berlin had by far the highest per capita expenditure on R&D in east Germany. R&D employment in east Germany increased by almost 30 percent between 1997 and 2017 to around 104,000 full-time equivalents. At the same time, R&D expenditure per

capita and employment in R&D have increased more strongly in the public sector than in the business sector since 1997.<sup>67</sup> In west Germany, R&D expenditure per capita and R&D employment have increased even more strongly overall than in east Germany over the last 20 years.<sup>68</sup> This was mainly due to a large amount of growth in R&D activities in the business sector (cf. figure B 1-2).<sup>69</sup>

### Per capita expenditure on R&D by performing sector in east and west Germany 1997–2017 in €



Source: SV Wissenschaftsstatistik, Statistisches Bundesamt (Federal Statistical Office). Own calculations in Ihle et al. (2020). © EFI-Commission of Experts for Research and Innovation 2020.

R&D expenditure as a percentage of gross domestic product (GDP) is called the R&D intensity. Starting from 2.1 percent in 1997, the figure for east Germany rose to 2.5 percent in 2017.<sup>70</sup> However, R&D intensity rose much more strongly in west Germany, from 2.2 percent in 1997 to 3.1 percent in 2017. Even so, the R&D intensity of 2.5 percent achieved by east Germany in 2017 was still higher than that of e.g. France, Italy or the UK.<sup>71</sup>

Whereas in 2017, around 73 percent of R&D expenditure in west Germany was in the business sector, in east Germany it was only around 40 percent. In east Germany, by contrast, an important role is played

in R&D financing by the public sector (state research institutions and tertiary education institutions). For example, in 2017 the state (including private non-profit institutions) contributed 33 percent of R&D expenditure in east Germany, tertiary education institutions 27 percent.<sup>72</sup>

Since the mid-1990s, around 30 percent of total government R&D expenditure (including private non-profit institutions) has been flowing to east Germany.<sup>73</sup> This amounted to more than four billion euros in 2017. The highest grants in absolute terms went to the Länder Berlin (€1.6 billion), Saxony (€1.0 billion) and Brandenburg (€0.5 billion).<sup>74</sup>

Fig. B 1-2

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from product innovations – differentiated according to market novelties and imitative innovations.<sup>75</sup>

In order to take into account the differences in the economic structure between east and west Germany and thus arrive at a meaningful comparison, these indicators are also considered in a structurally adjusted manner: a 'matching' approach is used to identify those differences in innovation activities between east

and west German companies that are not attributable to regional differences in the observable structural features.<sup>76</sup> The analysis adjusts for the following observable structural features: size of the companies, sector in which the companies operate, age of the companies, membership of a corporate group, and the spatial type in which companies are located. As a result, only companies in east and west Germany are compared with comparable structural characteristics.<sup>77</sup>

Box B 1-3

### Innovation indicators<sup>78</sup>

#### Input indicators of innovation activity

**Share of companies with continuous R&D activities:** R&D activities carried out by the companies themselves, i.e. internal R&D activities, can be continuous or occasional. While continuous R&D activities are conducted on a permanent basis, occasional R&D activities are conducted only if needed. The share of companies with continuous R&D activities is defined as the number of companies that continuously conduct R&D activities internally as a percentage of all companies.

**Share of innovation-active companies:** The share of innovation-active companies indicates the number of companies that have conducted innovation activities in the preceding three-year period as a percentage of all companies. Innovation activities are defined as activities aiming at developing or introducing new or improved products or processes. These activities include internal R&D activities, external R&D activities (outsourcing of R&D contracts to third parties) and other innovation-related activities (e.g. the design or installation of new equipment).

**Innovation intensity:** Innovation intensity is defined as innovation expenditure relative to a company's turnover in a corresponding year. Innovation expenditure includes all R&D expenditure (internal plus external) and other internal and external expenditure necessary to implement innovation projects. This includes, for example, conceptual work, production preparation, market research and marketing concepts, further training and the acquisition of fixed assets for innovation.

#### Output indicators of innovation activity

**Innovator rate:** The innovator rate measures the number of companies that have introduced at least one product innovation (i.e. a new or significantly improved product) or process innovation (i.e. a new or significantly improved process) in the preceding three-year period as a percentage of all companies.

**Share of turnover from product innovations:** The share of turnover from product innovations indicates the percentage contributed by product innovations to turnover in the first three years after their market launch.

**Share of turnover from market novelties:** Market novelties are product innovations that companies are the first to introduce to the market. The share of turnover from market novelties indicates the percentage contributed by market novelties to turnover in the first three years after their market launch.

**Share of turnover from imitative innovations:** Imitative innovations are product innovations that are new to a company but not new to the market. The share of turnover from imitative innovations indicates the percentage contributed by imitative innovations to turnover in the first three years after their market launch.

## Convergence in innovation inputs

The share of companies with continuous R&D activities, the share of innovation-active companies, and the intensity of investment in innovation activities provide an initial impression of the innovative performance of the business sector.

Over the last 20 years, the share of companies with continuous R&D activities was on average 1.4 percentage points higher in east Germany than in west Germany. However, there has recently been some convergence: in 2017, 11.4 percent<sup>79</sup> of east German and 11.1 percent of west German companies were engaged in continuous R&D activities.<sup>80</sup>

A comparison of structurally similar companies shows that the share of companies with continuous R&D activities in east Germany has been only slightly higher than in west Germany on average over the last 20 years (see figure B 1-4). Since 2012, the structurally adjusted share of companies with continuous R&D activities has always been below the west German level.<sup>81</sup>

In order to measure the willingness of the business sector to search for innovative ideas and solutions, one can consider not only companies with continuous R&D activities, but also companies that carry out R&D occasionally or engage in innovation activities without internal R&D. The number of these so-called innovation-active companies as a percentage of all companies has decreased in both east and west Germany over the last two decades – in east Germany from around 59 percent in 1999 to only 40 percent in 2017, and in west Germany, from approximately 62 percent to 44 percent over the same period. Taking the average for the period 1999 to 2017, the share of innovation-active companies in east Germany was about 5 percentage points below the west German figure.<sup>82</sup>

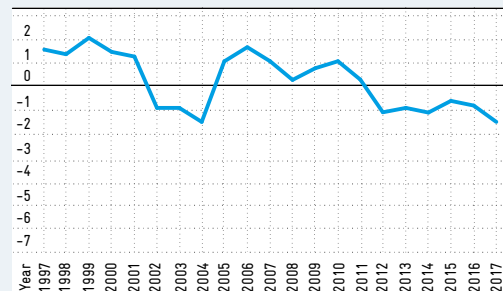
Even when the analysis takes structural differences into account, the share of innovation-active east German companies remains below that of west German companies (see figure B 1-4). This is mainly due to the lower share of innovation-active companies that only engage in R&D activity occasionally.<sup>83</sup>

The indicator innovation intensity goes beyond the mere willingness to pursue innovation activities, and reports the intensity with which companies invest their turnover in R&D and other innovation activities. Looking at the figures that have not been

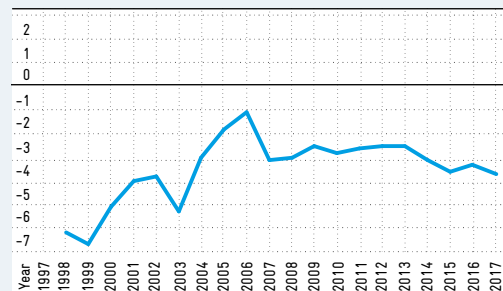
## Structurally adjusted deviation of innovation input indicators 1997–2017 in percentage points

Deviation of companies in east Germany compared to companies in west Germany

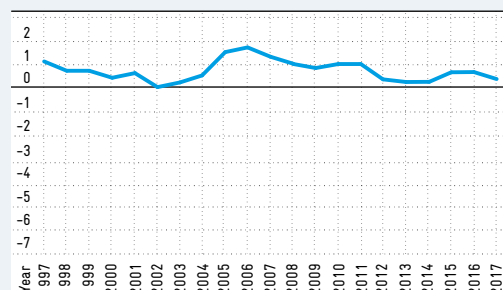
### Deviation in the share of companies with continuous R&D activities



### Deviation in the share of innovation-active companies



### Deviation in innovation intensity



Moving averages of the previous three years. Legend: In 2017, the share of companies with continuous R&D activities in east Germany was 1.5 percentage points lower than that of structurally similar companies in west Germany. Source: Mannheim Innovation Panel. ZEW calculations in Rammer et al. (2020b). © EFI-Commission of Experts for Research and Innovation 2020.

Fig. B 1-4

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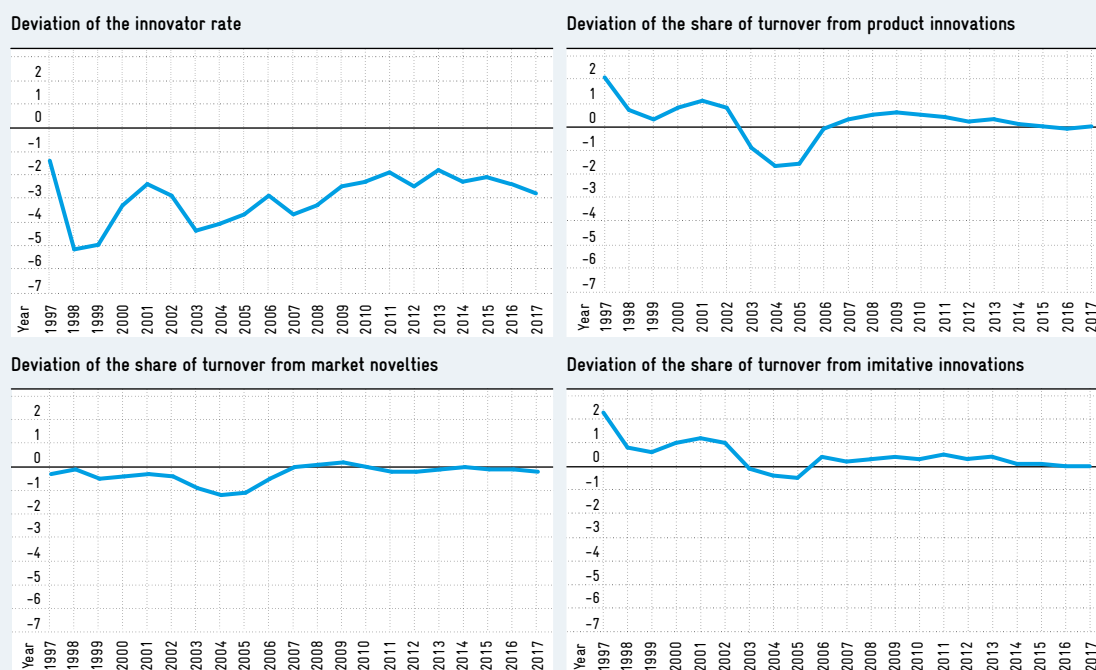
structurally adjusted, innovation intensity in west Germany has remained stable over the last two decades, while it has fluctuated in east Germany. Up until 2008 it was higher than the innovation intensity of west German companies; since 2009 it has been lower. According to current figures, innovation intensity is 2.9 percent in east Germany and 3.6 percent in west Germany.<sup>84</sup>

Fig. B 1-5

Download  
data

## Structurally adjusted deviation of innovation output indicators 1997–2017 in percentage points

Deviation of companies in east Germany compared to companies in west Germany



Moving averages of the previous three years. Legend: In 2017, the innovator rate of companies in east Germany was 2.8 percentage points lower than that of structurally similar companies in west Germany.

Source: Mannheim Innovation Panel. ZEW calculations in Rammer et al. (2020b).

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If the figures for innovation intensity are structurally adjusted, the east German companies show an average intensity of investment in innovation activities that is 0.7 percentage points higher than that of west German companies between 1997 and 2017 (see figure B 1-4). However, the current figures show hardly any differences.<sup>85</sup>

### Mixed picture when it comes to innovation output

The market launch of new products and services and the introduction of newly developed production and manufacturing processes are an important early indicator for innovation output. The number of companies who launch new products and services and/or introduce new processes as a percentage of all companies is called the innovator rate. Between 1998 and 2017, the innovator rate in east Germany was on average about four percentage points below the rate in west Germany. As in other European countries, it has declined sharply in both east and west Germany over the last two decades:<sup>86</sup> from 57 percent in east

Germany and 60 percent in west Germany in 1998 to only 34 and 36 percent respectively now.<sup>87</sup>

Also after structural adjustment, the innovator rate in east Germany is markedly lower than in west Germany (see figure B 1-5). Although the two rates initially converged somewhat over the period under consideration, this process has stagnated since the early 2010s.<sup>88</sup> In 2017, the innovator rate of east German companies was around three percentage points lower than in comparable west German companies.

In addition to the innovator rate, another important output measure is the share of turnover that companies have generated with innovations. The focus here is on the share of turnover from product innovations as a whole, as well as differentiated according to market novelties and imitative innovations. These three indicators developed largely parallel in east and west Germany: after a declining trend up until the mid-2010s, they tended to rise slightly again. For all three indicators, east Germany lagged behind west Germany in the period under consideration.<sup>89</sup>



After adjustment for structural differences, east German companies had a higher share of turnover from product innovations and imitative innovations than west German companies in the late 1990s and early 2000s (see figure B 1-5). By contrast, the share of turnover from market novelties was higher among west German companies during this period. Since the mid-2000s, however, hardly any differences can be observed in the three indicators between east and west German companies.<sup>90</sup>

### Differences in innovation activity determined by regional structure

Innovation activities differ not only between east and west Germany, but also according to spatial structures and areas. One way of classifying areas is to divide them into settlement types according to the definition of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (Bundesinstitut für Bau-, Stadt- und Raumforschung, BBSR): predominantly urban regions, partly urban regions and rural regions.<sup>91</sup> According to this classification, east Germany is much more rural than west Germany.<sup>92</sup> There are systematic differences between these three settlement types when it comes to corporate innovation activities over the period from 1992 to 2017, even when differences caused by age, size and sector are taken into account. The differences between rural and urban regions are more pronounced in east than in west Germany.<sup>93</sup> For example, the innovator rate in east Germany is 3.9 percentage points higher in urban regions than in rural regions. In west Germany this difference is only 3.1 percentage points.

A comparison between the innovation activities of east and west German companies located in the same settlement type does not suggest a uniform picture.

In rural regions, there is little difference between east and west Germany when it comes to the share of companies with continuous R&D activities. In urban regions, by contrast, the proportion is significantly higher in east than in west Germany (two percentage points). On the other hand, the share of innovation-active east German companies is significantly lower in rural and urban regions than in their west German counterparts, namely about three percentage points respectively. The innovation intensity of east German companies in all three settlement types is significantly higher than that of their west German counterparts. The difference amounts to around two percentage points in each case.

The innovator rate, in turn, is significantly lower among east German companies in urban and rural regions than among their west German counterparts. The differences amount to two and three percentage points respectively. However, the share of turnover from product innovations is higher for east German companies in all three settlement types than for their west German counterparts. In urban regions, for example, the difference is about four percentage points, in rural regions around two percentage points. This is because east German companies are far ahead as regards the share of turnover from imitative innovations (three to four percentage points). On the other hand, east German companies are below their west German counterparts in all settlement types in terms of the share of turnover from market novelties (one to two percentage points).

## Additional innovation indicators

B 1–2

### Patent activities still lagging behind

Patents are intellectual property rights for new technical inventions. They provide the basis for exploiting innovations on the market, while at the same time supporting the transfer of knowledge and technology between the actors in the innovation system.<sup>94</sup> The following section examines triadic patent applications, i.e. patents that are filed simultaneously with the European Patent Office, the Japanese Patent Office and the US Patent Office. In east Germany, the number of triadic patent applications increased by about 29 percent to 2,428 between 2001 and 2015.<sup>95</sup> In west Germany, the increase over the same period – starting from a higher level – was lower at 8 percent, rising to 25,319 applications.

East Germany is still a long way behind west Germany, not only in terms of the absolute number of triadic patent applications, but also when it comes to per-capita applications. The gap has also been reduced here. In 2001, triadic patent applications per 100,000 inhabitants in east Germany amounted to about 30 percent of the west German level, in 2015 to 40 percent.<sup>96</sup> Berlin had by far the highest figure in east Germany with 26.7 triadic patent applications per 100,000 inhabitants in 2015.<sup>97</sup>

R&D employee productivity measures the number of triadic patent applications per 1,000 R&D employees. It is an indicator of how successful R&D employees are in developing new, patentable ideas.



While R&D employee productivity in east Germany increased slightly on average over the entire period under consideration, it declined markedly in west Germany.<sup>98</sup> For example, the gap between east and west Germany narrowed from 35.8 in 2001 to 21.9 in 2015. Most recently (2015), R&D employee productivity in east Germany was 25.6. This was only about half of the west German level (47.5).

### Number of start-ups in R&D-intensive industry are at the same level as in west Germany

Young companies contribute towards augmenting and modernizing the existing range of products and services, thus making an important contribution to economic growth and to maintaining both the competitiveness of a country and the local added value generated in a region.<sup>99</sup> From an innovation-policy perspective, start-ups are particularly important in the knowledge-intensive sectors.<sup>100</sup> The knowledge-intensive sectors comprise R&D-intensive industry and knowledge-intensive services.<sup>101</sup>

As in many other industrialized countries, the number of start-ups in the knowledge-intensive sectors declined in Germany:<sup>102</sup> from over 35,400 in 1997 to 21,300 in 2018. Relatively speaking, east Germany was more affected by the decline than west Germany.<sup>103</sup> The majority of start-ups in the knowledge-intensive sectors are active in the field of knowledge-intensive services. Over the past 20 years, the number of start-ups in this field has fallen by 45 percent in east Germany, and thus more sharply than in west Germany (37 percent).<sup>104</sup> A different east-west picture emerges when looking at R&D-intensive industry. While more than 2,700 companies were founded in this field in Germany in 1997, the number of start-ups in 2018 was only 1,250. In recent years, the number of start-ups in east Germany has stabilized at an average of 250 per year, while it has fallen continuously in west Germany.<sup>105</sup>

Start-up intensity indicates the annual number of start-ups per 10,000 employable people and is an indicator of the willingness to start a business. In line with the absolute number of start-ups, start-up intensity has also declined sharply in the knowledge-intensive sectors. Over the past 20 years, it has fallen from 5.7 to 3.7 in east Germany. This decline was somewhat less pronounced than in west Germany (from 6.9 to 4.2). Among other factors, the smaller decline in east Germany is due to start-up activities in Berlin, which are above average and stable.<sup>106</sup>

Start-up intensity in the other east German Länder is correspondingly well below that of west Germany and has been falling almost in parallel since 2004.<sup>107</sup> Most recently (2018), the gap between east and west Germany halved compared to 1997.<sup>108</sup>

In terms of start-up intensity in knowledge-intensive services, east Germany (without Berlin) lags markedly behind west Germany and has shown a somewhat steeper decline. For example, start-up intensity in east Germany (without Berlin) was only 2.0 in 2018, a fall of 2.4 compared to the intensity level in 1997 (4.4).<sup>109</sup> In west Germany, the corresponding start-up intensity fell by 2.4 over the same period to 4.0 in 2018 (cf. figure B 1-6). With an average of 8.1 since 1997, Berlin (next to Hamburg) has by far the highest start-up intensity in knowledge-intensive services.

In R&D-intensive industry, start-up intensity has fallen in east and west Germany over the past 20 years from 0.40 and 0.55 respectively to both 0.24 in 2018 (see figure B 1-6). Here, too, there are large regional differences; for example, start-up intensities in Berlin, Saxony-Anhalt and Thuringia were above the west German average.<sup>110</sup>

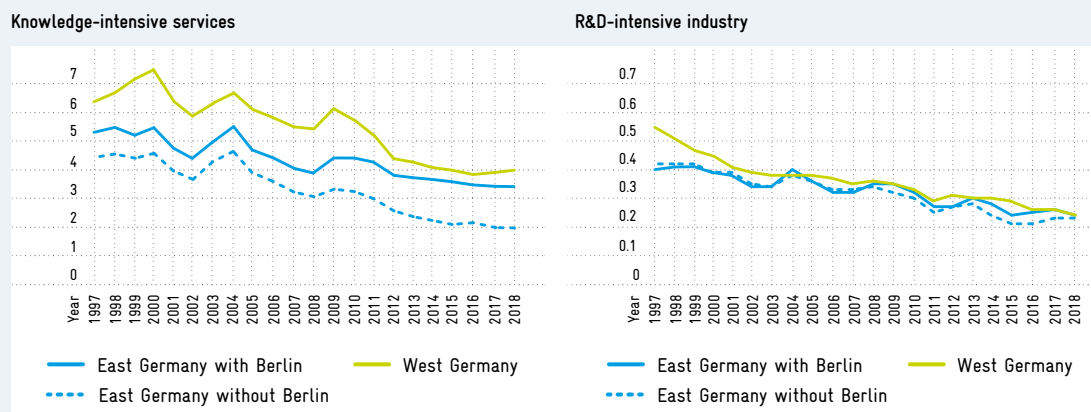
Spin-offs from tertiary education institutions make a particular contribution to the transfer of new ideas from application-oriented basic research to innovative application.<sup>111</sup> In 2017, there were around 460 spin-offs at east German tertiary education institutions, which corresponds to a share of over 25 percent of nationwide spin-offs.<sup>112</sup> While there were an average of 11.5 spin-offs per 10,000 students and graduates at east German tertiary education institutions in 2017, there were only 9.6 in west German tertiary education institutions. Tertiary education institutions in Brandenburg and Saxony-Anhalt recorded the highest figures nationwide with 22.2 and 18.4 respectively per 10,000 students and graduates.

The EXIST programme in particular has contributed to a positive development of the start-up culture at German tertiary education institutions.<sup>113</sup> Since 2007, with its EXIST Transfer of Research (EXIST-Forschungstransfer) programme, the Federal Ministry of Economics and Energy (Bundesministerium für Wirtschaft und Energie, BMWi) has been supporting in particular development activities which are important to prove the technical feasibility of research-based start-up ideas.<sup>114</sup> One third of the EXIST Transfer of Research projects were funded in east Germany.<sup>115</sup> Saxony, Berlin and Thuringia accounted for the largest number of projects by far.<sup>116</sup>

### Start-up intensity in knowledge-intensive services and R&D-intensive industry in east Germany (with and without Berlin) and west Germany 1997–2018

Fig. B 1-6

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Knowledge-intensive services: technology-oriented services and non-technical advisory services.

R&D-intensive industry: cutting-edge and high-value technology.

Source: Mannheim Enterprise Panel. Own calculations in Ihle et al. (2020).

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The EXIST Business Start-up Grant (EXIST-Gründerstipendium) funding line supports innovative technology-based start-up projects in the seed phase.<sup>117</sup> In 2017, about one third of the Business Start-up grants were awarded to beneficiaries in east Germany. Nearly half of these went to students, graduates and scientists from Berlin.<sup>118</sup>

#### Small proportion of innovation cooperation is international

Cooperation with other companies and organizations, especially from science, plays an important role in companies' innovation activities. Cooperation is especially important for SMEs to make up for their limited internal innovation activities and to share innovation risks with others.<sup>119</sup>

Since the end of the 1990s, innovation policy in east Germany has been geared towards promoting cooperation and networks (cf. figure B 1-7), in particular to initiate or strengthen regional cooperation relations between business and science, which were more pronounced in west Germany.<sup>120</sup> This is also evident with regard to the types of cooperation partners and a strongly regional orientation of cooperation activities.<sup>121</sup>

Looking only at innovation-active companies, the last 20 years (1996–2016) reveal that their cooperation

activities were more pronounced in east than in west Germany. For this group, the share of East German innovation-active companies engaged in cooperation on innovation is significantly higher than among their west German counterparts.<sup>122</sup> In 2016, the rate in east Germany was 26 percent, in west Germany 17 percent.

During this period, also at the sector level the proportion of innovation-active companies cooperating on innovation was higher in east than in west Germany. In east Germany, for example, this averaged over 50 percent in the R&D-intensive industry, markedly higher than the percentage among west German companies (37 percent). In knowledge-intensive services, too, considerably more east German innovation-active companies entered into innovation cooperation agreements than west German innovation-active companies (30 percent compared to 21 percent).<sup>123</sup>

Tertiary education institutions and non-university research institutions (außeruniversitäre Forschungseinrichtungen, AUF) are by far the cooperation partners most frequently named by innovation-active companies in both east and west Germany.<sup>124</sup> This percentage of innovation cooperation with non-university research institutions has risen sharply nationwide in recent years. In 2016, east and west Germany hardly differed at all here.<sup>125</sup>

However, differences can be found in cooperation activities between innovation-active companies and competitors. While an average of 27 percent of innovation-active companies in west Germany cooperated with a competitor in the period from 1996 to 2016, in east Germany the figure was only 23 percent.<sup>126</sup>

There are also differences between east and west Germany with regard to the spatial distribution of the cooperation partners. For example, east German innovation-active companies cooperate more often regionally and much less frequently at the European level.<sup>127</sup> This higher proportion of regional cooperation in east Germany could reflect the more regionally oriented cooperation funding in east Germany in recent years. A more international orientation could, however, expand the innovation-related scope of possibilities.

### B 1-3 R&I funding in east Germany

Over the past 30 years, the Federal Government has invested considerably in the R&I system in east Germany.<sup>128</sup> For example, the Federal Government's R&D expenditure in the east German Länder and Berlin totalled €68.5 billion between 1991 and 2018.<sup>129</sup> That is the equivalent of about 23 percent of the Federal Government's total R&D expenditure.

With the Solidarity Pact II (Solidarpakt II), the Federal Government provided the east German Länder and Berlin with a total of around €10.6 billion in what is known as disproportionate funding<sup>130</sup> for the policy area of 'Innovation, R&D, Education' in the period from 2005 to 2018.<sup>131</sup>

The priorities and measures of the Federal Government's R&I funding for the east German economy have changed over the years. In the early 1990s, R&I policy programmes were primarily designed to offset falling R&D staff levels. From the mid-1990s onwards, project funding became more important, with cooperative and collaborative projects gaining in importance (cf. figure B 1-7).<sup>132</sup> This funding then expanded further in the direction of a regionally oriented innovation policy to promote the innovation potential of entire regions. Following the general trend in European innovation policy, after the turn of the millennium the Federal Government promoted networks – i.e. long-term cooperation between different actors in research and innovation.

### High proportion of subsidized companies in east Germany

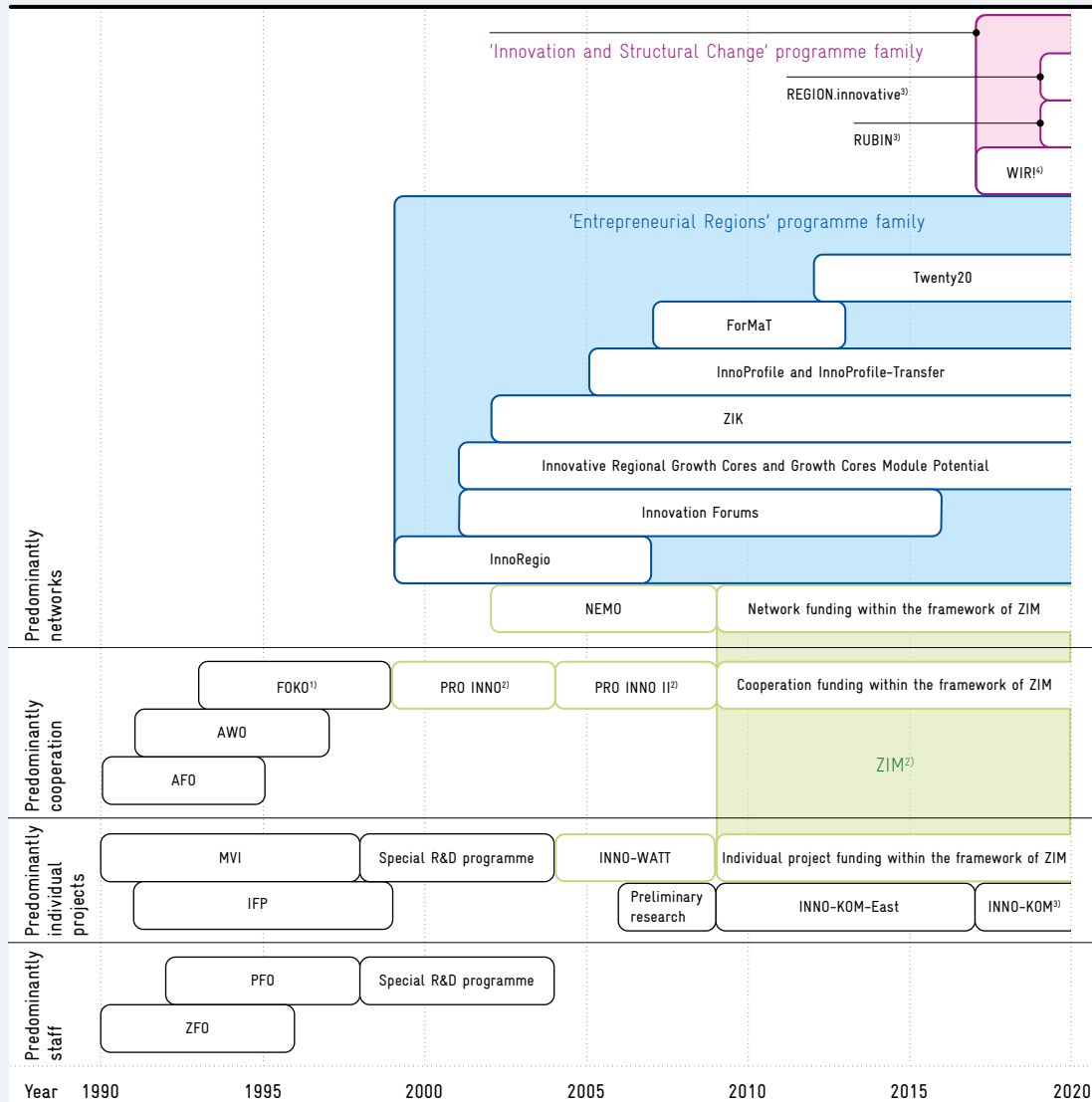
Public innovation funding is much more widespread in east Germany than in west Germany. In 2016, 26 percent of east German and 15 percent of west German innovation-active companies received financial support.<sup>133</sup> The focus of R&I programmes on the promotion of R&D activities is reflected in a higher proportion of funded companies in the R&D-intensive industry than in other industrial sectors (2016: 59 vs. 27 percent in east Germany, 31 vs. 14 percent in west Germany). Differentiated according to R&D activity, the percentage of companies receiving funding was highest among companies with continuous R&D activities, whereas innovation-active companies without internal R&D hardly benefited from funding at all (2016: 57 vs. 9 percent in east Germany, 31 vs. 8 percent in west Germany).<sup>134</sup> Companies that generate innovations without internal R&D tend to be smaller companies in non-research-intensive or non-knowledge-intensive sectors with a low proportion of highly qualified employees and a low export orientation.<sup>135</sup> Similarly, the funding provided by the Central Innovation Programme for SMEs (Zentrales Innovationsprogramm Mittelstand, ZIM) predominantly reaches more R&D-experienced companies;<sup>136</sup> this is particularly true for east Germany.<sup>137</sup> Another focus of R&I policy programmes in east Germany is the promotion of regional alliances (cf. figure B 1-7). This applies in particular to the initiatives within the 'Entrepreneurial Regions' (Unternehmen Region) programme family, including InnoRegio, Innovative Regional Growth Cores (Innovative Regionale Wachstumskerne) and InnoProfile Transfer (InnoProfile-Transfer).<sup>138</sup>

In general, no comprehensive statements can be made about the effects of these support measures. There is a lack of a systematic evaluation that takes into account the interplay of the programmes of several funding authorities. Existing evaluation studies confirm that the R&I programmes financed within the framework of Solidarity Pact II have had predominantly positive promotional effects, especially with regard to R&D activities, employment and turnover figures, and the formation of collaborations and networks of the companies that received funding.<sup>139</sup> There are, however, indications that in individual cases the expected implementation success of the projects was not yet fully achieved by the end of the funding period, e.g. Team Research for the Market (Forschung für den Markt im Team, ForMaT), Centres for Innovation

### Federal R&D funding programmes (BMBF and BMWi) in the east German economy (with Berlin) 1990–2019

Fig. B 1-7

Download data



<sup>1)</sup> Nationwide programme with an east-specific sub-programme called 'R&D Joint Projects East' (FUEGO).  
<sup>2)</sup> Nationwide programmes with preferential support for east Germany. Disproportionate funds under Solidarity Pact II.  
<sup>3)</sup> Funding in structurally weak regions. INNO-KOM: disproportionate funds under Solidarity Pact II.  
<sup>4)</sup> Since 2019, funding in structurally weak regions.

Not included are start-up funding programmes and the programmes 'External Innovation Management for Small Enterprises in the New Länder' (InnoMan) and 'Business Meets Science'. Another nationwide predecessor programme of ZIM without special regulations for east German grant recipients is 'Promotion of Innovative Networks' (InnoNet).

Staff development: ZFO: R&D Personnel Growth Promotion East; PFO: R&D Personnel Funding East; Special R&D Programme: funding of research, development and innovation in small and medium-sized enterprises and external industrial research institutions in the new Länder. Individual project funding: MVI: industrial research to prepare the market; IFP: innovation support programme; INNO-WATT: promotion of research and development among growth drivers in disadvantaged regions; Preliminary research: funding of preliminary industrial research in disadvantaged regions; ZIM: Central Innovation Programme for Small and Medium-Sized Enterprises; INNO-KOM-East: R&D support for non-profit external industrial research institutions in east Germany (Innovation Competence East); INNO-KOM: R&D support for non-profit external industrial research institutions (Innovation Competence). Cooperation funding: AFO: Contract and Development Research East; AWO: Contract Research West-East; FOKO: Research Cooperation in SMEs; PRO INNO: Innovation Competence of SMEs; PRO INNO II: funding to promote the innovation competence of SMEs. Network funding: NEMO: Network Management East; ZIK: Centres for Innovation Competence: creating excellence – securing talent; ForMaT: Team Research for the Market; Twenty20: Twenty20 – Partnership for Innovation; WIR!: WIR! – Change through Innovation in the Region; RUBIN: RUBIN – Regional Entrepreneurial Alliances for Innovation.

Source: own diagram based on Günther et al. (2010). Cf. also Ihle et al. (2020).  
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Competence (Zentren für Innovationskompetenz, ZIK).<sup>140</sup> While in the evaluation of ZIM control group analyses were also carried out, previous evaluation studies have largely been based only on corporate surveys, assessments by the grant recipients, and the development of economic indicators in terms of the subsidized companies.<sup>141</sup> A comprehensive impact analysis of the measures and their effects in relation to different success factors has so far not been carried out for most funding programmes.

### **New national funding system for structurally weak regions**

Following the expiry of Solidarity Pact II in 2019, the Federal Government has been supporting structurally weak regions at the national level since the beginning of this year,<sup>142</sup> regardless of whether they are in east or west Germany, urban or rural. The adopted structural-policy measures developed by the commission on 'Equal Living Conditions' include, among others, programmes to boost innovation, improve the technical and social infrastructure, and ensure the supply of skilled manpower.<sup>143</sup>

The national funding system for structurally weak regions, bundles, inter alia, several federal programmes and programme families in the field of 'Research and Innovation'.<sup>144</sup> First, there are programmes that provide funding exclusively in structurally weak regions: the 'Entrepreneurial Regions' programme family, the 'Innovation and Structural Change' (Innovation und Strukturwandel) programme family developed from it, and Innovation Competence (Innovationskompetenz, INNO-KOM). Second, there are programmes that are not restricted to the structurally weak regions of the funding system, but contain funding preferences for these regions, e.g. increased funding rates or reduced conditions on own contributions: ZIM and Innovative Municipalities (Kommunen innovativ). And third, programmes are included which are also not limited to structurally weak regions, but which, due to their objectives and the regional differences in the distribution of problems, lead to a disproportionate use of funds in structurally weak regions: EXIST-Potentials (EXIST Potentiale).<sup>145</sup>

## **Recommendations**

B 1-4

Even 30 years after reunification, there are still major structural differences between east and west Germany which impact inter alia on corporate innovation activities. A comparison of structurally similar companies shows that the level of innovation activity in east German companies has converged with that of west German companies in recent years. However, there is still a need for east German companies to catch up when it comes to launching innovation activities and introducing innovations to the market.

Within both east and west Germany there are differences in innovation activities between companies in rural and urban regions. These are more pronounced in the east than in the west.

Start-up intensity in the knowledge-intensive sectors has been declining for years in east and west Germany. In the meantime there is no longer any difference between east and west Germany in R&D-intensive industry. However, in knowledge-intensive services, start-up intensity in east Germany is still lower than in west Germany.

East German companies cooperate more on their innovation projects than west German companies, whereby their cooperation activities are more frequently regionally oriented.

### **Gear R&I policy for structurally weak regions towards excellence criteria**

- Against the background of the convergence of innovation activities of east and west German companies according to key indicators, the Commission of Experts welcomes the fact that the Federal Government will refrain from providing special R&I support for east German companies after the expiry of Solidarity Pact II. One important task of the Federal Government's R&I policy is to strengthen Germany's position in global competition. The Commission of Experts therefore believes that R&I policy should continue to focus on promoting excellent innovation projects, which exist in both east and west Germany.
- In the Commission of Experts' view, it makes sense to support R&I in structurally weak regions chosen on the basis of regional characteristics and not according to the borders between Länder.

Such funding, too, should target projects chosen according to excellence criteria. The national funding system for structurally weak regions introduced at the beginning of the year already contains corresponding funding formats.

- Furthermore, the Commission of Experts advocates an innovation-oriented structural policy. This promotes the potential of structurally weak regions, for example through infrastructure measures, and in this way aims to increase their overall willingness and ability to innovate. Examples include measures under the planned law for the structural strengthening of coal regions (Strukturstärkungsgesetz Kohleregionen), programmes for fields such as broadband network expansion and digitalization in the national funding system for structurally weak regions, and measures under the 'Joint Task for the Improvement of Regional Economic Structure' (Gemeinschaftsaufgabe Verbesserung der regionalen Wirtschaftsstruktur, GRW).<sup>146</sup> The Commission of Experts urges a rapid, effective and coordinated implementation of such programmes.

### Motivate more companies to innovate

- The Federal Government's R&I funding currently focuses on the promotion of R&D activities. In order to motivate more companies in structurally weak regions to engage in innovation activities, companies without R&D should be integrated more closely into R&I funding. In other words, non-technical and social innovations should also be given more support. This can be done on the one hand by opening up existing programmes and, on the other, by introducing specific programmes for innovation projects not involving R&D.<sup>147</sup>

### Support the market launch of innovations

- The Commission of Experts recommends that in future R&I policy should be more oriented towards giving companies in structurally weak regions support in launching new products and services onto the market, thus increasing the innovator rate. This applies particularly to SMEs. The promotion of innovation advisory services and innovation support activities should therefore be increased.

### Support start-ups from the scientific community

- The Commission of Experts welcomes the fact that the EXIST-Potentials programme supports in particular small and medium-sized tertiary education institutions in their entrepreneurship activities and that the total funding for EXIST is being increased. In order to promote academic start-ups, the culture of entrepreneurship and start-up training at tertiary education institutions should be further strengthened.

### Create incentives for supra-regional and international cooperation

- The Commission of Experts attaches importance to regional networking among innovation actors. However, it suggests placing greater emphasis on supra-regional and international forms of cooperation and networking in R&I funding.

### Improve accompanying research on R&I funding programmes

- The Commission of Experts once again urges that accompanying research on R&I funding programmes should be geared towards their impact. The prerequisites for this are an ex-ante definition of parameters for targets and measurement and a comprehensive database on important characteristics of funded and non-funded applicants and the selection process.