

**Supplementary appendix for:****“Investment Additionality and Job Creation: Evidence from Reforms to Regional Development Funding in Germany”, *The Annals of Regional Science*****Appendix A: Variable definitions, descriptive Statistics and additional estimation results****Table A1: Variable definitions and descriptive statistics**

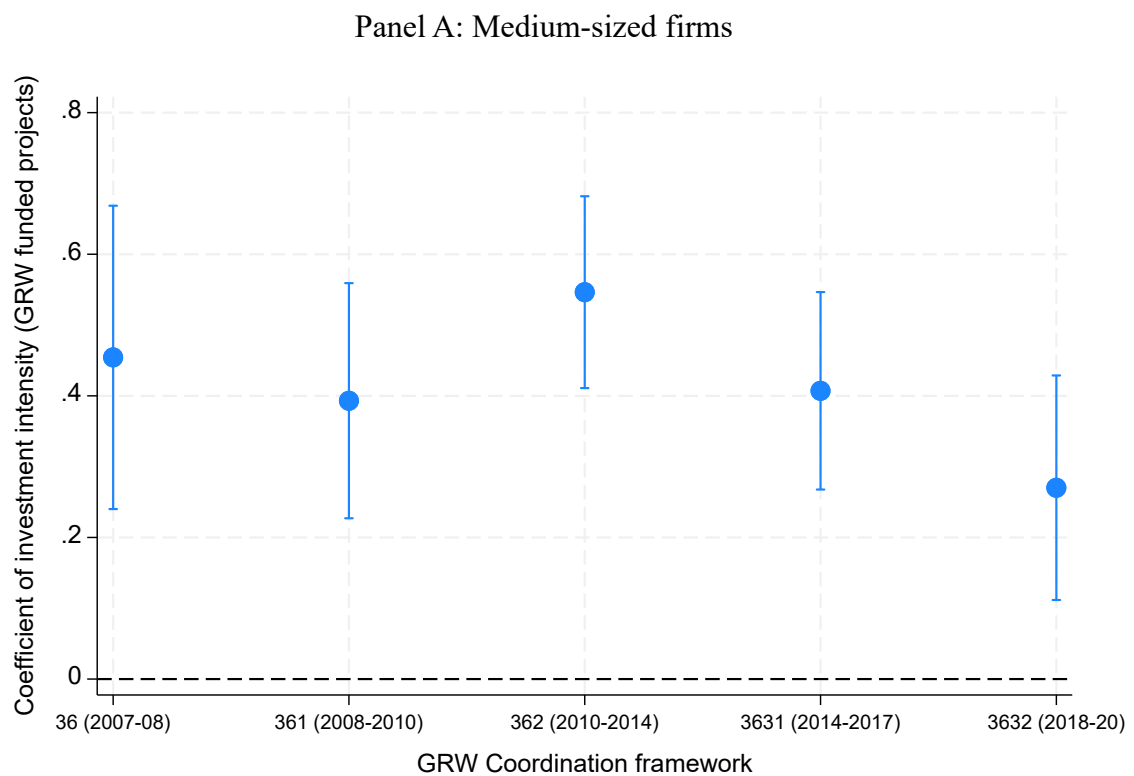
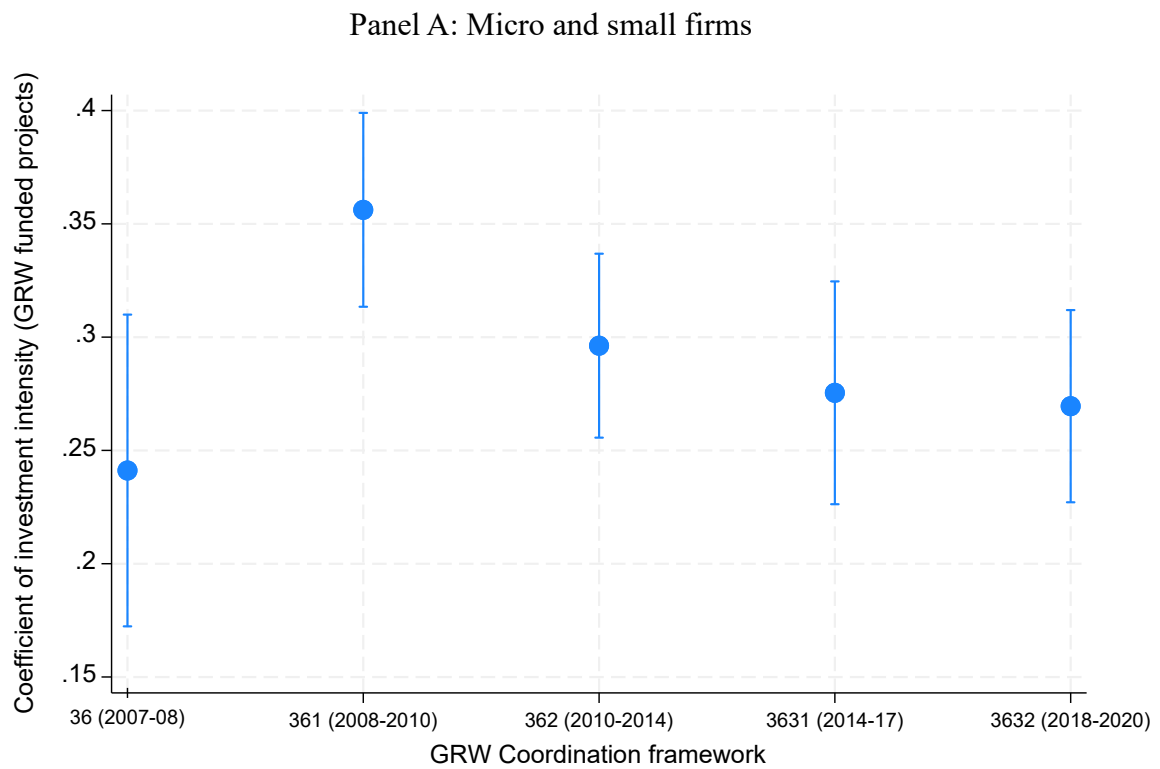
| <b>Micro and small firms (up to 49 employees)</b>    |                                                                                      | <b>Obs.</b> | <b>Mean</b> | <b>S.D.</b> | <b>Min.</b> | <b>Max.</b> |
|------------------------------------------------------|--------------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|
| <i>Δemp</i>                                          | Average number of newly created jobs in GRW funded firms (in total persons)          | 5,968       | 4.49        | 8.52        | 0           | 240         |
| <i>emp_initial</i>                                   | Initial employment level in GRW funded firms before project start (in total persons) | 5,968       | 17.37       | 13.05       | 1           | 49          |
| <i>grw_inv</i>                                       | Average investment volume in GRW funded firms (in million Euro)                      | 5,968       | 1.43        | 2.90        | 0           | 67.50       |
| <i>grw_invpemp</i>                                   | Average GRW investment volume per employee (in million Euro per initial employment)  | 5,968       | 0.14        | 0.47        | 0           | 12.58       |
| <i>max_Fundrate</i>                                  | Maximum GRW funding rate (in %)                                                      | 5,968       | 37.61       | 10.92       | 0           | 50          |
| <i>Δmax_Fundrate</i>                                 | Annual change in maximum GRW funding rate (in %-points)                              | 5,968       | -0.66       | 3.55        | -16         | 20          |
| <i>debt_capital</i>                                  | Average debt capital of GRW funded firm (in million Euro per project)                | 5,968       | 0.05        | 0.24        | 0           | 10.24       |
| <i>share_debtcap</i>                                 | Share of debt capital in total investment amount of GRW funded firms (in %)          | 5,968       | 5.77        | 11.90       | 0           | 129.75      |
| <b>Medium-sized firms (with 50 to 249 employees)</b> |                                                                                      |             |             |             |             |             |
| <i>Δemp</i>                                          | Average number of newly created jobs in GRW funded firms (in total persons)          | 1,739       | 12.20       | 18.94       | 0           | 282         |
| <i>emp_initial</i>                                   | Initial employment level in GRW funded firms before project start (in total persons) | 1,739       | 106.08      | 46.50       | 50          | 249         |
| <i>grw_inv</i>                                       | Average investment volume in GRW funded firms (in million Euro)                      | 1,739       | 4.53        | 5.96        | 0           | 84.4        |
| <i>grw_invpemp</i>                                   | Average GRW investment volume per employee (in million Euro per initial employment)  | 1,739       | 0.04        | 0.06        | 0           | 1.19        |
| <i>max_Fundrate</i>                                  | Maximum GRW funding rate (in %)                                                      | 1,739       | 38.31       | 10.43       | 0           | 50          |
| <i>Δmax_Fundrate</i>                                 | Annual change in maximum GRW funding rate (in %-points)                              | 1,739       | -0.69       | 3.46        | -15         | 20          |
| <i>debt_capital</i>                                  | Average debt capital of GRW funded firm (in million Euro per project)                | 1,739       | 0.22        | 0.73        | 0           | 10.90       |
| <i>share_debtcap</i>                                 | Share of debt capital in total investment amount of GRW funded firms (in %)          | 1,739       | 6.72        | 13.77       | 0           | 165.14      |

*Notes:* Variables are constructed based on GRW monitoring data obtained from the BAFA (2021). For a description of the monitoring data see main text.

**Table A2: Municipal- and district-level control variables**

| Variable and description  |                                                                                                                        | Obs.  | Mean   | S.D.   | Min.   | Max.   |
|---------------------------|------------------------------------------------------------------------------------------------------------------------|-------|--------|--------|--------|--------|
| <i>Employment rate</i>    | Employed persons at the place of residence per 100 inhabitants of working age, (in %, measured at the municipal level) | 5,968 | 58.51  | 6.81   | 5.08   | 151    |
| <i>Unemployment rate</i>  | Unemployment rate (in %, measured at the municipal level)                                                              | 5,968 | 8.34   | 3.25   | 2.51   | 19.41  |
| <i>Local business tax</i> | Local business tax ( <i>Gewerbesteuer</i> ) per population (in Euro per population, measured at the municipal level)   | 5,968 | 339.66 | 916.38 | -16858 | 47618  |
| <i>GDP growth</i>         | Annual growth rate of nominal GDP (in %, measured at the district level)                                               | 5,968 | 2.30   | 3.55   | -20.73 | 16.64  |
| <i>GDP per capita</i>     | GDP per population (in Euro, measured at the district level)                                                           | 5,968 | 24,445 | 5,644  | 12,180 | 75,300 |
| <i>Industry share</i>     | Share of industry sector in total regional gross value added (in %, measured at the district level)                    | 5,968 | 32.55  | 8.74   | 11.07  | 65.24  |

*Notes:* Variables are constructed based on regional data obtained from the INKAR database (BBSR, 2025): INKAR – Indikatoren und Karten zur Raum- und Stadtentwicklung. Available at: <https://www.inkar.de>. Municipal level = LAU2 region (Gemeinden), district level = NUTS3 region (*Kreise*). Descriptive statistics reported for sample of GRW funded projects in micro and small firms. For estimation, variables are log-transformed.

**Figure A1: Employment effects of GRW funded investment projects by framework plans**

*Note:* Estimates include municipal- and district-level controls together with municipal-level fixed effects. Included regional controls are listed in Table 1 in the main manuscript.

**Table A3: Municipality-wide employment effects of GRW investment projects**

| Outcome: $\Delta emp$                                | (1)                | (2)               | (3)               | (4)                  | (5)                  | (6)                   |
|------------------------------------------------------|--------------------|-------------------|-------------------|----------------------|----------------------|-----------------------|
| Estimation method:                                   | FE                 | FE                | FE                | FE                   | FE                   | FE                    |
| <b>Micro and Small Firms</b>                         |                    |                   |                   |                      |                      |                       |
| <i>Investment intensity</i><br>(GRW funded projects) | 0.002*<br>(0.0014) | 0.002<br>(0.0015) | 0.001<br>(0.0015) | 0.002<br>(0.0014)    | 0.001<br>(0.0015)    | 0.000<br>(0.0012)     |
| <i>Employment rate</i><br>(municipality)             |                    |                   |                   | 0.239<br>(0.1738)    | 0.299<br>(0.1999)    | 0.189<br>(0.1936)     |
| <i>Unemployment rate</i><br>(municipality)           |                    |                   |                   | 0.038***<br>(0.0087) | 0.042***<br>(0.0091) | 0.624***<br>(0.1251)  |
| <i>Local business tax</i><br>(municipality)          |                    |                   |                   | 0.005<br>(0.0041)    | 0.005<br>(0.0044)    | 0.003<br>(0.0082)     |
| <i>GDP growth</i><br>(district)                      |                    |                   |                   | -0.059<br>(0.0505)   | -0.105*<br>(0.0616)  | -0.053<br>(0.0539)    |
| <i>GDP per capita</i><br>(district)                  |                    |                   |                   | -0.038**<br>(0.0164) | -0.019<br>(0.0674)   | -0.208***<br>(0.0743) |
| <i>Industry share</i><br>(district)                  |                    |                   |                   | -0.023*<br>(0.0121)  | -0.053<br>(0.0380)   | 0.047<br>(0.0376)     |
| Obs.                                                 | 5949               | 5949              | 5949              | 5928                 | 5928                 | 5928                  |
| Region FE                                            | State              | District          | Municipality      | State                | District             | Municipality          |
| Time FE                                              | Yes                | Yes               | Yes               | Yes                  | Yes                  | Yes                   |
| (Macro-region $\times$ time) FE                      | Yes                | Yes               | Yes               | Yes                  | Yes                  | Yes                   |
| <b>Medium-Sized Firms</b>                            |                    |                   |                   |                      |                      |                       |
| <i>Investment intensity</i><br>(GRW funded projects) | 0.004<br>(0.0025)  | 0.003<br>(0.0027) | 0.002<br>(0.0029) | 0.003<br>(0.0026)    | 0.002<br>(0.0027)    | 0.002<br>(0.0027)     |
| <i>Employment rate</i><br>(municipality)             |                    |                   |                   | 0.217<br>(0.1667)    | 0.346*<br>(0.1802)   | 0.304***<br>(0.1112)  |
| <i>Unemployment rate</i><br>(municipality)           |                    |                   |                   | 0.046**<br>(0.0193)  | 0.050**<br>(0.0199)  | 0.482***<br>(0.0550)  |
| <i>Local business tax</i><br>(municipality)          |                    |                   |                   | 0.000<br>(0.0064)    | -0.001<br>(0.0068)   | 0.023**<br>(0.0093)   |
| <i>GDP growth</i><br>(district)                      |                    |                   |                   | 0.061<br>(0.0703)    | -0.067<br>(0.0780)   | 0.005<br>(0.0606)     |
| <i>GDP per capita</i><br>(district)                  |                    |                   |                   | -0.055**<br>(0.0253) | -0.101<br>(0.0958)   | -0.296***<br>(0.0843) |
| <i>Industry share</i><br>(district)                  |                    |                   |                   | -0.023**<br>(0.0100) | 0.035<br>(0.0630)    | 0.039<br>(0.0567)     |
| Obs.                                                 | 1733               | 1733              | 1733              | 1725                 | 1725                 | 1725                  |
| Region FE                                            | State              | District          | Municipality      | State                | District             | Municipality          |
| Time FE                                              | Yes                | Yes               | Yes               | Yes                  | Yes                  | Yes                   |
| (Macro-region $\times$ time) FE                      | Yes                | Yes               | Yes               | Yes                  | Yes                  | Yes                   |

Notes: \*\*\*, \*\*, \* denote statistical significance at the 1, 5, 10% critical level; robust standard errors clustered at the municipal level are given in brackets; State = German Federal State (NUTS1), District = NUTS3 region (*Kreis*), Municipality = LAU 2 region (*Gemeinden*); FE = Fixed effects. Further notes on the reported post-estimation tests for instrument relevance and exogeneity are given in the main text.

**Table A4: Subsample estimates for East and West German municipalities**

| Outcome: $\Delta emp$        | (1)                          | (2)                 | (3)                       | (4)                 |
|------------------------------|------------------------------|---------------------|---------------------------|---------------------|
| Sample:                      | <i>East Germany</i>          | <i>West Germany</i> | <i>East Germany</i>       | <i>West Germany</i> |
| Estimation method:           | 2SLS                         | 2SLS                | 2SLS                      | 2SLS                |
|                              | <b>Micro and Small Firms</b> |                     | <b>Medium-sized Firms</b> |                     |
| <i>Investment intensity</i>  | 0.642***                     | 0.623***            | 0.598***                  | 0.545**             |
| <i>(GRW funded projects)</i> | (0.0409)                     | (0.1053)            | (0.1452)                  | (0.2117)            |
| <i>Obs.</i>                  |                              |                     | 1051                      | 674                 |
| <i>Region FE</i>             | Municipality                 | Municipality        | Municipality              | Municipality        |
| <i>Time FE</i>               | Yes                          | Yes                 | Yes                       | Yes                 |
| <i>Regional Controls</i>     | Yes                          | Yes                 | Yes                       | Yes                 |

Notes: \*\*\*, \*\*, \* denote statistical significance at the 1, 5, 10% critical level; standard errors clustered at the municipal level are given in brackets. Included regional controls are listed in Table 1 in the main manuscript.

**Table A5: Share of municipalities with declining maximum fund rates 2007-2020**

| Federal state          | East Germany | Municipalities with increasing maximum funding rate 2020 vs. 2007 | Municipalities with decreasing maximum funding rate 2020 vs. 2007 |
|------------------------|--------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| Schleswig-Holstein     |              | 64                                                                | 106                                                               |
| Niedersachsen          |              | 76                                                                | 199                                                               |
| Bremen                 |              | 0                                                                 | 2                                                                 |
| Nordrhein-Westfalen    |              | 79                                                                | 15                                                                |
| Hessen                 |              | 39                                                                | 42                                                                |
| Rheinland-Pfalz        |              | 38                                                                | 48                                                                |
| Bayern                 |              | 7                                                                 | 217                                                               |
| Saarland               |              | 15                                                                | 10                                                                |
| Berlin                 | Y            | 0                                                                 | 1                                                                 |
| Brandenburg            | Y            | 0                                                                 | 270                                                               |
| Mecklenburg-Vorpommern | Y            | 0                                                                 | 316                                                               |
| Sachsen                | Y            | 0                                                                 | 351                                                               |
| Sachsen-Anhalt         | Y            | 0                                                                 | 153                                                               |
| Thüringen              | Y            | 0                                                                 | 220                                                               |

Notes: Variables are constructed using data obtained from the BAFA (2021). Calculations are based on changes in maximum funding rates for micro and small firms.

**Table A6: Leave-one out subsample estimates for German federal states**

| Outcome: $\Delta emp$                                | (1)                          | (2)                       |
|------------------------------------------------------|------------------------------|---------------------------|
| Sample:                                              | <i>Micro and Small Firms</i> | <i>Medium-sized Firms</i> |
| Estimation method:                                   | 2SLS                         | 2SLS                      |
| <i>Investment intensity</i><br>(GRW funded projects) |                              |                           |
| excl. Schleswig-Holstein                             | 0.566***<br>(0.0319)         | 0.502***<br>(0.0758)      |
| excl. Niedersachsen                                  | 0.566***<br>(0.0321)         | 0.511***<br>(0.0748)      |
| excl. Bremen                                         | 0.566***<br>(0.0322)         | 0.511***<br>(0.0749)      |
| excl. Nordrhein-Westfalen                            | 0.570***<br>(0.0322)         | 0.506***<br>(0.0749)      |
| excl. Hessen                                         | 0.566***<br>(0.0322)         | 0.510***<br>(0.0749)      |
| excl. Rheinland-Pfalz                                | 0.562***<br>(0.0321)         | 0.515***<br>(0.0750)      |
| excl. Bayern                                         | 0.569***<br>(0.0321)         | 0.522***<br>(0.0757)      |
| excl. Saarland                                       | 0.562***<br>(0.0320)         | 0.506***<br>(0.0748)      |
| excl. Berlin                                         | 0.566***<br>(0.0322)         | 0.510***<br>(0.0750)      |
| excl. Brandenburg                                    | 0.544***<br>(0.0361)         | 0.535***<br>(0.0767)      |
| excl. Mecklenburg-Vorpommern                         | 0.561***<br>(0.0340)         | 0.493***<br>(0.0817)      |
| excl. Sachsen                                        | 0.628***<br>(0.0433)         | 0.444***<br>(0.0923)      |
| excl. Sachsen-Anhalt                                 | 0.543***<br>(0.0348)         | 0.506***<br>(0.0757)      |
| excl. Thüringen                                      | 0.568***<br>(0.0345)         | 0.557***<br>(0.0926)      |
| Region FE                                            | Municipality                 | Municipality              |
| Time FE                                              | Yes                          | Yes                       |
| (Macro-region $\times$ time) FE                      | Yes                          | Yes                       |

Notes: \*\*\*, \*\*, \* denote statistical significance at the 1, 5, 10% critical level; standard errors clustered at the municipal level are given in brackets.

## **Appendix B: Regional performance, maximum funding rates and economic potential**

### **B.1. Regional performance indicator, eligibility and maximum funding rates**

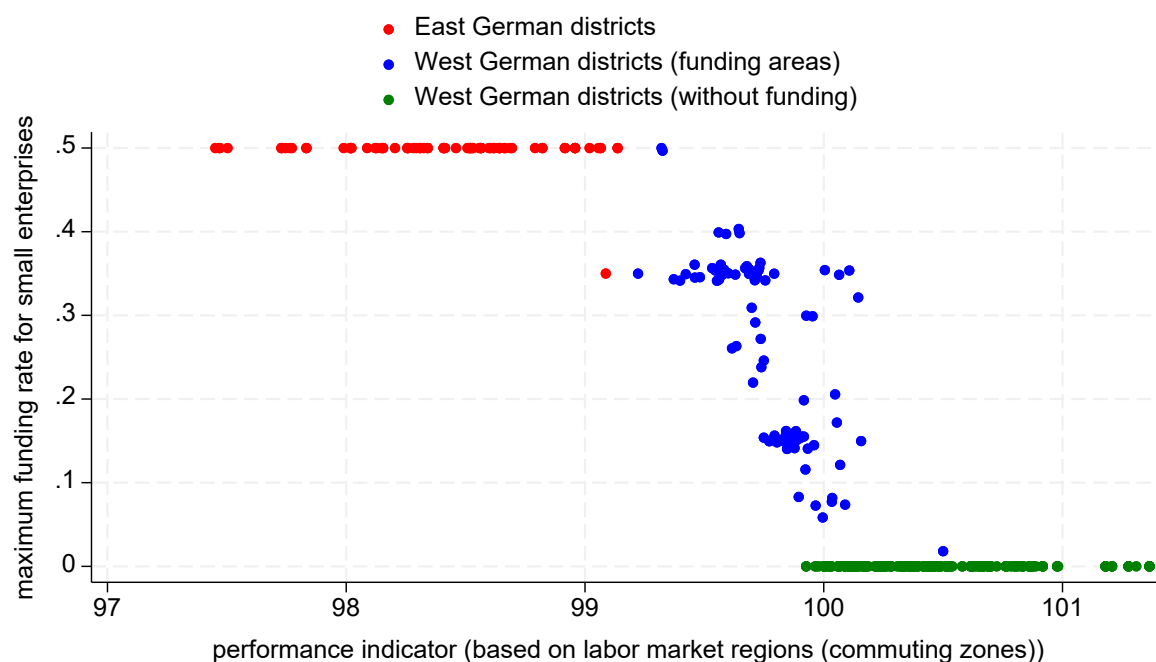
The institutional and historical context underlying the definition of eligible regions and maximum funding rates is central to our assumption of instrument exogeneity. Our sample begins with the 2007–2013 funding period. Before the start of the funding period, a “performance indicator” was calculated for all 270 German labour market regions, generating an index value for each region. Eastern German regions consistently recorded the lowest values. Despite this, all of Eastern Germany had already been designated as a priority funding area for 2007–2013 under EU rules at the NUTS2 level. Consequently, the 66 Eastern German labor market regions among the 117 eligible regions were selected independently of their indicator scores. In these regions, the maximum funding rate was applied uniformly (KR-36, pp. 21–22).

In Western Germany, the regional indicator model (Schwengler, IAB Short Report No. 17/2006) reduced the number of structurally weak labour market regions from 41 in 2000–2006 to 29 eligible regions in 2007–2013. Under the EU Regional Aid Guidelines, these areas were classified as C and D regions and received lower funding rates than Eastern Germany. The main exception was the districts of Uelzen and Lüchow-Dannenberg in the NUTS2 region of Lüneburg, which were also classified as maximum funding areas. More generally, special regulations generated substantial variation in funding rates across Western German regions, only partly reflecting the regional indicator model.

A distinctive feature of the Western German allocation was the so-called “Berlin levy.” Because Berlin’s population of roughly 3.4 million absorbed almost one third of the funding area cap of 9.075 million inhabitants, approximately 1 million were effectively reallocated to structurally weak regions in other Western German states under the flexibilities permitted by the Regional Aid Guidelines. This arrangement was financially neutral for Berlin and allowed support for structurally weak regions insufficiently captured by the indicator model. Similar “population transfers” within Western German states also led to exchanges between C and D funding areas. Hence, maximum funding rates in Western Germany were not mechanically tied to the indicator model but also reflected politically discretionary and plausibly exogenous adjustments.

Figure B1 illustrates the relationship between maximum funding rates and the performance indicator at the beginning of the 2007–2013 funding period. Maximum funding rates in Eastern Germany were assigned independently of measured economic strength. Moreover, no strict relationship existed in Western Germany: around one third of funded Western German regions had indicator values at which other Western German regions received no funding.

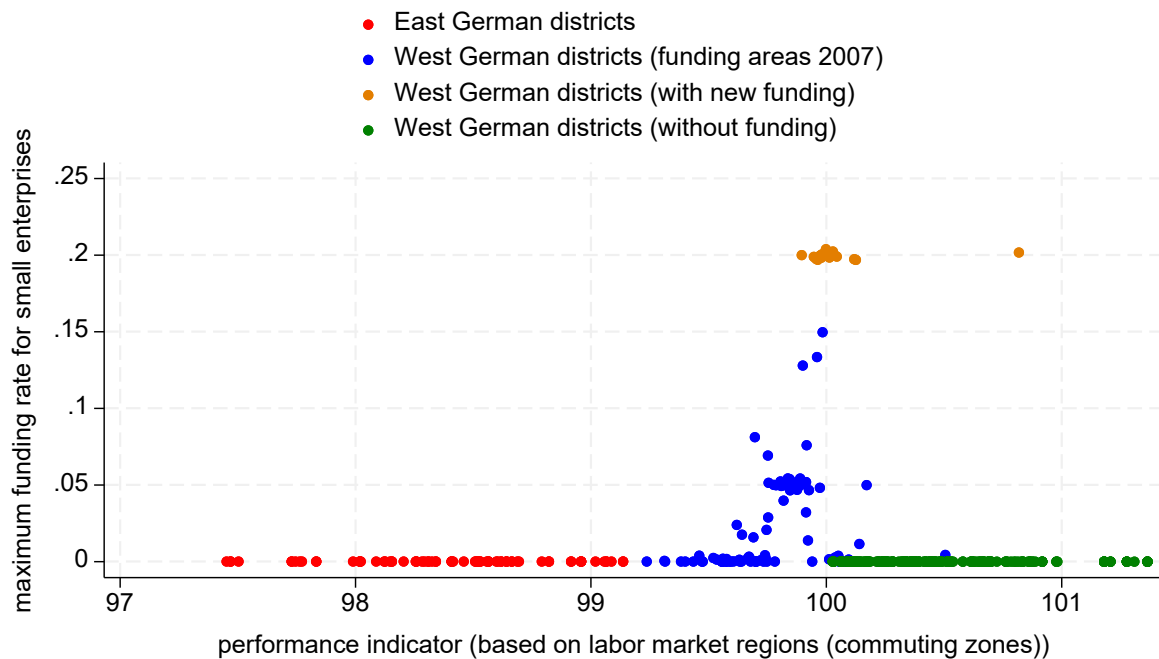
**Figure B1: Maximum funding rate and the performance indicator in East and West German districts, 2007-2013**



*Notes:* Maximum funding rate calculated for micro and small firms.

In West Germany, the funding ceiling set by the European Commission was supplemented by a so-called “D” funding area framework with limited funding rights under EU state aid law in order to largely preserve the scope of the previous “C” funding areas (2000–2006). At the end of 2008, the D-assisted areas were further expanded to include rural problem regions and former E-assisted areas. At the same time, existing leeway under EU state aid law was used to increase the maximum funding rates for small and medium-sized enterprises in D-areas by 5 percentage points. This reform therefore primarily affected the economically stronger regions within the GRW funding areas (see Figure B2). Consequently, the assumption that regions with declining maximum funding rates were ex ante better developed regions with higher expected growth potential does not apply to this amendment, irrespective of whether these regions in fact exhibited stronger development prospects relative to other funding areas.

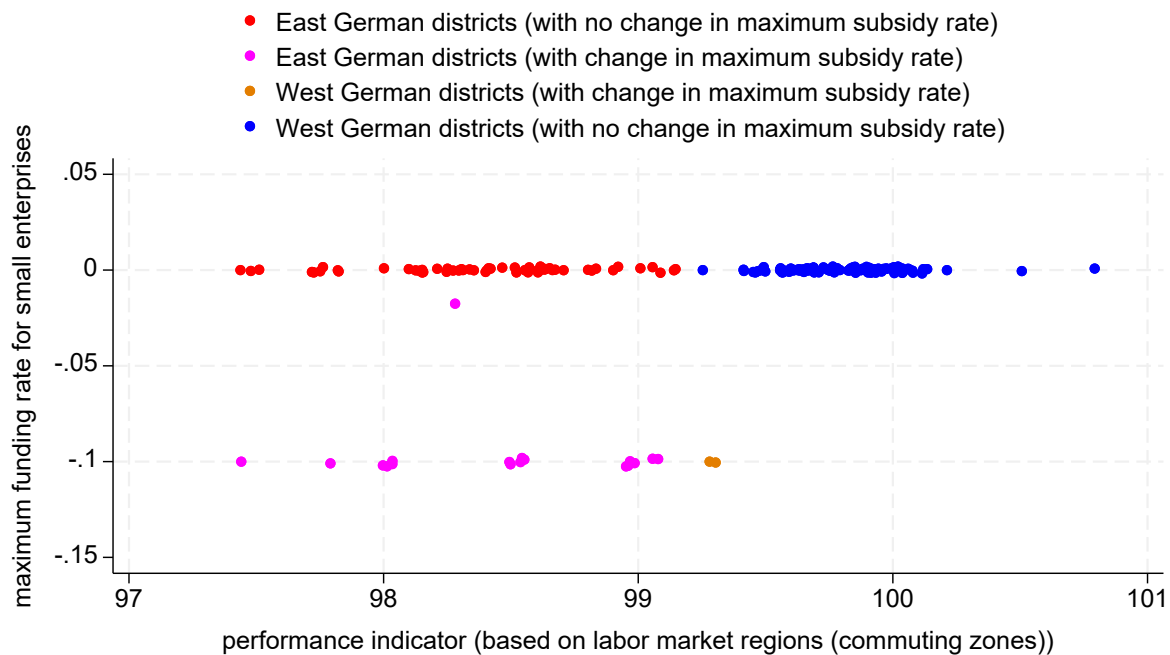
**Figure B2: Change in maximum funding rate in East and West German districts caused by the first amendment to the GRW funding rules (2009)**



*Notes:* Maximum funding rate calculated for micro and small firms.

A second change to the maximum funding rates took place in 2011 (Figure B3). Due to EU state aid rules, for the Eastern German regions of Halle, Leipzig and South-West Brandenburg, as well as for the Western German region of Lüneburg – which had met the criteria for maximum funding status in the EU-15 at the start of the funding period but no longer met them in the EU-25 (so-called ‘areas affected by the statistical effect’), a mandatory review of their maximum funding status in 2011 and a possible reduction in funding rates had already been planned at the start of the 2007–2013 funding period. In fact, this was decided by the European Commission in 2011, meaning that funding rates in these regions had to be reduced by 10 percentage points across the board. However, the regions of Halle, Leipzig, South-West Brandenburg and Lüneburg were NUTS2 regions and not labour market regions. They comprised several districts, and their special funding status was based by EU regulations on their per capita GDP for the period 2000–2002 and not on the performance indicator according the GRW regional indicator model. Within the German funding areas, however, at the time the funding rates were reduced – that is, a good 10 years after their specific status had been determined – the affected districts were by no means districts that had a better performance indicator (or, more generally, a higher level of productivity and significantly better growth prospects).

**Figure B3: Change in maximum funding rate in East and West German districts caused by the second amendment of the GRW Funding Rules in 2011**



*Notes:* Maximum funding rate calculated for micro and small firms.

The 2014–2020 funding period introduced further changes to the GRW funding area framework. Eastern German regions were no longer eligible for the highest level of EU regional aid. Nevertheless, under the “grandfathering” principle of the EU Regional Aid Guidelines, all labour market regions and districts in the new federal states remained designated as predefined C areas. As a result, maximum funding rates in these regions were generally reduced by 15 percentage points. In addition, a further reduction of 5 percentage points from 2018 onwards had already been determined in advance.

Two exceptions applied. First, alongside Berlin, the NUTS2 region of Leipzig was classified only as a non-predefined C area based on average per capita GDP in 2008–2010 and was therefore treated equivalently to West German regions from the outset. Second, East German regions bordering Poland experienced only a 10-percentage-point reduction, with no additional cut in 2018. Consequently, these border regions retained an increasing funding advantage relative to other East German predefined C areas. This exception resulted from EU rules designed to prevent funding gaps with neighbouring Polish A areas from exceeding 15 percentage points.

Hence, funding area designation and maximum funding rates in East Germany continued to be determined primarily by EU regulations rather than by the regional indicator model. This

becomes evident when comparing Schwengler's (2013) ranking of structurally weak regions with the actual 2014–2020 GRW funding framework. Several East German labor market regions (including Jena, Weimar, Potsdam-Brandenburg, Oranienburg, and Dresden) ranked above some West German regions but nevertheless received the same maximum funding rates as the rest of East Germany. By contrast, Leipzig received lower funding rates despite ranking only 23rd among the 54 East German labor market regions in the regional indicator model.

In West Germany, by contrast, funding rates were largely determined by the regional indicator model. Most West German funding areas experienced reductions in funding rates during the transition to the 2014–2020 period, despite in some cases exhibiting lower indicator values than East German regions in Thuringia or the affluent Berlin suburbs. The extent of the reduction depended on prior classification as a C or D area. Former West German C areas generally experienced smaller cuts (5 percentage points) than predefined East German C areas.

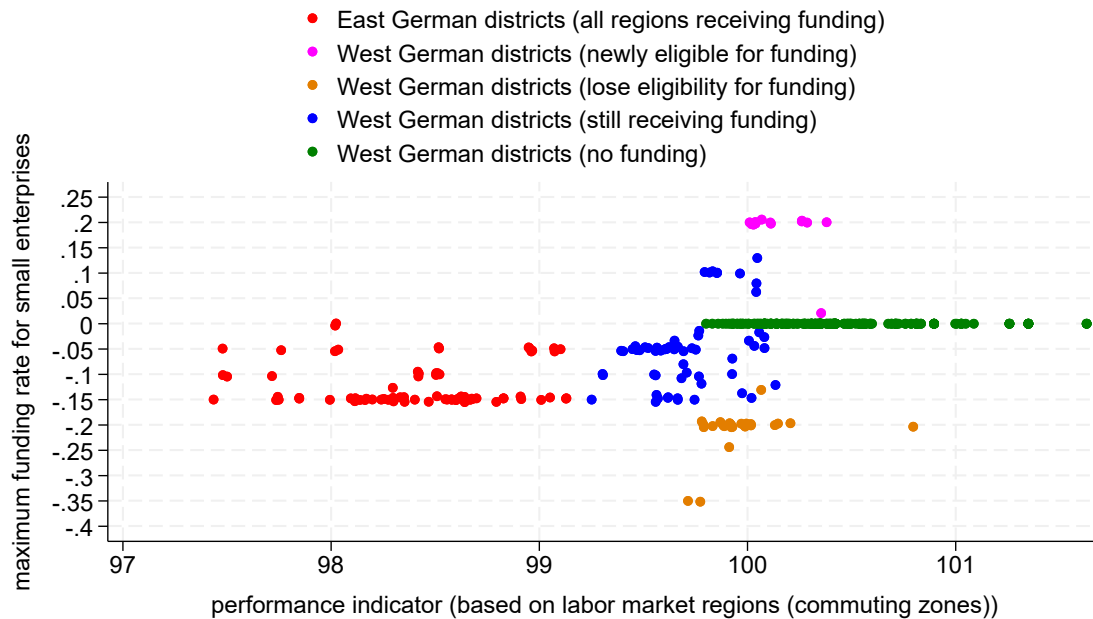
Among the 104 West German districts affected by funding changes, around 30% experienced reductions of up to 10 percentage points, including 22% with a reduction of exactly 5 percentage points. A further 21% were downgraded from C to D areas, implying reductions of 10–15 percentage points, while approximately 27% lost eligibility altogether, particularly in Bavaria, Hesse, and Lower Saxony. By contrast, funding rates increased in 22% of West German districts, mainly because former D areas were upgraded to C status or newly designated as funding areas, especially old industrial urban regions in North Rhine-Westphalia.

Panel A of Figure B4 relates changes in funding rates to the “old” performance indicator from the 2007–2013 period. Although funding rates generally declined, regions with comparable indicator values sometimes experienced either increases or decreases in funding intensity. Overall, no clear relationship emerges between changes in funding rates and economic strength as measured by the performance indicator.

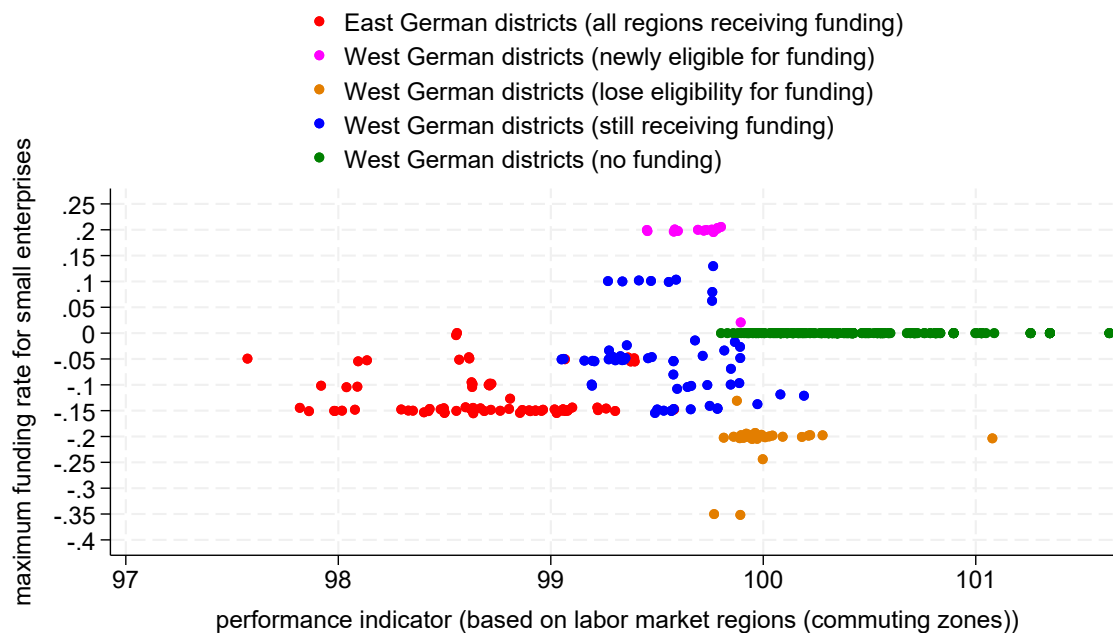
Panel B of Figure B4 repeats the analysis using the revised performance indicator and the delineation of funded and non-funded West German regions in both periods. For West Germany, the allocation and grading of funding areas broadly followed the continuous ranking generated by the performance indicator. Labor market regions close to the relevant thresholds exhibited very similar economic conditions. Consequently, the discrete jumps in funding rates imposed by EU regulations reflected only minor differences in underlying economic strength.

**Figure B4: Change in maximum funding rate in East and West German districts caused by second amendment of GRW-Funding Rules in 2014**

Panel A: Performance indicator (based on commuting zones) in 2007



Panel B: Performance indicator (based on commuting zones) in 2014

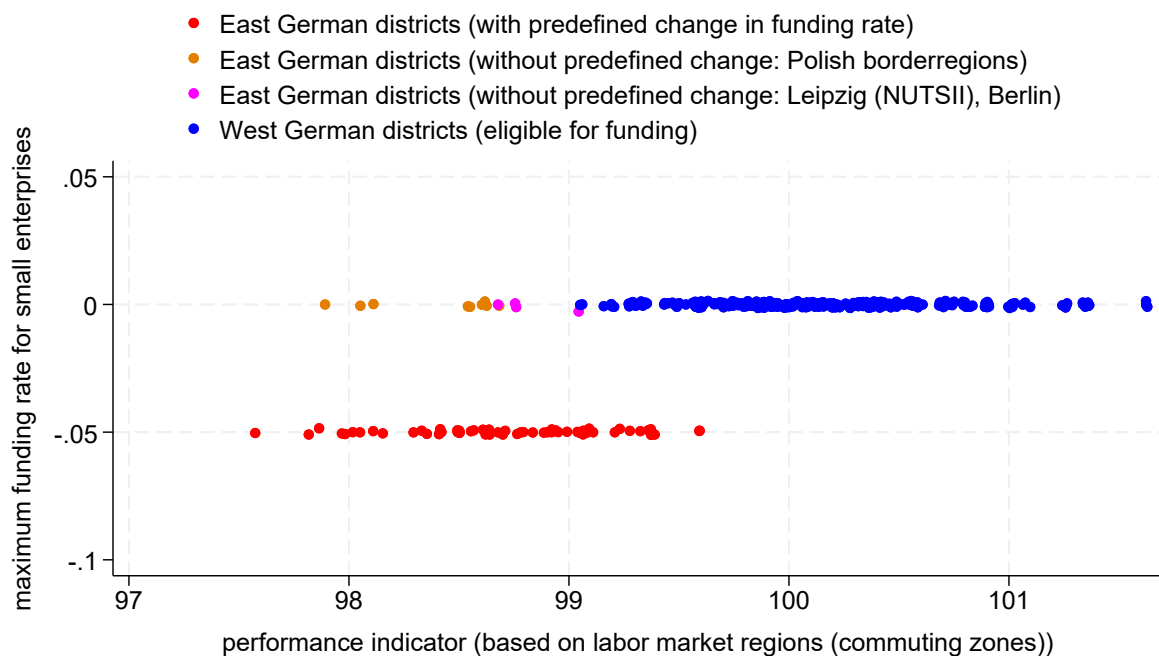


*Notes:* Maximum funding rate calculated for micro and small firms.

The most recent change to the funding rates took place in 2018, again solely as a result of EU state aid regulations: it had already been stipulated at the time the 2014–2020 funding area framework was established that the Eastern German regions – with the exception of regions

bordering Poland, belonging to the NUTS III region Leipzig and Berlin – would lose their preferential status halfway through the funding period. With this latest amendment, the Eastern German funding regions were placed on an equal footing with the Western German funding regions. Figure B5 shows the comprehensive and exogenously determined reduction in funding rates in Eastern Germany. This took place independently of the performance indicator. Here, too, the assumption that “regions with a declining maximum funding rate are the ex-ante better developed regions with expected higher development potential” is therefore incorrect.

**Figure B5: Change in maximum funding rate in East and West German districts caused by the second amendment to the GRW Funding Rules in 2018**



*Notes:* Maximum funding rate calculated for micro and small firms.

In summary, although the initial designation of eligible regions in 2007 was broadly based on the performance indicator, important distinctions existed within the set of funded regions. East German regions were uniformly classified as high-support areas under EU regulations, irrespective of their performance indicator values. West German regions, despite generally exhibiting higher indicator values than East German regions, received lower funding rates.

Subsequent changes in funding rates resulted primarily from political and regulatory decisions rather than from changes in regional economic performance. First, in 2008, several Western German funding areas with comparatively high values of the performance indicator received higher funding rates. Second, in 2011, funding rates in selected East and West German regions

were reduced without any clear relationship to the performance indicator. Third, during the transition to the 2014–2020 funding period, funding rates declined for almost all eligible regions, while a small number of Western German regions experienced increases. Finally, in 2018, funding rates were further reduced for nearly all East German regions irrespective of their performance indicator values, although these regions remained economically weaker than most West German regions.

## **B2. Performance indicator values and subsequent regional development**

The preceding analysis of the relationship between funding rates and the performance indicator in East and West Germany raises a broader question: to what extent is regional economic strength, as measured by the performance indicator, systematically related to subsequent development potential, for example in terms of productivity or employment growth at the district level, either overall or within manufacturing? From a theoretical perspective, both convergence and divergence dynamics are conceivable, implying that economically weaker regions may subsequently grow either faster or slower than stronger regions.

To examine this issue, we estimate the relationship between the performance indicator and several baseline economic variables at the labour market region and district level. As expected, the performance indicators used for the 2007–2013 and 2014–2020 funding periods are positively and significantly correlated with 2007 levels of per capita income, aggregate labour productivity, and manufacturing labour productivity (Table B1). However, these correlations are substantially weaker than those observed for unemployment, whose correlation coefficient ranges between 0.8 and 0.9 and is therefore most closely associated with the performance indicator. The weakest relationship is found for manufacturing labor productivity. Moreover, within the East and West German development regions, the correlations between the performance indicator and both per capita income and labor productivity are noticeably weaker.

A look at the correlation between the performance indicator and the growth rates of various macroeconomic indicators reveals a mixed picture (Table B2). There is a negative correlation with the growth rates of per capita income and labor productivity, and a positive correlation with the growth rates of employment and population. The change in the unemployment rate (in percentage points) also shows a positive correlation; that is, the significant nationwide decline in unemployment was even more pronounced in structurally weaker regions. The weakest correlation for the performance indicator is with employment trends in the manufacturing sector.

It is striking that only very weak correlations are evident in the Western German funded regions with no significant link between productivity growth and employment.

**Table B1: Correlation coefficients between performance indicators and macroeconomic indicators (level variables) at the level of labor market regions (N=257)**

|                                            | performance indicator 2007 |                |       |        | performance indicator 2014 |                |        |        |
|--------------------------------------------|----------------------------|----------------|-------|--------|----------------------------|----------------|--------|--------|
|                                            | all regions                | funded regions |       |        | all regions                | funded regions |        |        |
|                                            |                            | all            | West  | East   |                            | all            | West   | East   |
|                                            | N=257                      | N=134          | N=80  | N=54   | N=257                      | N=134          | N=80   | N=54   |
| GDP per capita                             | 0.69*                      | 0.64*          | 0.45* | 0.57*  | 0.71*                      | 0.61*          | 0.36*  | 0.53*  |
| GDP per person employed (total)            | 0.70*                      | 0.65*          | 0.42* | 0.33*  | 0.70*                      | 0.58*          | 0.21   | 0.35*  |
| GDP per person employed (manufact. sector) | 0.41*                      | 0.24*          | 0.27* | 0.08   | 0.58*                      | 0.41*          | -0.17  | 0.36*  |
| unemployment rate                          | -0.89*                     | -0.87*         | -0.21 | -0.89* | -0.83*                     | -0.79*         | -0.68* | -0.85* |

Notes: columns II-V: GDP per capita in 2007 etc.; columns VI-VIII: GDP per capita in 2014 etc.

**Table B2: Correlation coefficients between the performance indicator and macroeconomic indicators (growth rates) at the level of labor market regions (N=257)**

|                                            | performance indicator 2007 |                |        |       | performance indicator 2014 |                |      |        |
|--------------------------------------------|----------------------------|----------------|--------|-------|----------------------------|----------------|------|--------|
|                                            | all regions                | funded regions |        |       | all regions                | funded regions |      |        |
|                                            |                            | all            | West   | East  |                            | all            | West | East   |
|                                            | N=257                      | N=134          | N=80   | N=54  | N=257                      | N=134          | N=80 | N=54   |
| GDP per capita                             | -0.27*                     | -0.37*         | -0.27* | -0.22 | -0.30*                     | -0.22*         | 0.14 | -0.39* |
| GDP per person employed (total)            | -0.34*                     | -0.45*         | -0.21  | -0.14 | -0.38*                     | -0.38*         | 0.12 | -0.33* |
| GDP per person employed (manufact. sector) | 0.26*                      | 0.22*          | -0.12  | 0.20  | -0.19*                     | -0.14          | 0.10 | -0.28* |
| Employment (total)                         | 0.58*                      | 0.47*          | -0.05  | 0.48* | 0.56*                      | 0.53*          | 0.13 | 0.32*  |
| Employment (manufact. sector)              | -0.20*                     | -0.41*         | -0.05  | 0.09  | 0.25*                      | 0.11           | 0.09 | -0.03  |
| Population                                 | 0.67*                      | 0.54*          | 0.18   | 0.62* | 0.67*                      | 0.53*          | 0.06 | 0.47*  |
| unemployment rate                          | 0.90*                      | 0.90*          | 0.54*  | 0.59* | 0.88*                      | 0.88*          | 0.43 | 0.77*  |

Notes: columns II-V: growth rate of GDP per capita 2007-2014 etc.; columns VI-VIII: growth rate of GDP per capita 2014-2020 etc.

Tables B3 and B4 report correlations using district-level macroeconomic indicators, while the performance indicator remains defined at the level of labor market regions. Correlations are consistently weaker at the district level. For funded districts in both East and West Germany, correlations between productivity growth and employment growth are in some cases very weak. More generally, in West German funded districts, growth rates show no significant correlation with the performance indicator, except for changes in the unemployment rate.

**Table B3: Correlation coefficients between performance indicators and macroeconomic indicators (level variables) at the level of districts (N=400)**

|                                            | performance indicator 2007 |                |        |        | performance indicator 2014 |                |        |        |
|--------------------------------------------|----------------------------|----------------|--------|--------|----------------------------|----------------|--------|--------|
|                                            | all regions                | funded regions |        |        | all regions                | funded regions |        |        |
|                                            |                            | all            | West   | East   |                            | all            | West   | East   |
|                                            | N=400                      | N=197          | N=121  | N=76   | N=400                      | N=197          | N=121  | N=76   |
|                                            |                            |                |        |        |                            |                |        |        |
| GDP per capita                             | 0.44*                      | 0.36*          | 0.11   | 0.37*  | 0.45*                      | 0.34*          | 0.16   | 0.35*  |
| GDP per person employed (total)            | 0.62*                      | 0.53*          | 0.30*  | 0.21   | 0.61*                      | 0.46*          | 0.19*  | 0.26*  |
| GDP per person employed (manufact. sector) | 0.38*                      | 0.24*          | 0.19*  | 0.02   | 0.48*                      | 0.32*          | -0.11  | 0.24*  |
| unemployment rate                          | -0.84*                     | -0.80*         | -0.23* | -0.82* | -0.75*                     | -0.66*         | -0.57* | -0.74* |

Notes: columns II-V: GDP per capita in 2007 etc.; columns VI-VIII: GDP per capita in 2014 etc.

Our analysis is based on municipal-level data. While data on GDP and productivity (both aggregate and sector-specific) are unavailable at this level, information exists on total employment (employees subject to social security contributions at the place of work) and on the employment rate (employees subject to social security contributions at the place of residence per 100 working-age inhabitants). For changes in maximum funding rates to be systematically related to municipal employment trends, the performance indicator itself would need to be strongly correlated with subsequent employment dynamics.

Figure B6 shows that, at the municipal level in the funded regions of West and East Germany, there is no positive correlation between the performance indicator and employment growth; correlation coefficients are not significantly different from zero. Moreover, employment rates decrease as the value of the performance indicator increases. Thus, the assumption that initially stronger regions subsequently exhibit higher employment growth is not supported by the data.

**Table B4: Correlation coefficients between the performance indicator and macroeconomic indicators (growth rates) at the level of districts (N=400)**

|                                            | performance indicator 2007 |                |       |       | performance indicator 2014 |                |       |        |
|--------------------------------------------|----------------------------|----------------|-------|-------|----------------------------|----------------|-------|--------|
|                                            | all regions                | funded regions |       |       | all regions                | funded regions |       |        |
|                                            |                            | all            | West  | East  |                            | all            | West  | East   |
|                                            | N=400                      | N=197          | N=121 | N=76  | N=400                      | N=197          | N=121 | N=76   |
|                                            |                            |                |       |       |                            |                |       |        |
| GDP per capita                             | -0.27*                     | -0.32*         | -0.17 | -0.18 | -0.25*                     | -0.23*         | -0.02 | -0.32* |
| GDP per person employed (total)            | -0.31*                     | -0.39*         | -0.13 | -0.08 | -0.34*                     | -0.35*         | -0.04 | -0.25* |
| GDP per person employed (manufact. sector) | 0.18*                      | 0.11*          | -0.12 | 0.19  | -0.14*                     | -0.14          | 0.01  | -0.17  |
| Employment (total)                         | 0.51*                      | 0.36*          | -0.02 | 0.38* | 0.52*                      | 0.43*          | 0.06  | 0.35*  |
| Employment (manufact. sector)              | -0.20*                     | -0.35*         | 0.01  | 0.11  | 0.14*                      | -0.01          | 0.01  | -0.05  |
| Population                                 | 0.64*                      | 0.44*          | 0.17  | 0.54* | 0.63*                      | 0.44*          | 0.05  | 0.48*  |
| unemployment rate                          | 0.86*                      | 0.86*          | 0.35* | 0.58* | 0.83*                      | 0.82*          | 0.38* | 0.64*  |

Notes: columns II-V: growth rate of GDP per capita 2007-2014 etc.; columns VI-VIII: growth rate of GDP per capita 2014-2020 etc.

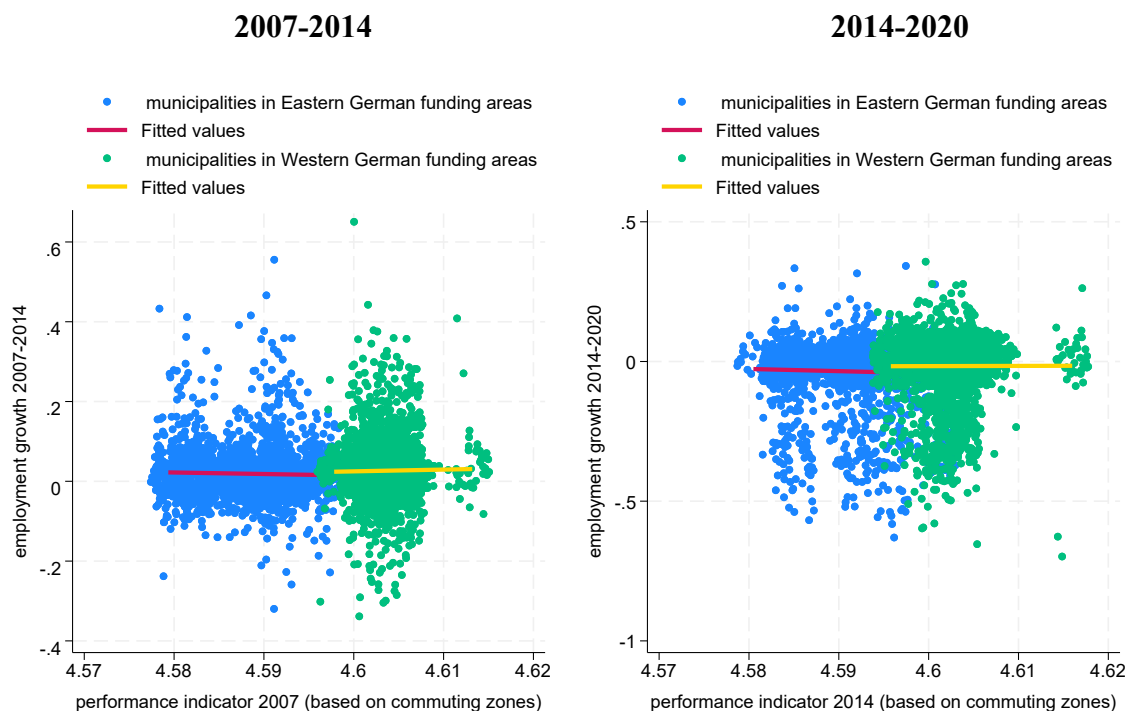
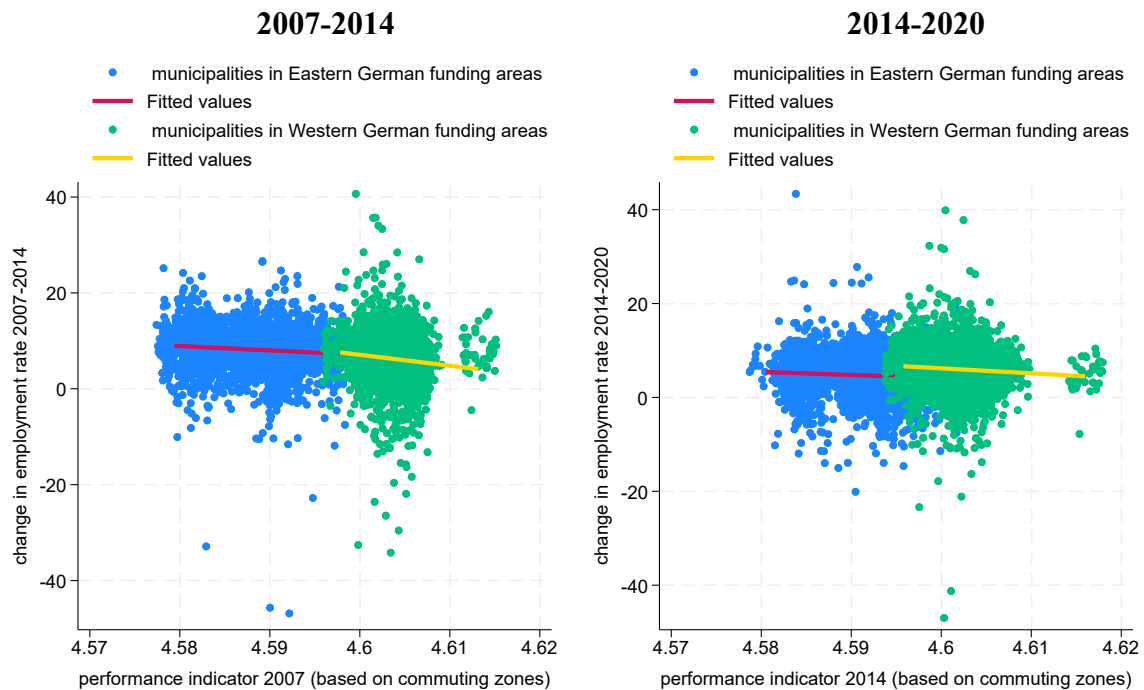
**Figure B6: Scatterplot of change in employment versus performance indicator (based on commuting zones) in East and West German municipalities**

**Figure B7: Scatterplot of change in employment rate versus performance indicator (based on commuting zones) in East and West German municipalities**



Regional development in Germany in recent years has been characterised, on the one hand, by convergence among economically weaker regions, but on the other hand by accompanying population and employment losses in these same areas. These processes overlap with pronounced differences between rural and urban areas as well as between East and West Germany, producing a growing urban–rural divide: rural regions are shrinking and ageing more rapidly than cities, particularly in East Germany. At the same time, East Germany’s catch-up process contributes to overall convergence, whereas West Germany alone exhibits tendencies towards divergence. Across both parts of the country, structural change has driven heterogeneous regional outcomes depending on initial conditions, making it difficult to identify a uniform spatial pattern. The literature accordingly emphasises strong regional heterogeneity in development needs across economic, demographic, and infrastructural dimensions.

Although the performance indicator used to delimit eligible regions is based on a multi-variable model, its level at a given point in time does not provide robust information about subsequent regional development trajectories. The correlation analyses presented here show, at most, weak relationships. These correlations weaken further at the district level and disappear entirely for municipal employment trends, where no systematic relationship is observable.