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Education Expansion in Ageing Regions: Demographic Consequences for the Skill Composition

In the context of progressing demographic change across industrialised countries, Germany, the demographically oldest country in Europe, is already facing an ageing and shrinking labour force. Low fertility rates since the 1970s as well as increasing life expectancy imply that changes to the size and composition of the labour force are already measurable and expected to intensify in the future. In coping with the challenges of a smaller and older workforce, continuous investment in education and skill development are considered to be fundamental to avoid possible growth-limiting effects (e.g. Börsch-Supan, 2003; Crespo Cuaresma, Loichinger, & Vincelette, 2016). However, the aggregate effect on the skill composition depends on the balance between two counteracting trends: on the one hand, the decreasing quantity of new labour market entrants due to smaller birth cohorts, and, on the other, the changes in educational attainment in the context of continuous education expansion. Since both demographic balances and educational investment exhibit geographical patterns, demographic change is thus expected to be associated with distinct trends in regional skill compositions. These differences in the availability of specific skills may lead to patterns of regional polarisation of the labour market in young and growing versus ageing and shrinking regions. This paper analyses the link between regional demographic structure and labour force skill composition for German districts (Kreisebene) between 1996 and 2010 and investigates consequences for regional disparities.

In contrast to other European countries, which are only slowly beginning to be affected by population ageing, Germany has been described as "in the midst of demographic change" (Statistisches Bundesamt, 2015, p. 11): Its median age has increased from 38 years in 1996 to 44 years in 2010, it recorded a period of population decline between 2003 and 2009 (Statistisches Bundesamt, 2015), and even with increasing participation rates and considerable immigration, an ageing and decreasing labour force potential is unavoidable (Fuchs, Söhnlein, & Weber, 2011). Despite the overarching national trends, a large extent of regional variation of demographic structure remains, which is characterised also but not exclusively by differences between the east and the west and rural versus urban regions (Bucher, Schlömer, & Lackmann, 2004; Swiaczny, 2015).

Human capital investment is widely emphasised as a prime policy to address the potential negative effects of a smaller and older labour force by increasing labour productivity and supporting the generation of ideas and technological progress. However, there is little empirical evidence on the interrelations between demographic change and human capital itself, especially on a regional level. On an individual scale, studies of cohort-size effects on educational attainment find a positive effect of decreasing cohort sizes on educational attainment (e.g. Fertig, Schmidt, & Sinning, 2009). Although these studies help to understand the channel of influence of demographic change on human capital, they provide little insight into the changes in the aggregate human capital of labour supply. Instead, if education or skills differ among age groups, demographic change affects the overall level and type of human capital by changing the composition of the population and labour force. Taking into account trends of pronounced expansion in secondary and tertiary education, young labour market entrants are, on average, more highly educated than retirees. The compositional effect of demographic change on human capital therefore depends on the balance between the quantity of new labour market entrants and the changes in educational attainment. These effects jointly determine the number of labour market entrants with a given educational or vocational degree.

Considering the extent of regional disparities in demographic conditions (Swiaczny, 2015), it is relevant to consider the consequences of demographic and educational shifts for the skill composition of regional labour markets. The role of selective migration is particularly noteworthy in this context since it may affect aggregate human capital both quantitatively (i.e. representing labour market entries or exits) and qualitatively (i.e. if the distribution of human capital among migrants differs from non-migrants). Indeed, since some regions continue to experience population growth due to migration while others are shrinking and ageing strongly, the associated shifts in the skill composition could lead to a polarisation of the labour force and affect prospects of further economic development and regional disparities.

Studies on the regional skill composition (e.g. Südekum, 2008) as well as the consequences of an older labour force for productivity (e.g. Brunow & Hirte, 2009) and innovative capacity (Gregory & Patuelli, 2015) emphasise the regional relevance of human capital and acknowledge the role of demographic change. However, these studies do not address the relationship between the gradual process of population ageing and changes in the skill composition itself. Furthermore, with the exception of for instance Tarazona (2010), the majority of studies focus on the share of high-skilled or low-skilled labour as measures of human capital. These indicators are limiting for two reasons. First, these broad categories disregard the variety within the skill composition and, especially for Germany and other countries with strong vocational training systems, neglect the substantial human capital content of vocational degrees. Second, considering only the extreme categories of the skill composition implies that relative shifts between types of human capital or educational degrees over time or between regions cannot be investigated.

This paper presents an analysis that considers changes in both the composition of the population and in the composition of human capital. We investigate the regional skill composition by calculating relative shares for six different types of qualification. This approach allows us to consider the skill composition as a distribution across different types of qualification and avoids the dichotomy of the high-skilled and low-skilled. The qualification types refer to the highest level of education completed and distinguish between vocational and higher education (see Table 1). The information is obtained from the Sample of Integrated Labour Market Biographies[1] (SIAB7510), which constitutes a 2% sample of German employees covered by social security, but excluding the self-employed and public servants. Based on this micro-level dataset, we compute detailed regional shares for the qualification types for the period 1996-2010 and link these to demographic and other socio-economic indicators for 332 district-regions in Germany. The effects of population ageing on the relative shares of the respective qualification types are analysed using regional and time-variation by fitting both growth regressions and fixed effects panel regressions.

[1] Data access was provided via a Scientific Use File supplied by the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB).

Type	Secondary Education	Vocational Education	Higher Education
1	Primary / Lower secondary/ Intermediate secondary	No	No
2	Primary / Lower secondary/ Intermediate secondary	Completed	No
3	Upper secondary education	No	No
4	Upper secondary education	Completed	No
5	-	-	University of Applied Sciences Degree
6	-	-	University Degree

Table 1: Six qualification types derived from SIAB7510 and measuring the skill composition

Although all but one regional district exhibit population ageing between 1996 and 2010 and the vast majority exhibits upskilling of the labour force, considerable variation remains. Preliminary regression results suggest that population ageing indeed affects the relative prevalence of certain qualification types in the skill composition. While population ageing is on average associated with a lower share of most highly-skilled qualification types, it is positively associated with degree type 2, i.e. a completed vocational degree with primary, lower secondary or intermediate secondary education. Thus, while regions with a relatively young labour force may experience an education expansion leading to increasing shares of (academic) tertiary degrees, the skill composition in older regions may follow an alternative route involving a stronger role of vocational degrees. In this sense, demographic change may contribute to geographic polarisation of skill availability with broader consequences for local economic development and regional disparities. Acknowledging the relevance of human capital as a driver of economic growth, this article aims to explore the role of demographic change in affecting the skill composition particularly for economically vulnerable regions. To further investigate these patterns, we consider detailed descriptive statistics on regions exhibiting specific patterns and aim to conceptualise a typology of the regional patterns in demographic change and skill development.

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