Long-term Dynamics of Regional Self-employment – What makes a leapfrogger?

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1. Aims and scope

Regional entrepreneurial activity can have strong historical roots. Recent research for a number of countries has shown that regional differences of self-employment and new business formation can be rather persistent (see Fritsch & Wyrwich, 2023), but there are also regions that show considerable change.[1] Analyzing the development of regions that experienced a pronounced increase in entrepreneurship, the 'leapfroggers', could indicate important policy levers to initiate an increase in regional entrepreneurial activity (Potter et al., 2023). Likewise, studying regions with declining levels of entrepreneurial activity, the 'plungers', could help policy makers identify the forces that cause deterioration of entrepreneurial activity. In contrast, regions that remain permanently at the top or bottom of the league table offer only relatively limited opportunities to learn how to initiate change.

The paper investigates the development of regional self-employment and new business formation in Germany. The analysis of self-employment spans a

[1] Fritsch & Kublina (2019), Fotopoulos & Storey (2017), Potter et al. (2023), Fritsch et al. (2025).

period of nearly 130 years, from the late 19th century to the present. The data on new business formation that we analyze are for West Germany from 1978 to 2024, a period of 46 years. The analysis focusses on the following questions:

- How significant are changes in regional entrepreneurial activity?
- What characterizes regions that show a substantial increase in the level of entrepreneurial activity (entrepreneurial leapfroggers)?
- What are the characteristics of those regions that experienced a significant decrease in the level of entrepreneurial activity (plungers)?

Based on these findings we discuss recommendations for a policy that is aimed at fostering regional entrepreneurship.

2. Data and regions

The regional framework of the analysis is the German labor market regions[2] which are functional travel to work areas and thus conceptually related to commuting zones. Each labor market area consists of several NUTS3 regions, ideally a city center and the interwoven surrounding area. There are 257 labor market regions in Germany, 203 in the West and 54 in the East of the country.

We use regional rankings to assess the long-term dynamics of entrepreneurial activity. One main advantage of comparing rank positions of regions over time is that this measure can be expected to be rather robust with regard to national trends that affect all regions in more or less the same way. Therefore, changes in rank positions should reflect primarily regional rather than national influences. Another advantage of rankings is that, due to their ordinal character, they are rather robust with respect to the effect of extreme values ('outliers') that could distort the results if continuous metrics are used. Finally, rankings help mitigate biases in metrics arising from different measurement concepts.

To quantify changes in rank positions, we calculate a Rank Mobility Index (RMI) for each region *r* as

[2] We use the definition of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) (2014).

$$RMI_r = \frac{Rank_{r,t=0} - Rank_{r,t=1}}{n-1} \quad (1).$$

The numerator counts the number of positions changed and the denominator adjusts the index with the highest possible rank change given by the number of ranks (n) minus 1 so that all RMI values are in the interval -1 and +1 (cf. Fotopoulos & Storey, 2017).

Identifying leapfroggers and plungers based on rank mobility rather than growth rates is appropriate because leapfrogging and plunging are fundamentally about relative change. For example, leapfroggers not only show an increase in entrepreneurial activity, but this increase is more pronounced than in other regions that are overtaken. Similarly, plunging means a decrease in the level of entrepreneurial activity compared to other regions. Rank mobility captures relative changes by showing how a region's position changes within the rank distribution.

The choice of independent variables to explain the development of regional self-employment and new business formation is limited by the availability of data. We use information on population density, industry structure, and workforce qualification.[3] In the analysis of self-employment we also use information on the success of regional self-employed persons in the year 1925 that is provided by a respective Census. The analysis of changes in new business formation also includes information on small firm presence, industry diversity, average wage level, and the share of immigrant population.

3. Results for regional self-employment 1895-2020

Figure 1 shows the regional distribution of the RMI values that represent rank changes with regard to regional levels of self-employment between 1895 and 2020. Many of the regions that significantly improved their position in this period were and still are rather rural, many of them located in the south of the country. A considerable part of the leapfroggers, particularly those located close to lager cities, obviously benefitted considerably from development spillovers that were generated by the growth of these centers. However, the performance of other

[3] As a control for the quality of the soil of a region, we apply a set of dummy variables indicating any limits to agricultural use such as gravel, lithic or sodic soil.

leapfrogging regions like those in northern Bavaria, in the south and the west of Baden Wuerttemberg, as well as south-east of Bremen, can hardly be explained by such growth spillovers among neighboring regions.

Regions that declined in the league table exhibited relatively high employment shares in manufacturing and mining in 1895 as well as high levels of population density. Interestingly, the population density in the year 2020 is also much higher for plungers than for leapfroggers. These results indicate that population density is not particularly conducive to entrepreneurship.

We find that a high rank position in the base year is related to a decreasing rank position, indicating a 'regression to the mean' effect. The respective coefficient reflects the fact that regions with a high rank have only limited or even no potential to move up in the ranking, but are faced with the danger of considerable decline. Population density in the base year is only slightly related to RMI values and only in East Germany. We find a negative coefficient for the employment share in manufacturing and mining in 1895 in West Germany but not in the East. The coefficient may indicate the well-known negative relationship between large firm employment and entrepreneurship (Parker, 2018).

Information from two Censuses conducted in the year 1925 indicates a pronounced positive relationship between the income of regional self-employed in that year and an upward move in the ranking. This suggests that the economic success of the regional self-employed is positively related to an increase in regional entrepreneurial activity. Industrial diversity in the year 1925 is positively related to increasing entrepreneurial activity.

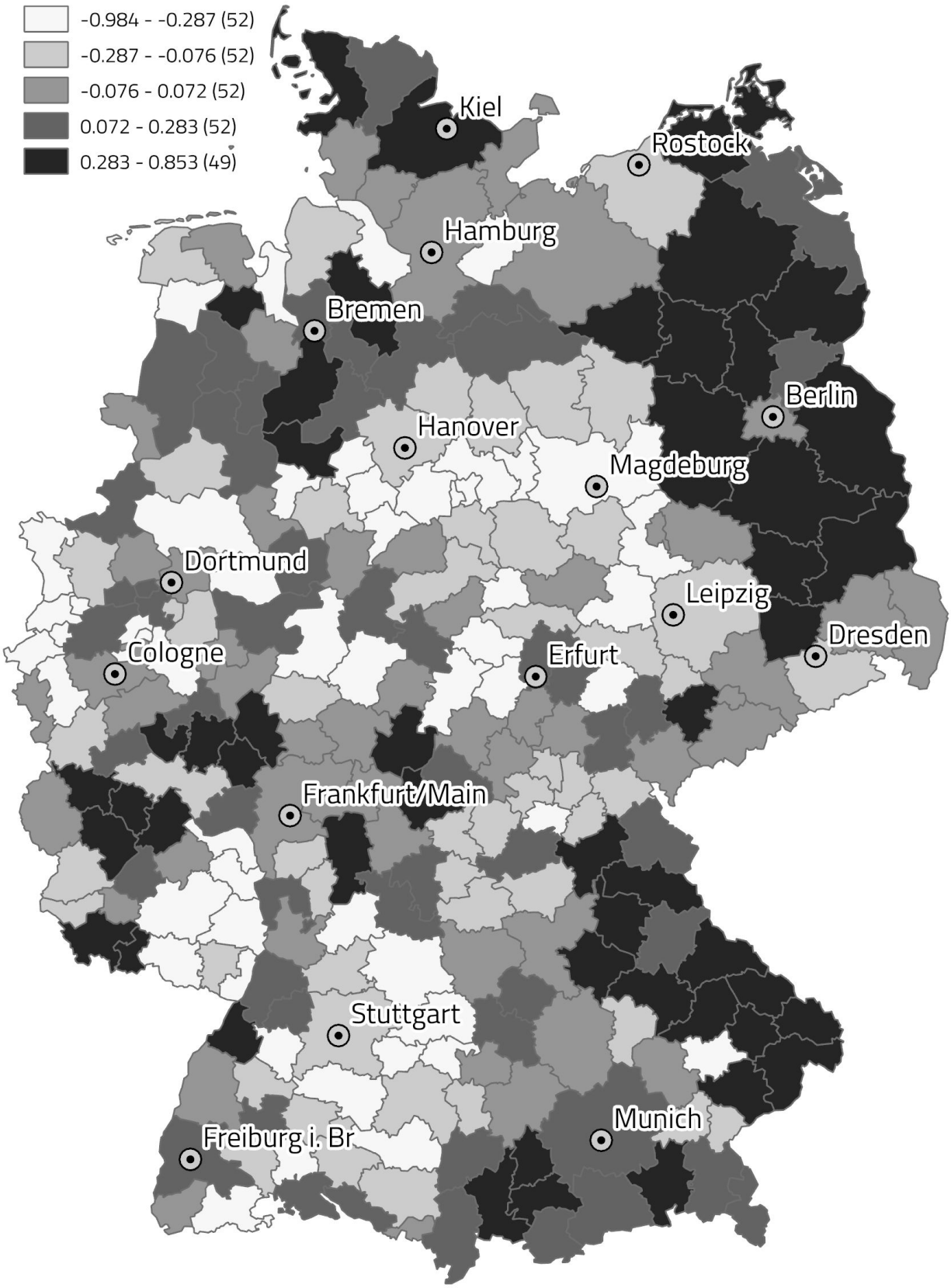

Figure 1: Rank Mobility Index of regional self-employment in Germany 1895-2020

4. Results for regional new business formation

A strong tendency of persistence over long periods of time can also be found for regional levels of new business formation. The analysis of changing levels of start-up activity in West Germany over the period 1978 - 2020 shows a highly significant positive effect of the regional skill level (share of employees with a tertiary degree), a positive effect of the share of immigrant population, and a positive effect of small firm presence. Furthermore, the density of the regional population is positively related to an increase in the number of new businesses in this period. It should be noted that industry diversity, the share of the manufacturing sector, the age structure of the regional population, and the average wage level are not significantly related to the changes in the levels of new business formation. These results for West Germany correspond rather well to the findings of respective analyses for England & Wales and the USA (Fritsch et al., 2025). In particular, these results underline the key role of a qualified workforce as a pool of potential founders.

5. Policy implications and further research

Generally, our analysis confirms long-term persistence of both forms of entrepreneurial activity, self-employment, and new business formation. Since changes in the regional level of entrepreneurial activity occur only slowly, any policy that attempts to increase the regional level of entrepreneurial activity should have a long-term orientation. Respective measures should be regarded as long-term investment into regional entrepreneurship capital.

The policy recommendations that can be derived from our analyses are rather limited and particularly suggest strengthening the qualification of the regional workforce in order to stimulate entrepreneurial activity. Another important finding is that the role of population density for regional entrepreneurship is rather limited. This clearly indicates that good regional conditions for entrepreneurial activity can be found in many kinds of regional setting independent of large cities. Policy may learn more from more in-depth case studies of leapfrogging regions. Such case studies may particularly help identify successful strategies that are not appropriately reflected in the kind of data we applied for our analysis.

Since Germany can be regarded a special case in several respects, it is unclear to what extent our findings may hold for other countries. An important feature in this respect is that the type of entrepreneurship in Germany is quite different from the Silicon Valley model that dominates large parts of the literature. In contrast to the Silicon Valley model, where the impact of entrepreneurship is driven by a few highly innovative and economically successful firms, the relationship between entrepreneurship and growth in Germany is based on an ecosystem of small and medium-sized firms including long-established family businesses, which primarily serve niche markets and focus on customer-oriented innovation (Audretsch, 2021; Pahnke & Welter, 2019). For these reasons, it may well be the case that the long-term relationships between entrepreneurship and regional performance that we found in Germany do not hold in the same way in other countries, particularly in countries where different types of entrepreneurship play a more prominent role. Further research should identify the different models for the effect of entrepreneurship on development.

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