# The long-term consequences of brain drain related to depopulation on social and territorial cohesion with a focus on the North of the Netherlands and a short comparison with Germany and Denmark

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# Contents

## 1. Introduction

Following the publication of the Report on the impact of demographic change[1] and the Green Paper on ageing[2], the European Commission services are preparing a Communication on Brain Drain[3] and the challenges associated with population decline in line with the Commission Work Programme for 2022.

This paper contributes to the Brain Drain Communication with a territorial analysis with a focus on the North of Netherlands and a limited comparison with similar areas in Germany and Denmark. The aim of this paper is to shed light on the consequences of brain drain and, more broadly, brain circulation on social and territorial cohesion. The paper identifies the economic sectors and job categories most affected and explore how regional economies can adapt to a shrinking (highly skilled) labour force and still achieve a shift to a more productive knowledge-based economy. It will investigate the long-term consequences, the different drivers, and potential comprehensive solutions at all levels of governance to stop or even reverse brain drain.

To shed light on this the focus of this study is on the North of the Netherlands covering the three northern provinces Groningen, Fryslân and Drenthe. About 10% of the population of the Netherlands lives in the North while the population density is four times lower than the average of the Netherlands. The dominating university town Groningen and closely surrounding areas perform relatively well, while the more peripheral areas near the coast and the German border suffer from population decline. Talented young people leave these areas to study at the University of Groningen (UoG) or elsewhere in a city with an institute of higher education and the graduates do not return after graduation to their home regions. As a result, these peripheral regions end up with an aging population and a low educated labour force facing economic decline where automation and robotization causes job losses. This causes further population decline and also cause those services for health, transport and education and local shopping centres are declining. Relatively many inhabitants do not have jobs, depend on social security and are poor. It is very difficult to develop new economic activities that create suitable jobs for the remaining labour force. Several policy initiatives are taken to create new jobs, but success is limited. However, during covid this seems to change, because there is first evidence that due to changing residential preferences and more options to work from home, more people migrate to declining areas where house prices are still moderate and physical living conditions are healthier. However, it is not clear how this will develop after covid and if this will also stop or even reverse brain drain and how this can be supported by policy.

The paper will be based on desk research of existing studies for The Netherlands and specific for the North of the Netherlands. This region borders the UNECSO World Heritage Wadden Sea, the largest tidal flat system in the world, with Outstanding Universal Nature Value, stretching along a coastal strip of about 500 kilometres from the North of the Netherlands via Germany up to Denmark. Due to data problems a detailed comparable analysis encompassing the whole area in the three countries is not well possible. Therefore, the findings for the North of the Netherlands will be compared with the coastal areas in Germany and Denmark by means of a reflection on the relevance of the Dutch results by Stephan Brunow as German and Torben Dall Schmidt as Danish expert, whose opinions will be included as separate textboxes in this paper.

The structure of the remainder of this paper will be as follows. Section 2 will be setting the scene for the region of The North of The Netherlands. It starts with a short historical introduction to regional economic

[1] Demography_report_2020_n.pdf (europa.eu)
[2] Green_paper_ageing_2021_en.pdf (europa.eu)
[3] For the purpose of this assignment, brain drain is understood as the emigration of highly qualified people whose skills are scarce in their place of origin. Its negative effects can occur at national or regional level and can exacerbate problems in regions suffering from population decline, in particular if high skilled movers do not come back to their place of origin.

development and policy as background. Next the regional economic and labour market development will be discussed in detail. Next the demographic development is discussed followed by a detailed analysis of brain drain. Section 2 end with an overview of indicators for well-being, liveability, health and voting behaviour in areas with population and brain drain. Section presents the comparison with similar regions in Germany and Denmark. Section 4 gives an overview of policies that could improve employment opportunities in areas with a shrinking (educated) population and/or make these areas more attractive places to live or mitigate the negative effects of brain drain. In section 5 the results are summarized, and conclusion are drawn. In the whole paper references are made to slides with figures and tables in the accompanying PowerPoint presentation to this paper which is attached as Appendix A tot this paper.

## 2. Setting the scene for the region of The North of the Netherlands

### *2.1. History of regional economic development and policy background*

After World War II the North of The Netherlands suffered from substantive job losses in agriculture and this also led to the fear of a substantial decline of the population. To prevent this alternative job opportunities needed to be found. To achieve this the North of the Netherlands was since the start in the 1950s continuously one of the regions for which a broad variety of regional policy measures were employed. The main goal of these policies was to reduce regional differences (equity goal) e.g., in terms of GDP, employment rate and unemployment. Stimulation of the development of new or the relocation existing industrial activities by means of investment premiums were in place for many decades. For example, in the seventies several branch plants of Philips were established in Drachten, Winschoten, Stadskanaal and Emmen. Other examples of regional policy to enhance the regional economy are the creation of a new harbour (Eemshaven) in the seventies and relocation of the State Postal and Telegraph headquarters from The Hague to Groningen in the eighties. Although the measures certainly contributed to strengthen the regional economic structure, the successes were limited and especially the unemployment rate in the North remained substantially higher and the employment rate substantially lower than the national average. From the beginning of this century traditional regional policy with investment premiums and the equity goal was phased out and replaced by switching to the efficiency goal with a more spatial oriented policy. Based on an evaluation study by the Dutch Central Government (IBO REB, 2004) regional policy was terminated and replaced by non-spatial sectoral policies (Topsectorenbeleid). A final attempt to stimulate the regional economy in the The North of the Netherlands was via a strong lobby for a highspeed MAGLEV train (Zuiderzeelijn) from Amsterdam to Groningen via the new reclaimed polders in the IJsselmeer. However, in 2007 the Dutch Central Government decided not to build the Zuiderzeelijn, but to allocate 1,8 billion euro as a final gesture for regional policy in the North. This amount is mainly used for infrastructural projects in the region of which some like the ring road around the city of Groningen are still under construction. The more recent policy initiatives related to regional economic and demographic development, and especially related to the labour market and brain drain will be dealt with in section 4.

Another major event for the economic development of the region was the discovery in 1959 in Groningen of the largest natural gas field in Europe and one of the largest in the world. Revenue from natural gas production became important in the post-war development and construction of the Dutch welfare state. As a result, Groningen was for many years in the top 10 of richest regions in Europe in terms of GDP per capita. However, the benefits for the inhabitants of the region were very limited because the revenues were not spent in the region and the extraction of natural gas does not create many jobs in contrast to e.g., coalmines. However, the gas extraction resulted in subsidence above the field. From 1991 this was also accompanied by earthquakes but the relation with the gas extraction was denied for a long time. The earthquakes led to damage to houses and unrest among residents. It was therefore decided to phase out gas extraction from 2014 onwards. The reinforcement operation and damage settlement because of the

earthquakes are progressing slowly. The National Ombudsman called this a "national crisis" in 2021. The Groningen gas field is expected to be closed in 2022, but this might be postponed due to the present situation with the delivery of natural gas from Russia related to the war with Ukraine. In the end the Nordic region hardly benefitted from the natural gas extraction from economic perspective, but many inhabitants suffer from mental illness since earthquake damage is not repaired or compensated for. Trust in the government has gone down substantially, also resulting in high shares of votes for populist parties indicating that the inhabitants of this area feel that their place does not matter. (See also Rodriguez-Pose, 2018, and Dijkstra et al., 2020). Since a few years there is a fund Nationaal Programma Groningen (see https://nationaalprogrammagroningen.nl/) to invest in the future via strengthening the regional economy, liveability, and nature and to invest in education and job creation also in relation to climate change. In addition to that in 2022 also European funding will become available for this region from the Joint Transition Fund (see: https://www.europarl.europa.eu/factsheets/en/sheet/214/just-transition-fund), a new financial instrument within the Cohesion Policy which aims to provide support to territories facing serious socio-economic challenges arising from the transition towards climate neutrality.

Region economies and labour markets can in many ways be affected by demographic transitions like and aging and declining populations and regional development policies might be able to help make labour markets and regional economies more resilient and inclusive (Martinez et al, 2017). In the next sections this will in detail be explored for the North of The Netherlands.

### *2.2. Regional economic and labour market development*

The long term regional economic development in the North of the Netherlands compared to the rest of the country can be characterised by looking at changes in the employment rate (number of jobs per 1000 of the population 15-64 years old) over the last 50 years. Bureau Louter (2017, slides 3 and 4) shows that in the period 1973-1995 the employment rate increased mostly in the Randstad area around Amsterdam and Utrecht, although also some areas in the middle and south of the Netherlands showed positive developments. In the North of the Netherlands the availability of jobs compared to the population worsened in most parts, except for the area close to the city of Groningen. This pattern changed considerably over the period 1995-2010: now the Randstad area is no longer the area with the highest increase in the growth of the employment rate. Now a ring around the Randstad ranging from the top of Nord-Holland, south of Fryslân via Zwolle to the southern province of Noord-Brabant showed the highest grow rate. The situation in the North of the Netherland improved, except for the areas along the coast of the Waddensea and near the border with Germany, where the eastern parts of Groningen and Drenthe perform rather bad.

The lagging position of the North of the Netherlands was also confirmed in the so-called Langman Advies (1997), which calculated that to improve the employment rate for the North of the Netherland and to close the gap to the average level of The Netherlands as a whole, 43.000 jobs extra need to be created on top of the 'normal' development. Based on recent figures from De Stand van het Noorden (Doets et al., 2021) and slide 5 we can conclude that in 2020 the gap has increased to a lack of 64.000 jobs. Slide 6 shows that the region of Delfzijl is the only region in The Netherlands that shows decline in jobs over the period 1996-2020. Other regions in the North show growth rate between 0 – 40% and only the region around the small regional towns of Heerenveen and Drachten (with many industrial firms around a cluster with Philips) in the south-east of Fryslân shows a growth rate of more than 40% which is rather common in many other regions in the middle of the country where some regions (e.g. around Amsterdam) show growth rates of more than 60%. Slide 7 shows that there are also substantial changes within the province of Groningen: the city of Groningen and Westerkwartier to the south-west of the city

show growth rates of 15% over the period 2006-2018, while the area with the earthquakes to the north and east of the city of Groningen show hardly any growth of jobs (Ponds and Van Woerkens, 2019)

The sectoral structure in the North of the Netherlands is rather like the rest of The Netherlands (slide 8). Most striking is that in the North health care is the largest sector in terms of employment. Agriculture and the industrial sector are also relatively large, while business services are relatively small. At the more detailed level of municipalities, slide 9 shows that health care is in most municipalities the largest sector, followed by the trade sector. In on only four municipalities in the province of Groningen the industrial sector is the largest, while tourism related services are the largest sector on the Wadden islands. Slide 10 shows that in the province of Groningen over the longer period 2006-2018 health care shows by far the largest growth with over 10.000 extra jobs. Other sectors with a growth of more than 5.000 jobs are all in the service sector, while the number of jobs is declining in industry, transport and storage, agriculture, and construction. Furthermore, the number of jobs in mining has declined because of diminishing the extraction of natural gas in Groningen. Jobs in financial services decreased due to automation especially in the city of Leeuwarden, which had many jobs in back-offices of banks and insurance companies.

Although the employment rate in the North of The Netherlands is lower than the national average, the gap in the unemployment rate (slide 11) has a bit surprisingly narrowed over de period 2010-2020 and the difference is now only 0.2%. This is partly due to the definition of unemployment where you are only counted as unemployed if you are immediately available for work and are actively searching for a job. This implies that the official pool of unemployed consist mainly of those who receive unemployment benefits. However, unemployment benefits last only two years and those who are than still unemployment are shifted to another type of benefits, viz. minimum subsistence benefits. There is also a large group of people who have mental and/or physical deficiencies and are not able to work or only a limited number of hours in particular jobs. Instead of looking at the official unemployment rate, the net-participation rate (i.e. the share of the labour force with a job) tells a more reliable story. The net - participation rate is also shown in slide 11 and in this graph the difference between the North and the national average is much larger and even slightly increasing. Slide 12 shows the unemployment rate and the net-participation rate at the more detailed spatial level of municipalities. The city of Groningen (and to a lesser extent Leeuwarden) shows the highest unemployment rate, just like other big cities in the Randstad like Amsterdam and Rotterdam. In the rest of the country the more rural and semi-rural areas show below average unemployment rates in most parts of the country. The major exceptions in the North are the municipalities to the east of the city of Groningen and Emmen near the German border. The spatial pattern of the net-participation rate clearly shows that the net-participation rate is the lowest in municipalities in the eastern part of the North near the German border.

Another important aspect of the potential regional development of a region is how a region is perceived by entrepreneurs in terms of locational preferences. Meester and Pellenbarg (2006) started to measure locational preferences of firms starting in 1983 and this survey has been repeated about every ten years since then. The most recent survey is held in 2020 (Koster & Kamminga, 2022). Slide 13 shows the results for the most recent survey for all Dutch firms, but also by region where the entrepreneur is located now. The figure for all Dutch entrepreneurs shows that overall firms prefer to be in the central area of the country and the more remote areas in the south, east and north are less popular. Considering the present location of the firms, the picture is more nuanced: it is clear that the majority of the firms located in the three northern provinces are rather happy with their present location. This so-called 'neighbourhood' effect seems rather obvious, but this has not always been the case as slide 14 clearly shows for the province of Fryslân. In the period 1983-1992 most Frisian firms indicated that the central part of the Netherlands was their preferred location, indicating than in fact they feel that they were not at the best location now. The more recent maps show that the firms feel more and more that they really like to be

located in the province of Fryslân. If this is the case also for the provinces of Groningen and Drenthe is still under investigation, but most likely the results will be like the outcomes for Fryslân.

### *2.3. Demographic development*

The fear for population decline has been an issue for the North of the Netherlands since World War II. Substantive job losses in agriculture and uncertainty about the future caused that many people migrated to other parts of the country or to other countries like the US, Canada, and Australia. Local policy makers were worried about the future of the northern rural part of the province of Groningen and initiated a comprehensive sociography study Bedreigd Bestaan (= Threatened Existence, 1959) about the social, economic, and cultural situation in this area. In 2010 this study was replicated (Gardenier, 2012) and the major findings are that employment opportunities in the rural area decreased substantially. In 1959 one out of three workers were employed in agriculture and this was reduced to one out of 10 in 2010. But the number of inhabitants was higher than 50 years ago[4] and all villages still exist. The population is aging and the provision of services like supermarkets, schools and health care disappeared from many villages. However, the inhabitants are still rather satisfied with the quality of life, mainly because the mobility rate increased substantially leading permitting to make use of services farther away and to commute to jobs located in the urban areas.

Looking in more detail to the change in population over the period 1996-2016 (slide 16) regions in the central part of The Netherlands showed in increase in population of more than 25%. In four peripheral regions in the south and two regions in the North in the province of Groningen the population declined. Two other regions in the North show a small increase of 0 – 4,5% and the more central regions in the North showed moderate growth rates in the range of 5,5 – 16,5%. All in all, population growth in the North of The Netherlands is substantially lower than in the core areas of The Netherlands. Within the province of Groningen there are significant differences (slide 17): in the period 1990-2015 the city of Groningen shows an increase in population of 20% which is even higher than the average growth in The Netherlands of 15%. Westerkwartier to the south-west of the city show growth rate just below the national average, while the area with the earthquakes to the north and east of the city of Groningen show population decline.

Since World Wat II internal migration caused a substantial redistribution of the population over the country (slide 18). In the period 1948 - 1952 the main flows were from the North and from the southern province of Zeeland to the core Randstad region. Ten years late in the period 1958 – 1962 the pattern becomes more diverse: from more and more peripheral regions there are movements to the Randstad, but we also see that people move from the Randstad to the middle part of the country with attractive residential characteristics. This process continued and in the period 1973 – 1977 the picture completely reversed: although there are large flows in both directions, the net effect is that the Randstad is losing population to the rest of the country, among others due to the relocation of government services from the Randstad to peripheral regions. This caused that policy makers in the North of the Netherlands were worried that migrants from the Randstad were taking the jobs of natives in the North. Van Dijk (1986a, b, c) showed in his dissertation that this was hardly the case. The migrants take jobs for which no natives with the right skills were available and this prevented that firms had to close or relocate due to lack of skilled personnel. On top of that the spendings of the migrants turned out to have a large multiplier effect that generated more jobs than the crowding out effect of natives by migrants. All in all, Van Dijk concluded that migration to the North in this period had positive effects for the regional economy instead of negative effects for local unemployed as expected by the policy makers.

[4] But consider that for the country as a whole the number of inhabitants has tripled.

Looking backwards, the period 1973-1997 was an exception period. The big economic crises in 1973 and 1981 caused that although the regional differences decreased for the Netherlands, for the provinces Groningen and Fryslân the difference with the national average increased (Atzema and Van Dijk, 2005). This is also clear from the migration flows over the period 1996 -2000 which is very similar to the period 1958 – 1962. The province of Drenthe is an exception, because it attracted end of career senior citizens (so-called Drenthenieren) from the Randstad who enjoyed the nice residential and recreation conditions in this province.

Migration figures for the more recent period 2010 – 2020 show (slide 19) that net internal migration for the North of the Netherlands. After 2010 net-migration became more and more negative with a peak in 2017 after which the negative effect almost disappeared. In contrast to internal migration, the net effect of international migration was positive with a peak in 2017. This is mainly due to asylum seekers which were hosted more than proportionally in the North of The Netherlands and partly compensates or hides the negative effect of internal migration. Slide 19 clearly shows that even over a short period of 10 years substantial fluctuations occur in the trends in migration and these trends differ for internal and international migration.

An interesting question is the effect of COVID on migration trends. Due to COVID working from home and online meetings are very common and it is highly likely that this will also have permanent effects. This may also have effects on the location choice or workers. If you do not have to commute every day to the work location but only 1-2 times per week it is possible that the distance between the home and work location will increase without an increase in the weekly travel time. OECD figures show that the potential for remote working increases with skill level and that the potential for remote working is relatively high in The Netherlands, even in rural regions with low population density. (see: https://www.oecd-ilibrary.org/sites/9431c2ef-en/index.html?itemId=/content/component/9431c2ef-en). Denmark similar to NL, Germany lower, but Hamburg the highest. If the trend of more remote working continuous this might imply that more graduates stay or return to the north if fast broadband access is available everywhere and especially in rural areas and travel time to the rest of the country is further reduced.

Figures about recent regional population and migration developments during COVID for 2020 and 2021 (Slide 20 and 21) show that only three municipalities in the North show population decline. Migration patterns also change: flows out of the Randstad to the Intermediate zone increase, but also to the more peripheral urban areas and regions along the German border. This tendency is also confirmed by changes in the housing market: slide 22 shows that compared to the period 2013-2014 the number of house buyers from outside the three northern provinces who buy a house in the North has tripled in 2019-2020.

Regional population forecasts till 2040 (slide 23 and 24) predict that population decline will be continued especially for the provinces Fryslân and Drenthe while for The Netherlands as a whole the population is expected to grow with 4%. At the more detailed level of municipalities (slide 24) it becomes clear that population decline is the highest in the coastal areas in the North and near the German border in the east. Population growth is predicted for only the very few urban areas and the highest growth of more than 10% is expected for the city of Groningen. However, the forecasts are rather uncertain (slide 25): the lower bound forecasts show population decline for all municipalities in the North except for a small increase for the city of Groningen. In contrast to this, the upper bound forecasts show that only a few municipalities in the far north of Groningen show population decline. This upper bound pattern is more similar to the recent population figures in 2021 (slide 20 and 21) than the mean forecast in slide 25.

Besides the development of the total population also the composition of the population is of importance, especially with regard to age and education from the perspective of the labour market. From slide 26 it can be concluded that nowadays the share of the population over 65 is relatively high in the North of The Netherlands compared to the central part of the country. The forecasts for 2035 indicate that in many municipalities more than 30% of the population will be older than 65. The only exception is the city of Groningen which is in terms of average age the youngest city in The Netherlands since about a quarter of the population consists of students. The aging problem will have substantial implications for the size of the labour force. Slide 27 shows that over the period 2015-2020 the growth of the labour force in the North of the Netherlands was only 1,5% compared to 4,5% for The Netherlands as a whole. Also, the quality of the labour force in terms of education shows that the position of the North of The Netherlands is worsening. Although the share of higher educated increases both in the North and in The Netherlands as a whole, over the period 2010-2022, the increase in the North is less, implying that the gap in the average educational level between the North and the rest of the country is increasing. At the more detailed spatial level of municipalities the difference in educational level is shown in slide 28. In many municipalities in the Randstad where most people live and the big cities are located, over 35% of the population 15-75 are higher educated while in the North of the Netherlands this is only the case in a few municipalities around the city of Groningen. In most municipalities near the coast and near the border with Germany, the share of higher educated is less than 25% or even less than 21%. The background of the regional disparities in the level of education will be analysed in detail the next section 2.4.

Although the long-term predictions of population decline at a detailed spatial level is rather uncertain this does not mean that the potential problem can be ignored. This was also recognized by the central Dutch government and policy measures for a selected number of regions were established based on expected predictions of population decline (Haartsen c.s., 2014 and Actieplan Bevolkingsdaling, 2016). Two types of regions were selected:

A. Krimpgebieden: 9 areas with expected strong decline of > 12,5% till 2040
B. Anticipeergebieden: 11 areas with moderate expected decline of > 2,5% till 2040

The location of the areas is depicted on slide 29. From the map it is clear that 4 of the 9 ‘krimpgebieden’ and 4 of the 11 ‘anticipeergebieden’ are located in the North of the Netherlands, indicating that this part of The Netherlands suffers severely from population decline. The aim of the policy measures it to mitigate the long-term effects of population decline, a shrinking labour force and aging with regard to housing, health care, education, accessibility, economics and labour markets in order to maintain and enhance liveability and economic vitality of the selected areas. For each individual region tailor made projects are agreed upon to mitigate the specific problem of each region. Interesting in the context of this paper is that the issue of brain drain is not mentioned at all-in both policy documents!

### *2.4. Brain drain or clean export product?*

In this paragraph the migration patterns in the North of the Netherlands will be analysed in more detail by municipality, age, income, and educational level. The escalator model predicts that talented people are concentrating in the bigger cities where institutes of higher education are located and might after graduation move to even bigger cities elsewhere in the country with large concentrations of jobs. In the north of the Netherlands the city of Groningen is the only city with a university. The University of Groningen now has about 35.000 students (8.000 from abroad), and in addition there is also the Hanze University of Applied sciences with about 31.000 students (3.000 from abroad). The UoG is concentrated in the city of Groningen and has only one small faculty located outside Groningen: Campus Fryslân in Leeuwarden with about 300 students. In Leeuwarden is also a university of applied science NHL Stenden with about 20.000 students and in addition to that in Leeuwarden 2.500 students are at Van Hall

Larenstein applied university with a focus on agriculture, food and sustainability. Students at applied universities are much more inclined to stay at the of the home of the parents during study.

The diagram on slide 31 clearly shows for the period 2013-2016 that the city of Groningen attracts young people with a sharp peak in the age group 15-20 years old, while many of them leave the region after graduation when they belong to the age group 20-30 year. The blue dots on the map on slide 31 show the municipalities that have a negative migration balance with the city of Groningen which attracts migrants from all municipalities in the North while most of them do not return after graduation to the municipality where they come from. The red dots show the municipalities that have a net gain in migrants. This is the city of Groningen itself and some of the surrounding municipalities in the North (on e-bike cycling distance!) and furthermore the big cities (especially Amsterdam) in the Randstad are attracting graduates from Groningen. For Leeuwarden the same pattern applies that young people move to the city of Leeuwarden to study and leave afterwards, but the numbers are much smaller than for the city of Groningen, and much more students continue to study at the home of the parents while studying. Overall, this leads to the conclusion that especially the areas near the coast and the German border loose population because young people are moving out and do not come back.

Statistics Netherlands permits a more detailed analyses of internal migration flows of adults of 18 years and older by several subgroups (age, student, type of household, type of home, income, social security benefits) between municipalities in the Netherlands for the period 2017-2020 via the dashboard: https://dashboards.cbs.nl/v3/Verhuizingendashboard2017tm2020/

Results for 2020 for the municipality of Groningen, which has by far the largest flows, are displayed in slides 33-36 for all migrants, the age group 18-25 and for students in higher education and at the medium level of education. In total about 11.000 persons move to and from Groningen, the net flow is nearly zero. Migration to and from abroad are excluded from the results presented here, because these are less relevant for the problem at hand. In 2020 about 2.400 students came to Groningen, while 1.500 left, leading to a net outflow of 900. Slide 34 shows that the age groups 18-25 is by far the most mobile group with an inflow of 7.200 and an outflow of 5.500 resulting in a net inflow of 1700, where also the age group 26-35 shows a substantial mobility, but with a net outflow of 1.400 of most likely higher educated graduates and early career movers. Slides 35 and 36 show the migration rates of higher educated and medium lever educated to and from the municipality of Groningen. The pattern for higher educated students is rather similar that for the age group 18-25, although the absolute numbers are about 1.8.00-2.000 lower and the net inflow is 250 lower. But it seems obvious that the migrants in the group of 18-25 mainly consist of students in higher education. This is confirmed by slide 36 with the migration pattern of medium level students. For the medium level students, the inflow in Groningen is only 400 and the outflow 250, while the number of students at the medium level is about 75% of the number of students in higher education. So, the mobility rate of medium level students is much lower. However, the need for them to move is also lower because the educational institutes are also more equally spread over the region, although there is a tendency to concentrate in fewer locations.

A comparison of the detailed maps of the origin and destination of the flows to the municipality of Groningen show that the municipalities of origin are more often located in the more peripheral areas in the North near the coast and the German border while the outflow is to the areas around the city of Groningen or to big cities in the rest of the country, and this confirms the pattern for the period 2013-2016 in slide 31. The pattern is visible already in slide 33 for total migration but becomes more outspoken in slides 34 and 35 for the young people and the students in higher education. In slide 33 the top 10 municipalities with the highest absolute number of migrants consist of municipalities in the north with the only exception of Amsterdam, which is number 8 in the list of origins, but number 1 in the list of destinations. When we compare the top 10 list of all migrants with the top 10 lists for young people and higher education students in slide 34 and 35 the pattern of origin is rather similar like total migration, but

the list of destination municipalities is dominated by Amsterdam, Utrecht, Zwolle, Rotterdam which are the top 4 with also s' Gravenhage (The Hague) in the top 10. For the medium level student in slide 36s, the top 10 municipalities of origin and destination are all located in the North. Slide 37 shows a similar pattern for the province of Fryslân. The capital city Leeuwarden with the Applied University NHL Stenden attracts most people, but overall, there is a loss of population in the age group 15-29 although the net loss decreases over the period 2010-2021.

All in all, the evidence of migration flows presented in slides 33-37 clearly show that the city of Groningen attracts substantial numbers of young people from the rest of the North and this group consist mainly of students entering higher education. This indicates a brain drain from the provinces Fryslân and Drenthe, to Groningen especially form the more remote municipalities near the coast and the German border to the provincial capital of Groningen and to a much lesser extent to the provincial capital Leeuwarden of Fryslân. After graduation a substantial number of graduates remains close to Groningen in the city itself or the surrounding municipalities commuting to Groningen, and to a lesser extend substantial numbers move to the big cities in the Randstad, especially to Amsterdam, after graduation and in the early career stage. This conclusion is in line with the findings of Elshof (2020) in a study of migration patterns by income level for the period 2011-2016 between the 'krimpgebieden' and 'anticipeergebieden' identified by population decline policy and the provincial capitals and the remaining areas. The results show that migration flows increase income differences in the North of the Netherlands. The areas with population decline 'krimpgebieden' and 'anticipeergebieden' 'krimpgebieden' ('krimpgebieden') show lower inflow of higher income groups and less outflow of lower income groups that the other areas in the North. On top of that these regions loose population because students move to the capital cities and do not return to their home region after graduation from institutes of higher education.

Instead of analysing migration flows, it is also possible to shed light of the 'stay rate' by level of education by analysing longitudinal information obtained from registry data of Statistics Netherlands of cohorts of youngsters who reached the age of 16 between 1984 and 1992. From this group we know in in which municipality they live at the age of 16 and at the age of 28 and we know if they completed an educational degree completed in this period. The results are presented in slides 38-40 and more information can be found at the website Talent in the Region, 2022 (see https://talentinderegio.com/talentmonitor/). Slide 38 shows the stay rates for all youngsters: especially in the province of Groningen most municipalities lost more than 50% of the 16-year-old, with the city of Groningen as the major exception. In Fryslân, Leeuwarden keeps most young people. In Drenthe the municipality of Emmen shows the highest keep rate of all municipalities in the North although only a small branch plant of the applied university NHL Stenden is present in Emmen. A possible explanation for the high keep rate in Emmen is the very low share of higher educated (see slide 28) in this municipality. This implies that most inhabitants have lower levels of education and lower educated are less spatially mobile than higher educated and that they can find a job in or near Emmen that fits with their level of education. Slides 39-40 provided more detailed information about spatial differences in the obtained level of education in combination with changes in municipality of residence. Slide 39 clearly shows that youngsters living in or close to the city of Groningen and to a lesser extend Leeuwarden much more often obtain a university degree. For applied university students this effect is smaller and most visible for the province of Groningen in the municipalities facing population decline near the coast and the German border. Youngsters living in these areas much more often obtain a degree at the medium level of vocational education. On top of that slide 40 shows that very often more than 50% of those who obtain a medium level degree live in the same municipality ate the age of 16 and 28. This in contrast to those obtaining a university degree of which in most of the municipalities less than 20% lives in the same municipality at the age of 16 and 28.

The foregoing indicates that two factors explain the large spatial differences in education shown in slide 28 and the lower level of education in the areas near the coast and the German border. First, in these municipalities the share of youngsters that obtain a degree of higher education is substantial lower than

in the more urban areas with on average a higher share of higher educated (parents). In addition to that a very large share of often more than 80% of those who obtain a university degree do not return to the municipality where they live at the age of 16.

We can conclude that there is indeed a brain drain *within* the North of the Netherlands from the areas near the coast and the German border to the central cities and surrounding areas without population decline. But an interesting question is also if the North suffers from brain drain when we take into account the in- and outflow of students to the University of Groningen (UoG). Slide 41 shows the results (Edzes c.s., 2020). It turns out that 65% of the university students living in the North at the age of 16 graduate from UoG, 35% goes elsewhere, mainly to Technical Universities in Delft, Eindhoven and Enschede. From the students at UoG 47% lives at the age of 16 in the North and thus 53% comes from elsewhere outside the North. In terms of students, the North attracts more students from elsewhere than students in the North who go to a university elsewhere in the country. This implies a brain gain. Slide 41 shows that two years after graduation this brain gain still exist, but after 4-6 years after graduation the retained share of graduates shrinks to 36% which is less that the 47% of students originating from the North and implies also a small brain drain at the level of the North as a whole.

Venhorst et al. (2013) analyse the spatial mobility of graduates from 10 years before graduation till 18 years after graduation for all Dutch universities. The results are depicted in slide 42. It is clear that the city of Groningen is a very popular university to study, but even before graduation some students already leave Groningen, e.g., for writing a thesis or doing an internship. It is also clear that Amsterdam, and to a lesser extent Rotterdam continue to keep and attract graduates from elsewhere also after graduation. Students originating from the North are much more inclined to stay in the North after graduation than those who came to study in Groningen from outside the North.

Based on a survey among Groningen students about search behaviour for jobs Fisher, Wever and Alsem (2021) found that about 50% of the students intend to stay in Groningen for work, 30% intends to leave and 20% does not know yet. University graduates intended more often not stay in Groningen than applied university students, but they did not find significant differences between fields of study. In the long run (10 years later) the share who expects to work outside Groningen increases significantly which is in line with actual behaviour shown in slide 41. The main reason to leave is career opportunities (70%), where the second reason (40%) is living together with the partner. Career opportunities are perceived to be better in the Randstad for all disciplines, expect health care. The main reason to stay is family and friends (44%), but also work (40%) and the living environment (30%) are frequently mentioned as reasons to stay. A substantial share of the leavers think that they might return to Groningen in a later stage of life, but those in economics and management have the lowest expectations that this will happen. Those with roots in the North have the highest chance to return to the North in a later stage of life.

All in all, we may conclude that there is substantial brain drain from the North of the Netherlands resulting in an overall lower level of education in the North as a whole, but also within the North resulting in a rather uneven distribution over the North (slide 28). The share of higher educated is about twice as high in and near the city of Groningen and to a lesser extent Leeuwarden than in the municipalities near the coast and the German border. For the North as a whole, the brain drain picture is more complicated. The UoG attracts half of the students from outside the North (and an increasing number – 8.000 in 2021 - from abroad, of which one third from Germany). Just after graduation more than half still lives in Groningen, but over time more and more leave the North mainly because of (perceived?) lack of job opportunities and (the job) location of the partner. This implies that also at the level of the North as a whole brain drain exists. However, the fact that half of the students at UoG come from outside the North also implies that the UoG is substantially larger than if only students from the own region should study at UoG. Manshanden en Koops (2021) estimate that in terms of spendings and jobs the institutes of higher education (including the hospital and some related R&D-firms) create 24.000 direct and 5.000 indirect jobs (19% of total employment) in the municipality of Groningen. Many of these jobs are service jobs for

lower educates, although most students themselves also work parttime in these sectors. Expenditures of students and employees are 1.6 billion euro and compare to around 30% of total wages earned in the city. Although there is some brain drain, the impact in terms of jobs is very substantial and the 'production' of graduates can also be valued as a clean export product! The benefits can further increase if the North is able to keep a higher share of the graduates, but this requires the creation of more jobs for high educated. Until now the number of R&D jobs is relatively small compared to e.g., Eindhoven and The Hague and here is room for improvement.

### *2.5. Well-being, liveability, health and voting behaviour in areas with brain drain*

Slide 28 shows the final resulting outcome of the migration patterns with regard to the spatial redistribution of higher educated as share of the population 15-75 year in 2020. It is clear that the higher educated concentrate near the location of the institutes for higher educated in the bigger cities. For the North this is clear around and in the municipality of Groningen and to a much lesser extent in and around Leeuwarden. In many municipalities in the Randstad where most people life and the big cities are located, over 35% of the population 15-75 are higher educated while in the North of the Netherlands this is only the case in a few municipalities around the city of Groningen. In most municipalities near the coast and near the border with Germany, the share of higher educated is less than 25% or even less than 21%. These are also the areas marked in slide 29 as the 'krimp' and 'anticipeer'-gebieden subject to population decline policy. It is well-know that education is a crucial factor for several socio-economic outcomes, like income, labour participation and unemployment. Education is also related to health. Higher educated have a higher life expectancy of about 5-6 years compared to lower educated and also live more years in perceived good health according to Statistics Netherlands (2020, see: https://www.cbs.nl/nl-nl/nieuws/2019/33/verschil-levensverwachting-hoog-en-laagopgeleid-groeit#id=undefined). In this paragraph we will discuss a series of indicators that shed light on the difference between the municipalities facing strong population decline and brain drain who are selected for policy and other regions.

Slide 12 is already discussed before and shows the unemployment rate and the net-participation rate by municipality. The city of Groningen (and to a lesser extent Leeuwarden) shows the highest unemployment rate, just like other big cities in the Randstad like Amsterdam and Rotterdam. In the rest of the country the more rural and semi-rural areas show below average unemployment rates in most parts of the country. The major exceptions are the municipalities to the east of the city of Groningen, Emmen near the German border. The spatial pattern of the net-participation rate clearly shows that the net-participation rate is the lowest in municipalities in the North near the German border in the region marked for population decline policy. Slide 44 shows maps with the distribution of disposable income and the share of the population receiving social security benefits in 2020. The pattern confirms the conclusion from the maps with unemployment and net-participation: more or less the same municipalities show high or low scores.

The previous indicators are mainly reflecting the economic domain. Nowadays the broader concepts of liveability and well-being are used to reflect spatial differences in broader well-being (in Dutch: Brede Welvaart) and or also related to the UN Sustainable Development Goals (SDG). Slide 45 shows the development of the liveability score for the four NUTS-1 regions in The Netherlands over the period 2002 – 2020 (Mandemakers & Burema, 2022). In all regions the score increases over time and during the whole period and the North of the Netherlands has the highest scores. However, since 2016 the score for the North is stable and even slightly declining, while the other regions continue to improve and reduce the gap with the North. Slide 46 gives a more spatially detailed pattern of well-being scores based on 33 indicators. The maps show for each municipality the number of indicators with a score in the highest and lowest quartile. Also, for this broader set off indicators it is clear that the municipalities with population

decline in the 'krimp' and 'anticipeer' regions near the coast and the German broader show more indicators with a score in the lowest quartile and less with a score in the highest scores. Lower scores are found for indicators like distance to schools, sports and health facilities, labour force participation, income, level of education and in terms of perceived health. A more detailed inspection learns that the type of indicator with low or high scores shows substantial variation over space. (For details see: https://www.cbs.nl/nl-nl/nieuws/2021/49/regionale-brede-welvaart-in-nederland-stabiel-wonen-onder-druk).

A final well-being indicator is perceived health. Slide 47 shows in the left map that the municipalities in the east near the German border that over 25% of their inhabitants perceived their own health as 'not good'. When corrected for income, education and migration background, the difference decreases and almost disappears if further corrections or made for the share in the population with chronic diseases and health limitations.

From the foregoing it can be concluded that the regions in the North suffering from population decline, aging and brain drain which are located near the coast and the German border show lower scores on socio-economic indicators, but also on a broader set of indicators reflecting liveability, well-being and health. Trust in the government has gone down substantially, also resulting in high shares of votes for populist parties indicating that the inhabitants of this area feel that their place does not matter. (See also Rodriguez-Pose, 2018, and Dijkstra, 2020).

## 3. A short (qualitative) description of similar areas in Denmark and Germany

### 3.1 *Introduction*

The foregoing gives an overview of the brain drain from regions in the North of the Netherlands facing population decline related to the regional economic and demographic developments. The vulnerable regions in the Netherlands are located near the coast and the German border. To broaden the perspective of the findings for the North of the Netherlands a comparison will be made with regions along the coast in Germany and Denmark. All these regions border the UNECSO World Heritage Wadden Sea, the largest tidal flat system in the world, with Outstanding Universal Nature Value, stretching along a coastal strip of about 500 kilometres from the North of the Netherlands via Germany up to Denmark.

An attempt for a trilateral comparison has been made by Van Dijk et al (2016) for the first decennium of this century with regard to the demographic and socioeconomic developments in the entire trilateral (with parts in the Netherlands, Germany and Denmark) Wadden region at the very detailed spatial scale of municipalities bordering the Wadden Sea. They find that the area suffers from population decline and an ageing population due to selective migration processes. As a result, the potential labour force is declining. The number of jobs in the Wadden region is also declining and unemployment is relatively high. The regional economic structure of the trilateral Wadden area is very diverse and differs substantially from the national economic structure. However, even within the Wadden area, there are substantial economic differences over space between the islands and the coast, but also between neighbouring municipalities within the coastal areas. For a vital regional economy, any economic development should be targeted at activities that do not have a negative effect on the ecosystem and that can be employed at an economic and spatial scale that fits the natural environment and matches the type of skills and jobs of the inhabitants. The analysis shows that within sectors such as agriculture, fishing, tourism, and personal and business services there are many types of activities that fit within these limitations that could be used to foster a vital regional economy in the Wadden region. Further, jobs can be created further away from the coastal zone if these jobs are created in urban areas within a reasonable commuting distance. Large-scale industrial activities in the Wadden area should be discouraged and, if necessary, only be allowed in the present industrial zones provided any potential damage to the ecosystem can be avoided

to preserve the unique natural values of the Wadden UNESCO World Heritage site. The issue of brain drain is not specifically addressed in this paper, but it is clear that general trends like population decline, aging and less favourable economic conditions are present in the rural areas in all three countries. A detailed quantitative comparative analysis of brain drain for all three countries with similar data as for The Netherlands is not possible within the scope of this paper due to lack of easy accessible comparative data and institutional differences.

Therefore, the findings for the North of the Netherlands in the preceding paragraphs will be compared with the coastal areas in Germany and Denmark by means of a reflection on the relevance of the Dutch results for Germany and Denmark by Stephan Brunow as German and Torben Dall Schmidt as Danish experts in the text boxes below.

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## 3.2 Box Germany: Demographic and regional economic development in rural and urban regions in North-west Germany

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In the following the focus is set on the German north-western part, starting in the north with the Nordic Sea, going south along the common border with the Netherlands to the South of Drenthe (Emmen) and from this area straight to the East up to Hamburg. Finally, the river Elbe restricts to the North-East until the Nordic Sea is arrived. The area offers within a 250km East-West range rural, urban and agglomerated areas[5] at the level of NUTS3 regions (see Figure 1). As can be seen, most of the regions are rather rural with some urban areas along the river Weser (around Bremen, Bremerhafen and Wilhelmshafen) and around Hamburg. Below the demographic, regional economic and labour market situation are summarized based on a series of maps in Appendix B.

Population density less than 200 individuals per squared km in all areas accept the cities. Interestingly, especially the urban areas and cities were shrinking in terms of population since 2005. It is worth mentioning that traditionally the rural regions in that area show a relatively higher fertility rate given a relatively lower proportion of females on all individuals in the age of 20 to 40. There is some rural-urban divide in the proportion of children less than 7 years of age and up to 18 years. However, the variation to the cities is moderate with a difference of a maximum of 2.5% and a mixed picture. So is, for instance the share of children between 7 and 18 years in Bremen slightly lower but for the young children up to 6 years relatively higher. Focussing on the mature population shows that especially the coastal line regions and the majority of rural regions show relative higher proportions of individuals of an age 65 and older. The cities of Oldenburg, Bremen and Hamburg have the lowest fraction of elderly people. The distribution of average age provides another picture concluding that average age is higher in rural regions. Focussing on youth migration, rural regions are less attractive for immigration. All rural regions have lost 18-25 years old youngsters. The net migration flow of the age group of 25 to 30 years can be seen as a migration flow that is not just education oriented but for the entry of the labour market. Students tend to leave rural areas to study in urban regions and economic agglomerations and this spatial mobility has further added to

[5] The definition is mainly population density based and provided by the German BBSR ("Bundesamt für Bauwesen und Raumordnung", Federal Office for Building and Regional Planning)

the already large advantages of these areas and thereby fuelled spatial inequality[6]. There is return migration mostly to areas with favourable socio-economic conditions, but highly qualified individuals exhibit below average shares of return migration[7]. Again, it is more in favour of urban areas and leads to a loss of talented individuals in rural regions[8]. Focussing on in- and out-migration, solely, does not provide any deeper regional insights except that flows are much lower in rural regions with a relative persistent pattern over time. Net migration from abroad is positive and especially rural regions with a common border to the Netherlands gain population from abroad. Most likely these are Dutch commuters, who migrate to Germany because of lower building land prices, but they keep their job in The Netherlands[9]. Rural regions along the costal line are not in favour of in-migration. Generally spoken, mainly urban areas and their surroundings and the Dutch border regions are attractive for immigration from abroad. Therefore, the proportion of foreigners is significant higher in such centres and low in rural regions (except along the Dutch border). Given the current distribution of individuals, the age structure and mobility, one can carefully draw the picture that the rural regions are expected to shrink in future given the relatively higher fraction of elderly people and the relative potential unattractiveness for jobs. This shifts the focus to the labour market.

There is a clear pattern on the distribution of the fraction of employees working subject social security contributions[10] with respect to the rural-urban divide. The proportion is slightly lower in the cities and rural regions and higher in urban areas. Unemployment and the share of long-term unemployed is higher in rural areas and in the cities. The fraction of unemployed individuals without occupational training and looking for a job as unskilled labour is relatively high in these areas. Additionally, in the cities and its surrounding regions, the proportion of unemployed skilled labour is lowest, but for higher educated specialists and experts is also relatively higher. However, the reason is that the proportion of jobs for higher educated individuals is also higher and indicates a specific selectivity of individuals and jobs in space. Therefore, the analysis now turns to employment opportunities. First, the variation of skilled labour is given but with respect to the regional classification not very pronounced. For short one can conclude: where the proportions in employment for a specific skill level is high, especially for unskilled and specialists/experts, then unemployment is high, indicating the selectivity of workers and jobs in space. However, especially the cities are in favour of jobs requesting high-skilled labour.

The age structure of the unemployed shows that especially in rural regions and cities the youth unemployment is relatively higher, but a clear pattern does not emerge. However, focussing on the proportion of young unemployed (<25 years) on all unemployed shows a clear pattern: it is higher in

[6] Philipp Gareis & Tom Broekel (2022), The Spatial Patterns of Student Mobility Before, During and After the Bologna Process in Germany. First published: 10 February 2022, https://doi.org/10.1111/tesg.12507

[7] Meister, Moritz, Stiller, Johannes, Niebuhr, Annekatrin, Peters, Jan Cornelius, Hinrichsen, Peer Lasse, Reutter, Philipp (2020), Zur Rückwanderung von Arbeitskräften in die ländlichen Regionen Deutschlands: Deskriptive Befunde. Thünen Working Paper, No. 144, https://onlinelibrary.wiley.com/doi/full/10.1111/tesg.12507

[8] This goes along with anectodical evidence that in rural regions young individuals have to answer two questions: Which job do I want? Do I get the job in my (rural) region or do I have to migrate to a city? In cities, on the other hand, just one question emerges: Which job do I want?

[9] Edzes, Arjen E., Jouke van Dijk & Viktor Venhorst (2018). 'Der grenzüberschreitende Arbeitsmarkt der Niederlande mit Deutschland und Belgien: Jenseits von Romantik'. Chapter in: Martin Heintel, Robert Musil & Norbert Weixlbaumer (eds.), 'Grenzen: Theoretische, konzeptionelle und praxisbezogene Fragestellungen zu Grenzen und deren Überschreitungen'. Springer Verlag für Sozialwissenschaften, series: RaumFragen: Stadt – Region – Landschaft, p.379-400. ISBN 978-3-658-18433-9.

[10] "Working subject to social security contributions" indicates that they are not self-employed or civil servants or work in marginal employment opportunities (<= 450€ per month). Those individuals cover about 90% of the entire German labour market.

rural regions, making these regions less attractive for the youth. Contrary, the proportion of mature unemployed on all unemployed is apparently lower in rural regions. Labour demand, especially open vacancies, follow the employment and unemployment structure, when focussing the task content. Labour demand with respect to skills shows a clear picture for specialists and experts in cities and urban areas and few options in rural regions. The self-employment rate is higher in rural regions.

The income in rural regions is relatively lower relative to cities, making the rural regions less attractive. Insofar it is not surprising, that the proportion net commuting is in clear favour of cities. Cities gain from in-commuting from surrounding (rural) regions. However, lower housing costs may compensate such that people live in the rural areas and commute to the cities. Long-distance commuting is rather an issue of rural regions between Bremen and Hamburg and less of the rural regions along the Dutch border. Again, long distance commuting is relatively less pronounced in urban areas and cities, indicating that enough jobs are available.

Considering the proportion of the service sector shows a distinct pattern, not necessarily bounded to the regional types but with a specific concentration in urban areas and cities. Especially the creative industry is highly skewed towards cities. Usually, the creative industry provides cultural goods and services (museums, opera houses, etc.) making cities culturally more diverse and relatively more attractive. There is also a higher proportion of industry employees in cities and urban areas. Within the industry, production takes place which is often related to export and thus, wage premia due to increasing returns to scale. Therefore, employment in larger firms with higher employment rates is especially given in cities and urban areas. Usually, large-scale firms benefit from increasing returns to scale, provide better promotion opportunities and as shown, higher wages. In this spite, the proportion of knowledge-intensive employees is also skewed towards the cities and urban areas. Such employees are usually associated with innovation and technological change and advanced production processes, leading to better growth perspectives. The proportion of employment in crafts occupations is higher in rural areas. Usually, these occupations are seen as “dirty, hard, manual” and offer worse working conditions. Finally, the provision of health care services and kindergarten places is better in cities and urban areas.

The descriptive analysis brings the conclusion that the rural regions in North-West-Germany are less attractive from an economic perspective. First, they show a relative older age structure and face population decline. This does not seem to change in future. Second, the provision of job opportunities is worse compared to urban regions and cities, making rural areas less attractive especially for young individuals. They are partly forced to out-migrate for higher education, expecting that many of them do not return, as also the vacant jobs for higher educated are scarce in rural areas, also because of the provision of (public) goods and services and the supply of leisure oriented services is worse. Consequently, the population issue does not change. Therefore, there is a specific brain drain from rural regions, which is associated with lower regional development options and thus, regional growth. Economic growth is usually driven by innovation and start-up activities. These activities usually need high-skilled workers, firm networks, and clusters, but also higher education institutions as a kind of idea-incubator. However, especially the rural regions cannot offer any of these in a substantive manner, such that regional economic growth is limited. With respect to the labour market, one may expect low unemployment rates in rural regions. The reduction, however, is driven by the population decline because currently working individuals will retire and resulting open vacancies may be filled with currently unemployed. The reduction in unemployment is therefore most likely not a sign for a prosperous, developing region but also caused by a shrinking labour force due to continuous population decline.

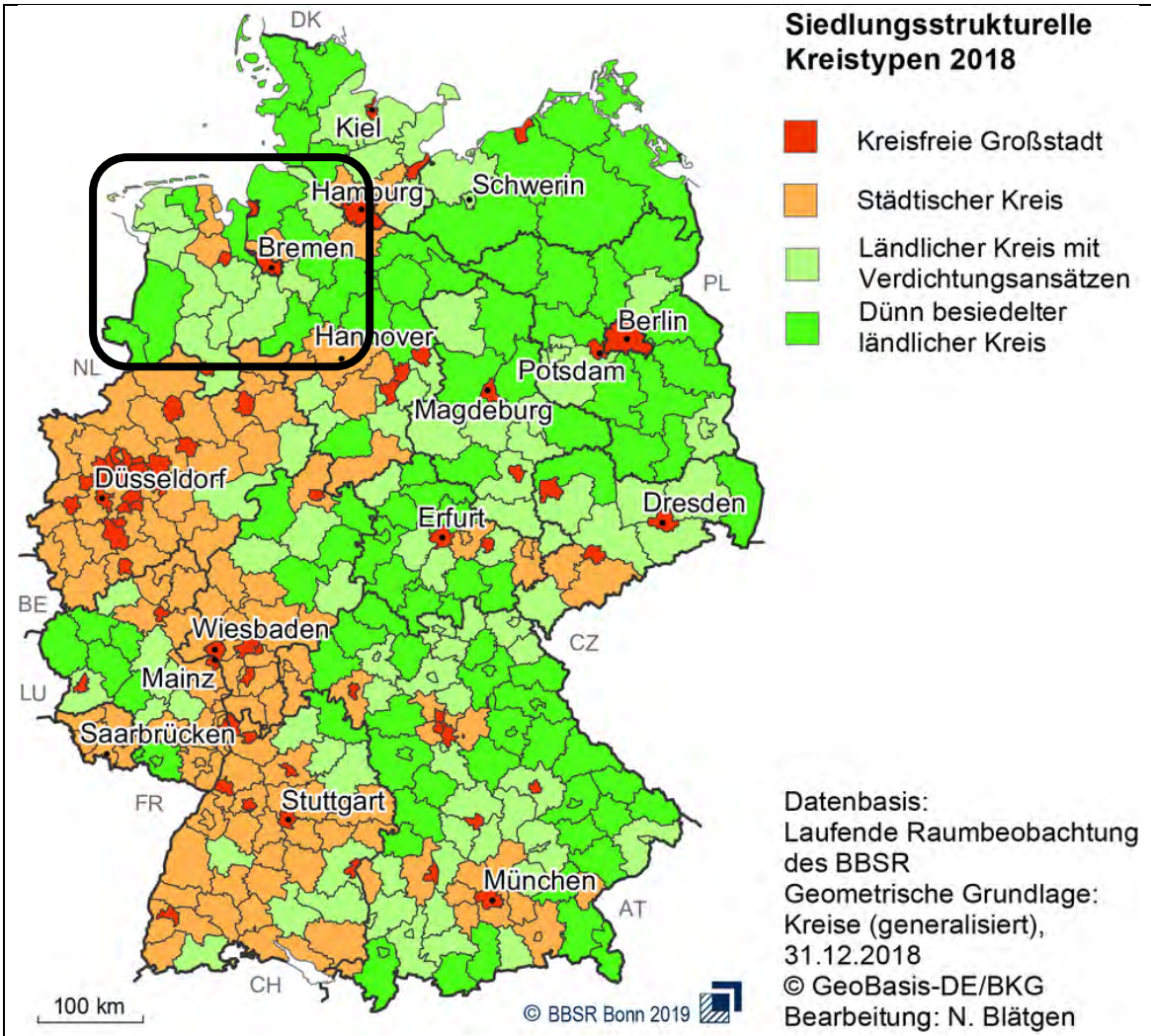



***Figure 1: Regional Classification of the degree of urbanity***

Notes:
Kreisfreie Großstädte: Cities
Städtischer Kreis: Urban area
Ländlicher Kreis mit Verdichtungsansätzen: Rural area with urban features
Dünn besiedelter ländlicher Kreis: Rural area with low population density

## 3.3 BOX Denmark: Demographic and regional economic development in rural and urban regions in Denmark

Denmark is about the same size of Netherlands with an area of 42,924 square kilometers compared with 41,540 square kilometers, while Germany is sizably larger at 357,276 square kilometers.[11] The population of Denmark is at 5,822,800 persons in 2020 compared with 17,407,600 persons in Netherlands and 83,166,700 persons in Germany.[12] Denmark is therefore among the geographically smaller EU countries and has a comparably low population density compared to Germany and Netherlands. Denmark is a unitary state with a central government deciding on policies for the country, while regions and municipalities have considerable autonomy within these national policies and regulations. In terms of regional development, regions are of particular importance, as they were after a structural reform in 2007 given responsibilities for regional development in their respective regions. Their focus is on health care, which is funded by the central government tax revenues. Tax subscription rights are not allocated to regions. Regional development has accordingly been carried more by initiatives from central government.

Given the moderate geographic size of Denmark, the relevance of discussing depopulation, loss of human capital in the periphery and urbanization has been debated. Recent development has though pointed to a renewed strength of considering such issues in Denmark. The following two short sections will first present evidence on depopulation trends and loss of human capital in the periphery for the period 2011 to 2021 supplemented with contributions in the literature on the issue of brain-drain in the periphery. The following section will the present the most recent policy initiative of the central government to counter these development patterns in Denmark.

### 1. Depopulation and brain-drain in Denmark 2011-2021

Trends in depopulation have only been discussed in Denmark during the last 10-15 years. To what extent has Denmark seen a concentration of the population in areas that were already densely populated? Panel A of Figure 1 shows the relationship between the population density in a Danish municipality as of 2011 compared with the population growth rates of the same municipality from 2011 to 2021. Is there any sign that municipality that already were density populated in 2011 also experiences a higher population growth rate from 2011 to 2021?

Clearly, some urban centers with a very high population density have seen sizeable positive population growth over the period, while some municipalities with low density have seen negative population growth. This hints at depopulation in low density areas and concentration in densely populated municipalities. Panel B in Figure 1 only considers those with a population density of 500 persons per square kilometer or lower. It thereby prevents the compression of the medium and low-density municipalities from a few municipalities with quite high densities in Panel A. For this medium or low range density, an upwards relation is shown for municipalities with a density until about 200 upon which the relationship becomes flatter. Areas with comparably high initial population density in 2011 of around 100 to 200 therefore see a higher population growth rate from 2011 to 2021, while some effects of congestion costs may be seen in denser areas above 200 rendering growth

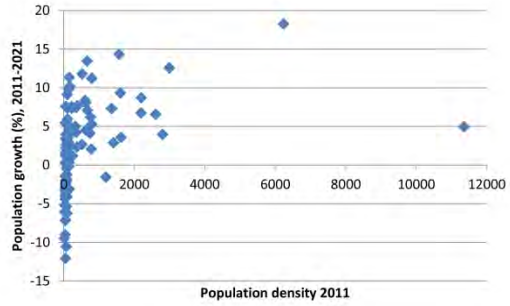
[11] See Life in the EU (europa.eu)

[12] Population and population change statistics - Statistics Explained (europa.eu)

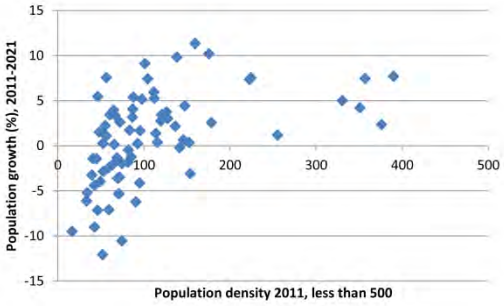
rates, but not generally much higher than those in the range of 100 to 200. These differences likely in part reflect urban sprawl around the municipalities with the highest density and polycentric urban structures in some parts of Denmark. Even so, several municipalities with a low density see a marked decrease in the population of over 10 percent over the period.

Figure 1: Concentration and depopulation in Danish municipalities 2011-2021?

Panel A: All Danish Municipalities




Panel B: Density in 2011 lower than 500

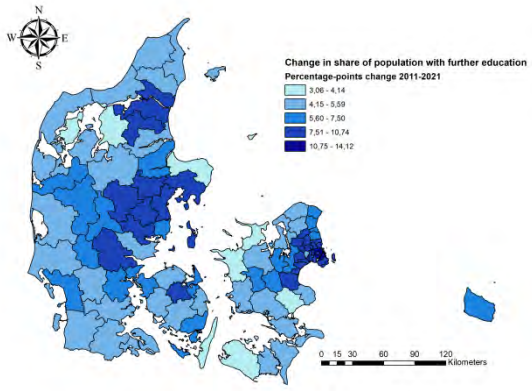



Source: Based on the variables AREALDK and BY2 from www.statistikbanken.dk.

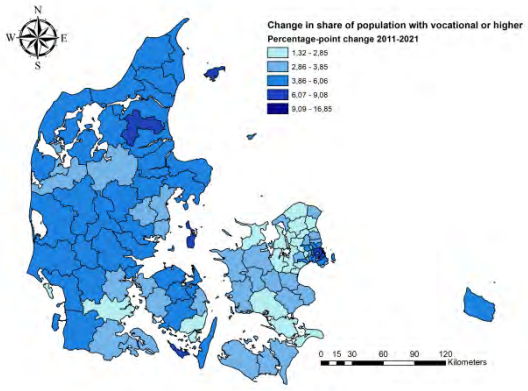
Is this trend towards some concentration associated with increasing regional differences in human capital levels in the population as a certain type of brain drain? Figure 2 shows the percentage-point change in the share of the population with further or higher education levels (Panel A) and vocational or higher education (Panel B).

Figure 2: A loss of human capital in the periphery of Denmark 2011-2021?

Panel A: Further or higher




Panel B: Vocational or higher




Source: Based on the variables HFFUDD11 from www.statistikbanken.dk.

The pattern in Panel A of Figure 2 appears rather clear. While the overall share of persons with further education increases generally across Denmark, the markedly largest increases in percentage-points in the share with further education is found in and around the larger urban centers and the polycentric area labelled “Trekantsområdet”. Very modest increases are found in the very western and southern parts of Denmark. Including vocationally trained in Panel B of Figure 2 changes the development pattern markedly, as the urban areas do not see equally strong concentration of persons with vocational training. It is therefore particularly for further educated persons that a brain-drain is observed in the relative periphery of Denmark.

Results found in Andersen and Henriks (2018) focusing on highly educated persons confirms the same human capital dynamic across the geography of Denmark. They conclude that for a person aged 30 in a year, the probability of residing in the same peripheral areas as when aged 15 years decreases with level of education. A higher education level therefore leads to a higher mobility out of more peripheral areas and that the difference in population human capital levels between urban and more peripheral areas therefore increases in education levels. Also, the mobility of persons without education or with vocational education is lower, which mirrors the results in Figure 2. Finally, they provide evidence for the depopulation of more peripheral areas. These results therefore provide additional evidence on the brain drain and depopulation taking place in Denmark over recent decades.

Christiansen et al. (2020) use data in 100 meter times 100 meter cells of the Danish geography and show that there are areas in Denmark where none of the 400 closest neighbors aged 25-64 years have a graduated in higher education, while in other areas there is 60 percent of the 400 closest neighbors that have. This compares with a national average of 12 percent. It is also noticeable that the areas with the highest density of higher educated are also the areas with the highest income. The analysis also shows that the higher educated cluster within the municipalities of the larger urban centers like for example in the municipality of Aarhus.

For the southwestern part of Denmark ("Sydvestjylland"), Højbjerre, Brauer and Schultz (2020) find that 19 out of 20 persons from the area graduate from higher education outside the area, while only 1 in 7 returns after graduation return to the area. This relatively peripheral area in Denmark is accordingly dependent on receiving higher educated from other areas in Denmark. A situation with such dependence of importing human capital constitutes an economic challenge in terms of ensuring economic development given a higher productivity of higher educated.

Recent developments in Denmark have accordingly been signified by depopulation in some areas combined with loss of human capital in terms of higher educated, which results in lower productivity and income. This mirrors the first steps of the escalator model, where some escalator regions attract young persons with potential and provide strong upwards social mobility in the region, while it is uncertain if the third step applies as persons reach retirement ages stepping of the escalator (Fielding, 1989; Fielding, 1992). Furthermore, the depopulation trend has led to problems of ensuring satisfactorily levels of some types of public services, particularly within health services. This leads to the question, what policy initiatives are instigated in Denmark to counter this?

## 2. Policy initiatives to counter loss of skills and competences in peripheral Denmark

Upon having pursued a policy of decentralizing central government jobs since the mid-2000, the most recent policy on balancing regional development by the central government concerns the educational geography of the country. The central government has negotiated with the parliament a plan to decentralize education programs generally including education programs related to further and higher education. This follows a period of centralization, where for example 59 of 98 Danish municipalities did not have further education programs and 95,5 percent of university education programs were located in the main urban areas of the capital region, Aarhus, Odense and Aalborg in 2016 (Danmark på vippen, 2018).

Initially, the intension was that up to 10 percent of student intake in the main urban and educational centers was to be relocated or downsized – downsizing meaning that student intake into programs were reduced. The new political agreement as of March 22, 2022 implies that universities have to relocate or downsize education programs by 5.7 percent in the four main urban and education

centers of Denmark within a time frame of 2030, while some further education programs are relocated or downsized by 7.6 percent with the exception of four large education programs in social and health services. For these four programs, the target is that 60 percent of the study programs must be located outside the four large urban and education centers in Denmark. Finally, for some further education programs, the closure of programs in English leads to a similar downsizing of education programs in the large urban and education centers of Denmark.

These policy initiatives also come with changed funding to education programs in Denmark that allows for a premium for education programs outside the large urban and education centers. Education programs outside these centers will as of 2023 receive twice as large a lump sum grant for each offered education program – from initially before the agreement about EUR 269.000 - and the hitherto limit of 6 such programs per institution is removed. Also, the payment for completed successful study years of students will for education programs outside the centers increases by 5 percent in 2023, 6 percent in 2025 and 2026 and 7 percent in 2027 and the following years. This has led to the changing geography of new education programs in Denmark located outside the larger urban and education centers shown in Figure 3.

Figure 3: Location of 31 new education programs across the geography of Denmark of 41 new


Source: [Bedre muligheder for uddannelse i hele Danmark — Uddannelses- og Forskningsministeriet (ufm.dk)](). Red points are education programs under the Ministry of Culture Denmark. Only 31 of 41 education programs shown, as the remainder has not finally been located outside the urban and educational centers.

While these are new initiatives agreed upon, a total of 66 existing programs will also benefit from the policy change. Also, among the education institutions, there were in the process ideas of 115 new initiatives outside the large urban and education centers, which remains to be considered.

The dynamics of human capital in the Danish geography has accordingly been subject to depopulation in more peripheral areas with a loss of competences for educational attainments

higher than vocationally trained. This constitutes a challenge in securing resilience and economic growth for these areas. A new policy initiative of the Danish central government targets decentralization of education programs, which may counter these dynamics. It remains to evaluate if this policy change will succeed in terms of securing student intake, financing and embedding newly educated from these initiatives in local more peripheral labor markets in Denmark.

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## 4. Policies for regions with shrinking population and brain drain

As mentioned in section 2.1 regional policy in The Netherlands was terminated in 2007 and replaced by sectoral policies. Since than several regions tried to convince the Central Government to relaunch regional policy, among others by referring to OECD Territorial Reviews: Netherlands 2014 (see also slide 46), which states:

* Economies of agglomeration in the Netherlands can also be enhanced by improving connectivity between functional urban areas.

* The National Policy Strategy for Infrastructure and Spatial Planning needs to further consider the input and participation of all provinces in the definition of national priorities.

Another argument for renewed interest for regional policy is to synchronize this with the European Place Based Smart Specialisation Strategie (S3) aiming to maximize the strength of regions to tackle regional problems in the region. To be eligible for participating in EU programmes the North of the Netherlands prepared Regional Innovation Strategy (RIS3) for the period 2013-2020 (SNN, 2012). Human capital gets only minor attention in this document and if so, the focus is on an inclusive labour market that creates jobs for those with limited job opportunities and not on brain drain.

In later years the of brain drain is mentioned very regularly as a problem in the North of Netherlands both with regard to students leaving the North after graduating at the University of Groningen (UoG), but

also for graduates from the universities of applied sciences NHL Stenden in Leeuwarden and Emmen and Hanze in Groningen. Several policy initiatives were taken to keep more graduates in the region.

The Accord of Groningen (AoG) was created in 2018 with the explicit mission of attracting, facilitating and keeping talent for Groningen. AoG is a strategic partnership among the University of Groningen (UoG), the Hanze University of Applied Sciences (HUAS), the University Medical Centre Groningen (UMCG), Martini Ziekenhuis, the province of Groningen, the institutes for vocational education Noorderpoort and Alfa-college and the municipality of Groningen. The ultimate goal of the Accord is to give an economic boost to the region and the wider Netherlands by creating more knowledge-based activity and work in Groningen. The Accord of Groningen's ambition is to be an attractive European city and region for (international) students, researchers, knowledge workers and companies. By providing a competitive innovation climate, high-tech facilities, an accessible labour market and a pleasant, affordable living environment. For more information see: https://groningen.nl/en/het-akkoord

In the new RIS3 for the North of the Netherlands for the period 2021-2027 (SNN, 2020) the Human Capital Agenda gets a much more prominent position. The aim of this RIS3 is to increase well-beiing (Brede Welvaart) and therefore four major challenges need to solve: 1. the energy transition, 2. the circular economy, 3. public health, and 4. digitization. This requires a continuous entrepreneurial discovery process in which Human Capital plays a major role. The RIS3 document explicitly mentions that coping with the challenges can seriously be hampered by demographic developments like aging that might lead to quantitative and qualitative shortages of labour. Investing in skill, live-long-learning and talent programs for attracting and binding talent to the region is an explicit goal. An important building stone fort his new RIS3 is report of the HESS-project of the Joint Research Center (Benneworth c.s, 2021) HESS refers to 'Higher Education and Smart Specialisation' and analysis the role of universities and applied universities in innovation strategies by looking at the link between Institutes of Higher Education (HEI's) and SME's, the role of Human Capital and Innovation Ecosystem and the governance of these systems. It concludes that more and better Human Capital itself provide the competences but does not lead automatically to innovation. JRC concludes that public and private sector in the North of the Netherlands lack a long-term vision for the development of human capital. There is no clear strategy to which HEI's can commit and as a result the HEI's have their own strategy which is not linked to a broader regional perspective.

This signal has been taken seriously by the University of Groningen and led to the establishment of The University of the North (UvhN, see: https://universiteitvanhetnoorden.nl/en/about-us/) is a knowledge and innovation network consisting of five Northern knowledge institutions working together with the three northern provinces. The UvhN takes the regional innovation strategy (RIS3) as starting point. The five Northern knowledge institutions are intensively working together in the fields of teaching, research, and innovation and establish unique collaboration with the business community and societal organizations, to stimulate transitions in our region.

The UvhN will boost the visibility and appeal of the Northern region as the top place to study, live, and work in order to attract and keep high skilled workers to the region. This human capital is crucial for the HEI's to take on an active and central role within the innovation ecosystem and to set up, grow, and guide start-ups and scale-ups, using targeted research. From the previous sections the areas near the coast and the German border loose talented people and end up as regions with an aging labour force with a lower level of education. To tackle this problem of lack of knowledge and to stimulate innovation of MSE's and further develop the northern start-up ecosystem in these areas, the UvhN strives to increase the regional spread of innovation facilities. Slide 49 gives an overview of the present initiatives for field labs, hubs, clusters and campuses in which staff and students of the HEI's work together with local business and governments. The map shows that initiatives are established in many different parts of the North and also in cross-border cooperation with German institutes and there are more to come.

Of course, the realisation of these initiatives of the UvhN needs funding. Several regional, national and European sources are available. Two funding opportunities are very relevant for the brain drain issues that are the focus of this paper. Since 2019 there is fund Nationaal Programma Groningen (NPG) established as compensation for the damage due to earthquakes caused by the natural gas extraction (see https://nationaalprogrammagroningen.nl/). The aim is to invest in the future via strengthening the regional economy, liveability, and nature and to invest in education and job creation also in relation to climate change. Initiated via the Accord of Groningen (AoG), one of the projects funded by the NPG is the project Talent in de Regio (see: https://talentinderegio.com/) in which UoG and Hanze work together with the Province of Groningen and municipalities. The aim of Talent in de Regio is to monitor the regional labour market in the short run, but also to provide insight in the trends and possible developments of talent in the long run. It provides detailed knowledge by sector about career development, the location of talent, the causes and effects of braindrain/gain for HR-managers and for education and labour market professionals. In addition to that, in 2022 also European funding will become available for the earthquake region from the Joint Transition Fund a new financial instrument within the Cohesion Policy which aims to provide support to territories facing serious socio-economic challenges arising from the transition towards climate neutrality (see: https://www.europarl.europa.eu/factsheets/en/sheet/214/just-transition-fund). Half of the funding of JTF is intended for labour related projects including talent related issues like brain drain.

Also, more indirect initiatives might help to cope with the brain drain problem. The provinces Drenthe, Flevoland, Fryslân en Groningen launched in 2021 the so-called Delta Plan (Berenschot, 2021 and slide 50) in which they offer to build 220.000 extra houses (of which 140.00 in the three northern provinces) in order to help in assisting to reduce the national shortage of houses in combination with construction of a high-speed train (Lelylijn) between Amsterdam and Groningen via the provinces Flevoland and Fryslân. The Lelylijn helps to better connect the North of the Netherlands with the Dutch urban network. Furthermore, the railway connection (Saksenlijn) along the German border in Groningen and Drenthe needs to be completed and improved. More houses lead also to an increase in population, and this might reduce the problem of population decline in the North. Better railway connections improve the accessibility of within the North but also between the North and the Randstad-area. In line with the recommendations of the OECD (2014) a high speed Lelylijn, (more or less the same line as the plan for the Zuiderzeelijn which was turned down in 2007) improves the connection of the functional economic areas in the North and the Randstad. This might also help to reduce brain drain from the North to the Randstad because it makes it easier that e.g. one member of a household continuous to reside in the North while the job is in the Randstad. This is especially possible, if it is partly possible to work from home instead of at the office. The Saksenlijn improves the accessibility of the areas along the German border that suffer from population decline and outflow of talent. Better connections may make it easier to keep residing in this area while working or studying elsewhere.

## 5. Summary and conclusions

The North of the Netherlands has a long history of a region in which the regional economy was lagging behind and unemployment and income were below the national average and many parts in the region suffered from population decline. In 1959 in Groningen the largest natural gas field in Europe was discovered which became important in the post-war development and construction of the Dutch welfare state, the region hardly benefitted from it. In contrast, the gas extraction resulted in earthquakes that damaged houses and led to unrest among residents, because damage is not repaired or compensated for. Trust in the government has gone down substantially, also resulting in high shares of votes for populist parties indicating that the inhabitants of this area feel that their place does not matter.

Population decline has been an issue in the North since World War II, especially in the areas near the coast and the German border. Besides shrinking, the population in these areas is aging and talented young people leave the region for study and jobs elsewhere and most often do not return in later stages of life to the home region. These regions also show lower scores on broader well-being indicators, like distance to schools, sports and health facilities, labour force participation, income, level of education and in terms of perceived health. For these areas we can conclude that they suffer from brain drain. However, many of the talented people who leave the areas with population decline moved to the city of Groningen to study at the University of Groningen or at Hanze Applied University. To a lesser extend this also happens in Fryslân where Leeuwarden attracts students to the Applied Universities NHL Stenden and Van Hall Larenstein.

Although for the areas near the coast and the German border is it clear that brain drain is present, the picture becomes more complicated for the North of The Netherlands as a whole. This is due to the fact that the University of Groningen attracts many students from the rest of the North, but also from the rest of the country and from abroad. Just over half of the students at UoG were living outside the North before they started to study in Groningen and thus the North attracted a lot of young talent which can be judged as brain gain. After finishing their study about half of the graduates stay in the North, but in subsequent years more and more graduates leave the North which ultimately leads to brain drain for years after graduation. From the boxes about comparable regions in the north-west of Germany and in Denmark similar issues are present with regard to the regional economic and labour market situation and demographics processes like population decline. Also, in these countries aging and the brain drain of talented young people from the peripheral rural areas to urban centres with institutes of higher education is happening, which results in a less high educated labour force in rural areas.

It is clear that the peripheral regions along the coast and the German border suffer from population decline and brain drain many to the city of Groningen. On top of that the city of Groningen is able to attract talented young people from outside the North as students to the University of Groningen. But after graduation many of them leave the North which in the end also leads to brain drain for the urban areas. The resulting policy challenge is how to provide human capital and knowledge to the peripheral areas and how to keep more graduates of the University of Groningen in the region. For many years there was not much attention of policy on brain drain, but this changed in recent years. Several policy initiatives like e.g., Het Akkoord van Groningen has as one of it aims to keep more graduates in the region. The recent initiative of the University of the North establishes all kinds of field labs, hubs and campuses in all parts of the North including the peripheral areas in order to develop and bring knowledge of staff and students of the UoG and the Applied Universities to stakeholders and SME's in rural areas in cooperation with local governments and institutes of vocational education. The UoG is concentrated in the city of Groningen and has only faculty located outside Groningen: Campus Fryslân in Leeuwarden with about 300 students and there are no plans for further spatial deconcentration of educational programmes. This is in market contrast with Denmark where a new political agreement as of March 22, 2022 implies that universities have to relocate or downsize education programs by 5.7 percent in the four main urban and education centers of Denmark within a time frame of 2030, while some further education programs are relocated or downsized by 7.6 percent with the exception of four large education programs in social and health services. For these four programs, the target is that 60 percent of the study programs must be located outside the four large urban and education centers in Denmark. For Germany no explicit policies for brain drain are in use.

Besides, policies aimed at brain drain and the redistribution of human capital and knowledge the provinces Drenthe, Flevoland, Fryslân en Groningen launched in 2021 the Delta Plan in which they offer to build 220.000 extra houses in their territory in order to help in assisting to reduce the national shortage of houses in combination with construction of a high-speed train (Lelylijn) to better connect the North of the Netherlands with the Dutch urban network. More houses might attract more people and

thus reduce population decline and better connections might reduce brain drain of graduates because it allows larger distances between the place of residence and place of work, especially in combination with hybrid working.

All in all, it is clear that the problem of brain drain exits in regions facing population decline in the North of the Netherlands, but also in comparable regions in the northwest of Germany and in Denmark. Although there are some policy initiatives trying to mitigate the negative effects of brain drain, there is no clear empirical evidence of the effects, and the strategies differ. In the Netherlands the policy aim is twofold: one aim is to prevent that graduates leave the Northern region and the other is to spread knowledge to the peripheral regions that suffer from population decline and brain drain. In Denmark a different strategy is chosen. They deconcentrate the supply of educational programs from the urban centres to the rest of the country. Brain drain is a complex problem that need to be analysed in more detail and the monitoring and evaluation of recent policy initiative in the three countries might help to understand the underlying forces and to develop effective policy measures.

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# Appendix A:

PowerPoint slides with figures and tables to which references are made in this paper.

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# The long-term consequences of brain drain related to depopulation on social and territorial cohesion with a focus on the North of the Netherlands and a short comparison with Germany and Denmark


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PowerPoint slides belonging to the Academic paper written on request of the European Commission for preparing a Communication on brain drain and the challenges associated with population decline in line with the Commission Work Programme for 2022.


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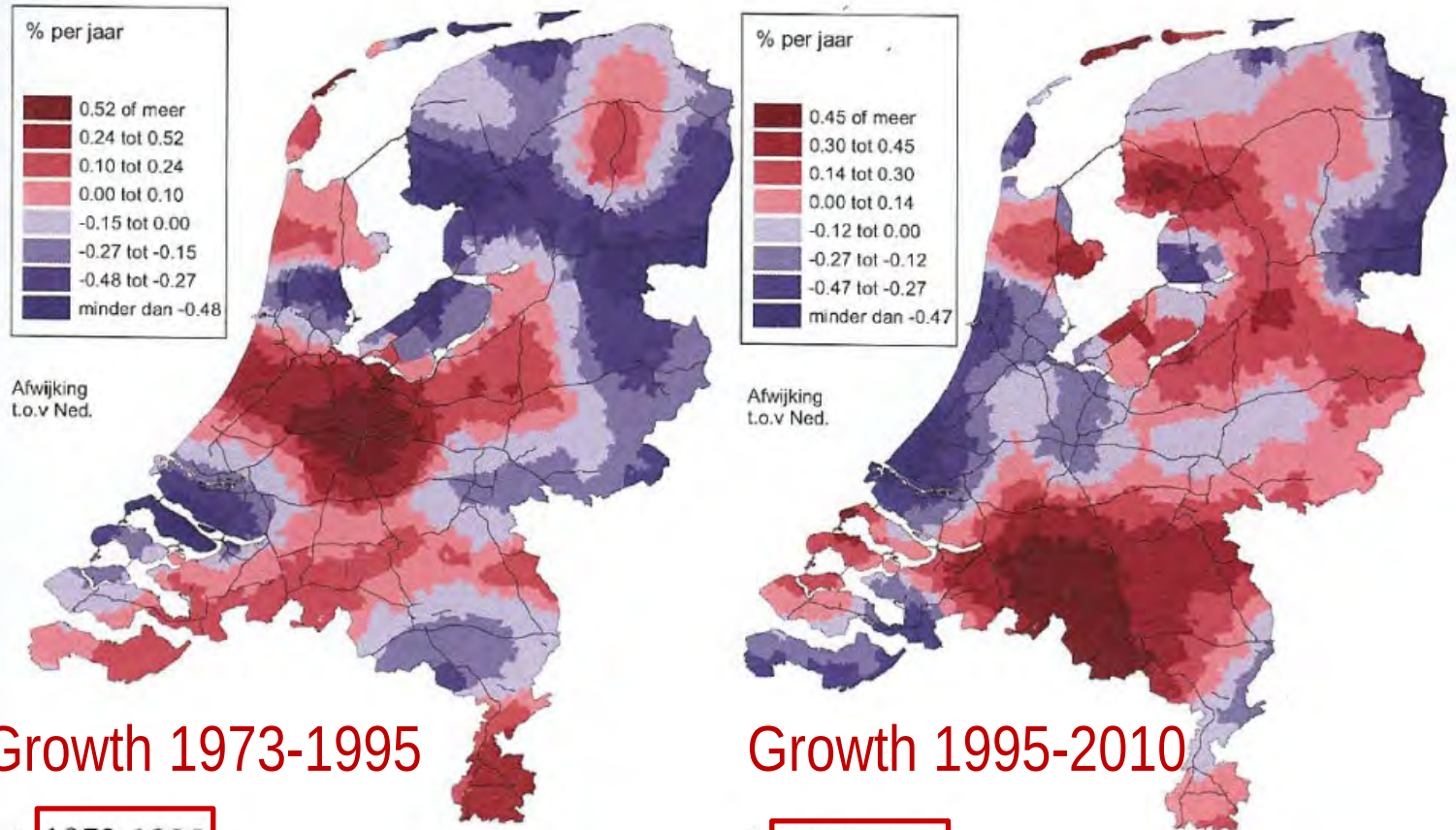
# Contents



# Changes in the employment rate (jobs per 1000 inhabitants 15-64 years old)

*Figuur 3.7* *Ontwikkeling arbeidsplaatsen per inwoner 15-64 jaar, 1973-2010*




Growth 1973-1995

Growth 1995-2010

a. 1973-1995

b. 1995-2010

Source: Bureau Louter, 2017

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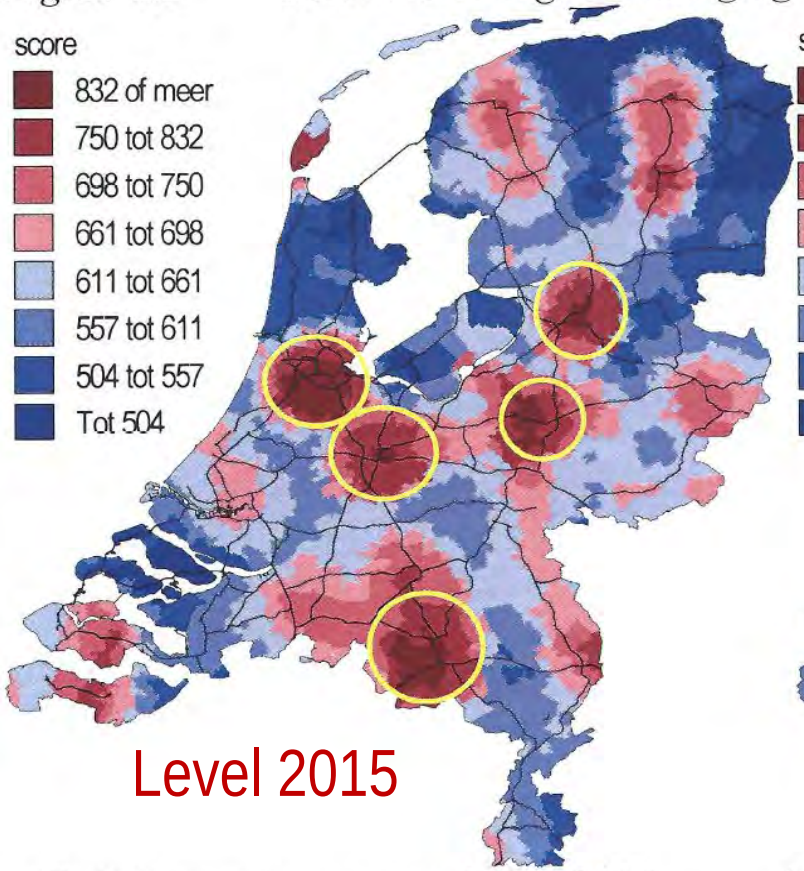
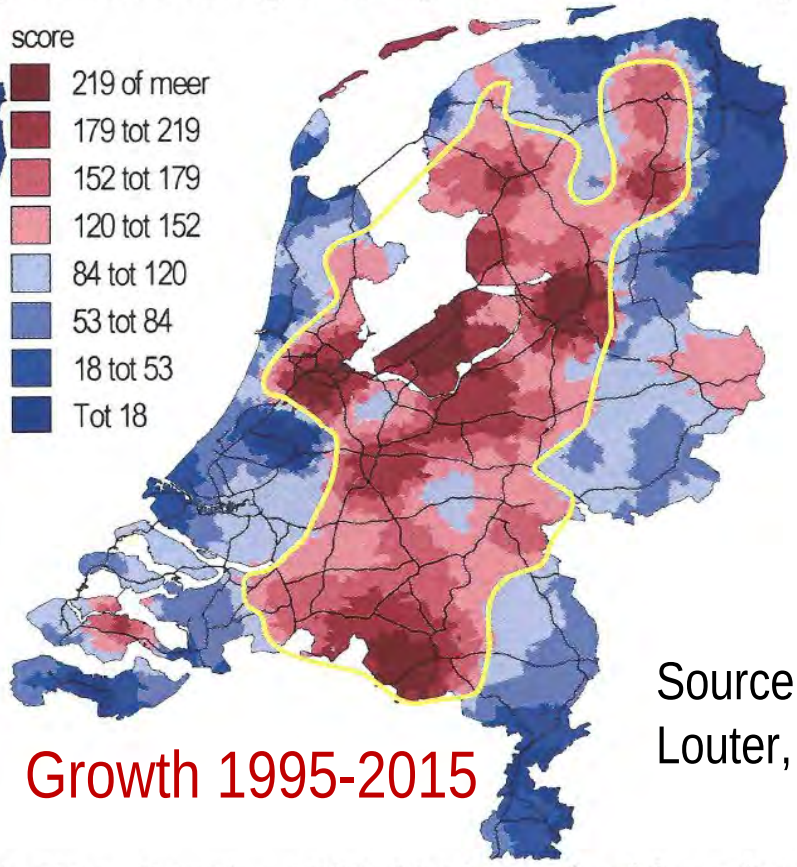
# Employment rate in 2015 and changes 1995-2015

*Figuur 2.2* *Relatieve vertegenwoordiging en ontwikkeling arbeidsplaatsen, totale bedrijvigheid*




Level 2015

a. Relatieve vertegenwoordiging 2015

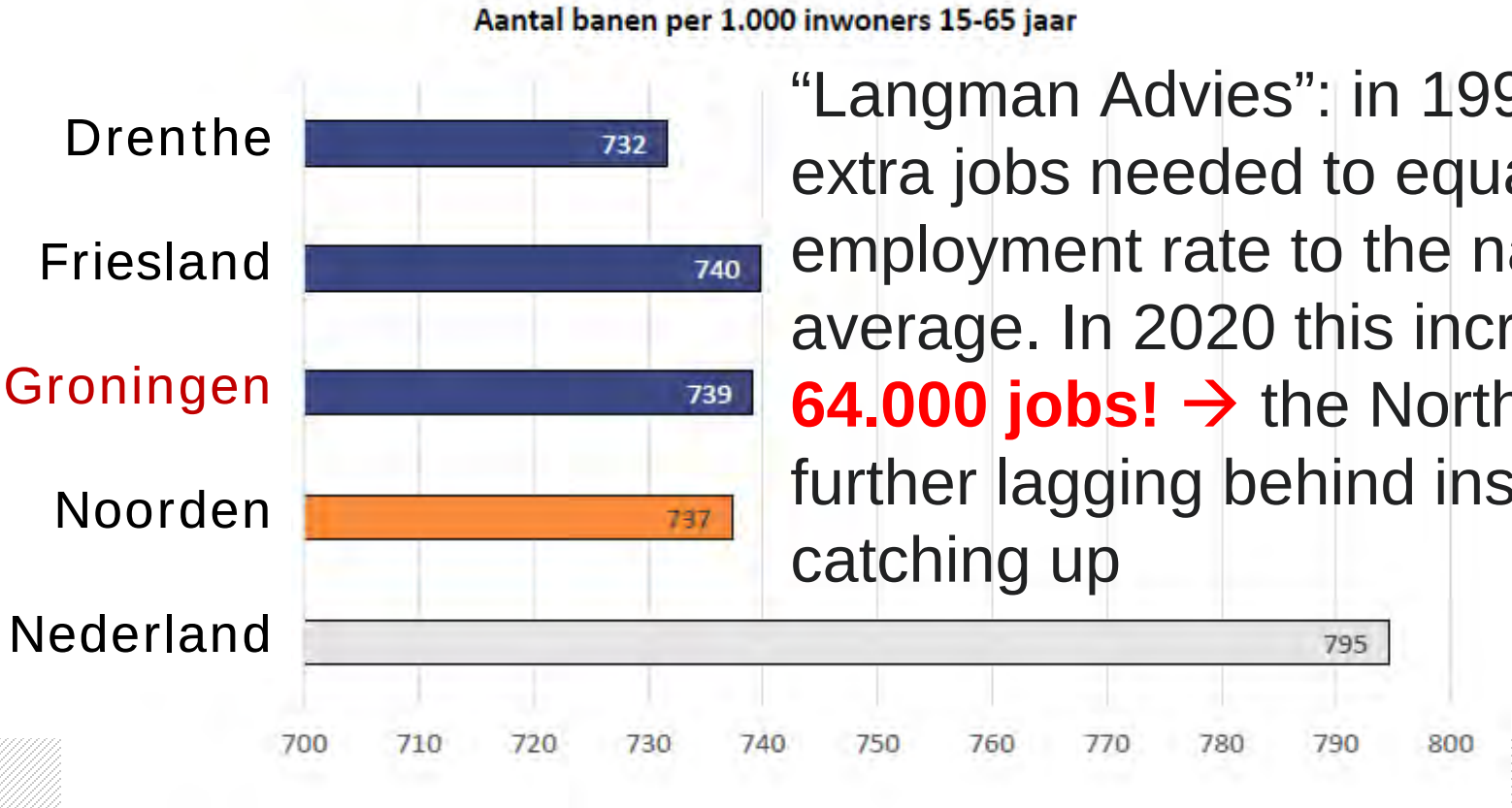



Growth 1995-2015

b. Ontwikkeling 1995-2015, geschaald aan inwoners

Source: Bureau Louter, 2017

# Employment gap in terms of differences in employment rate increase from 1996-2020




"Langman Advies": in 1996 **43.000** extra jobs needed to equalize the employment rate to the national average. In 2020 this increased to: **64.000 jobs!** → the North is further lagging behind instead of catching up

Source: De Stand van het Noorden, Doets et al., 2021

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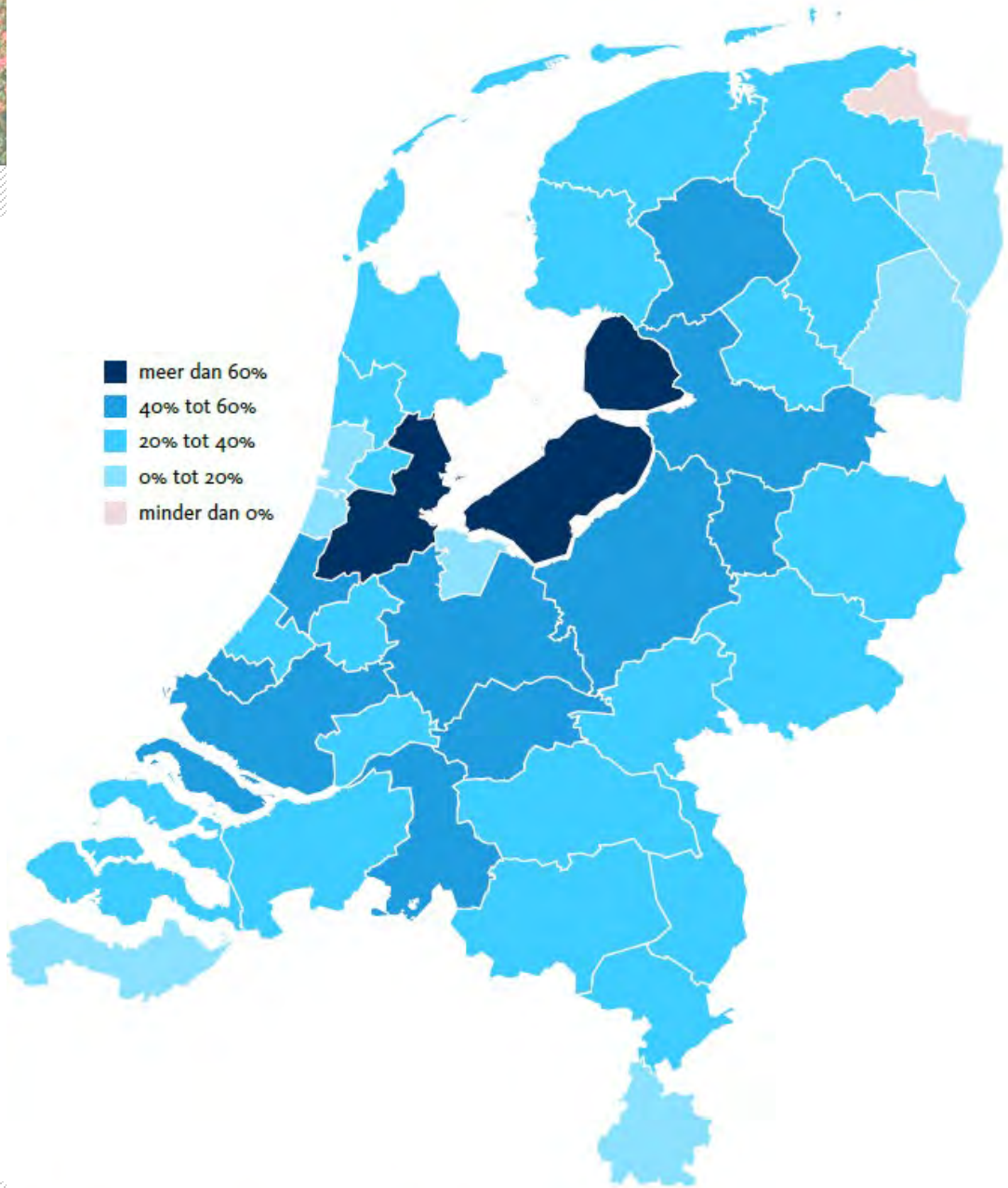
# Change in employment by COROP region 1996-2020

→ growing regions are everywhere!



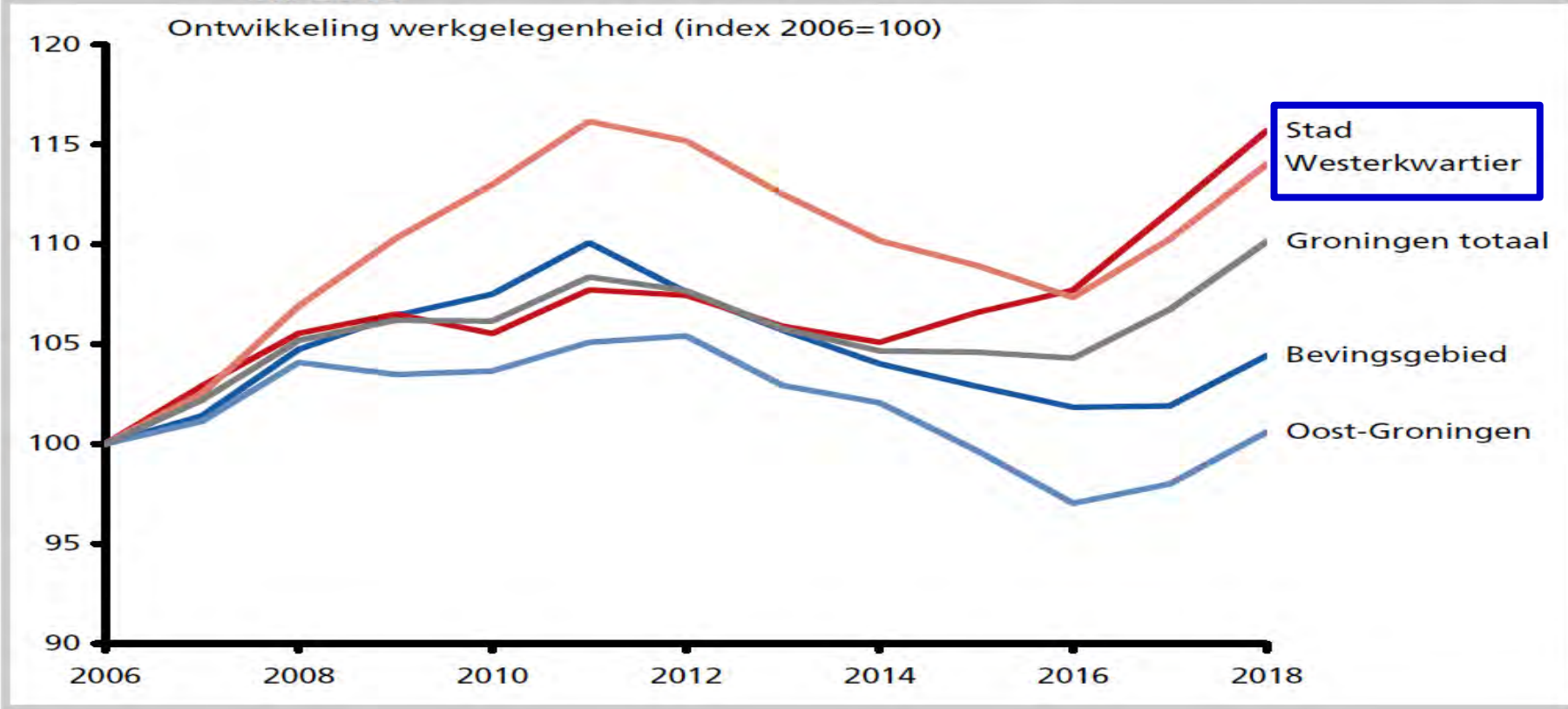

*Kaart 1. Groei banen per COROP-regio tussen 1996 en 2020*

Source: Lisa Nieuws, November 2021



# Large differences in job growth within the province of Groningen: City en Westerkwartier perform best.

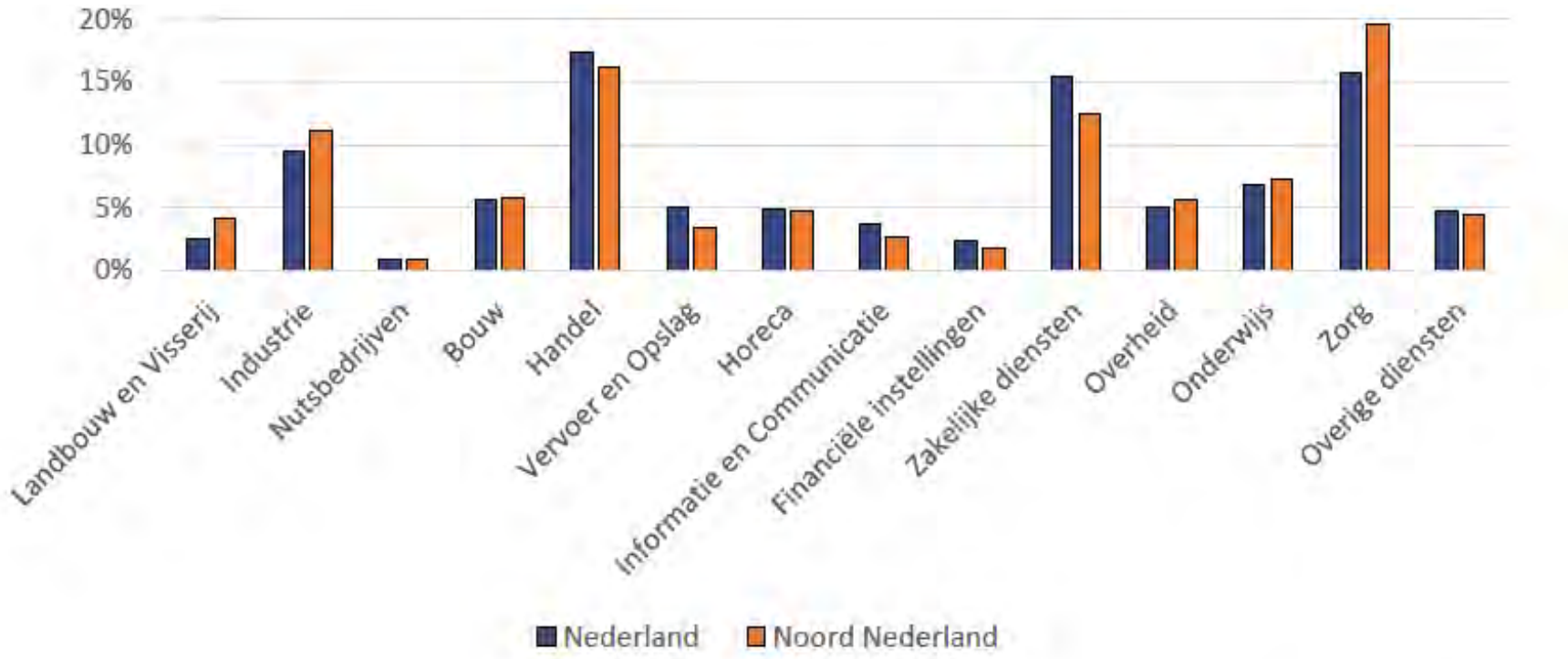
Figuur 3.3 Ontwikkeling werkgelegenheid in de vier deelregio's tussen 2006 en 2018




Source: Ponds and Van Woerkens, 2019.

Bron: Atlas voor gemeenten op basis van Lisa

# Sectoral distribution of jobs North of NL 2021




In the North healthcare is the largest sector

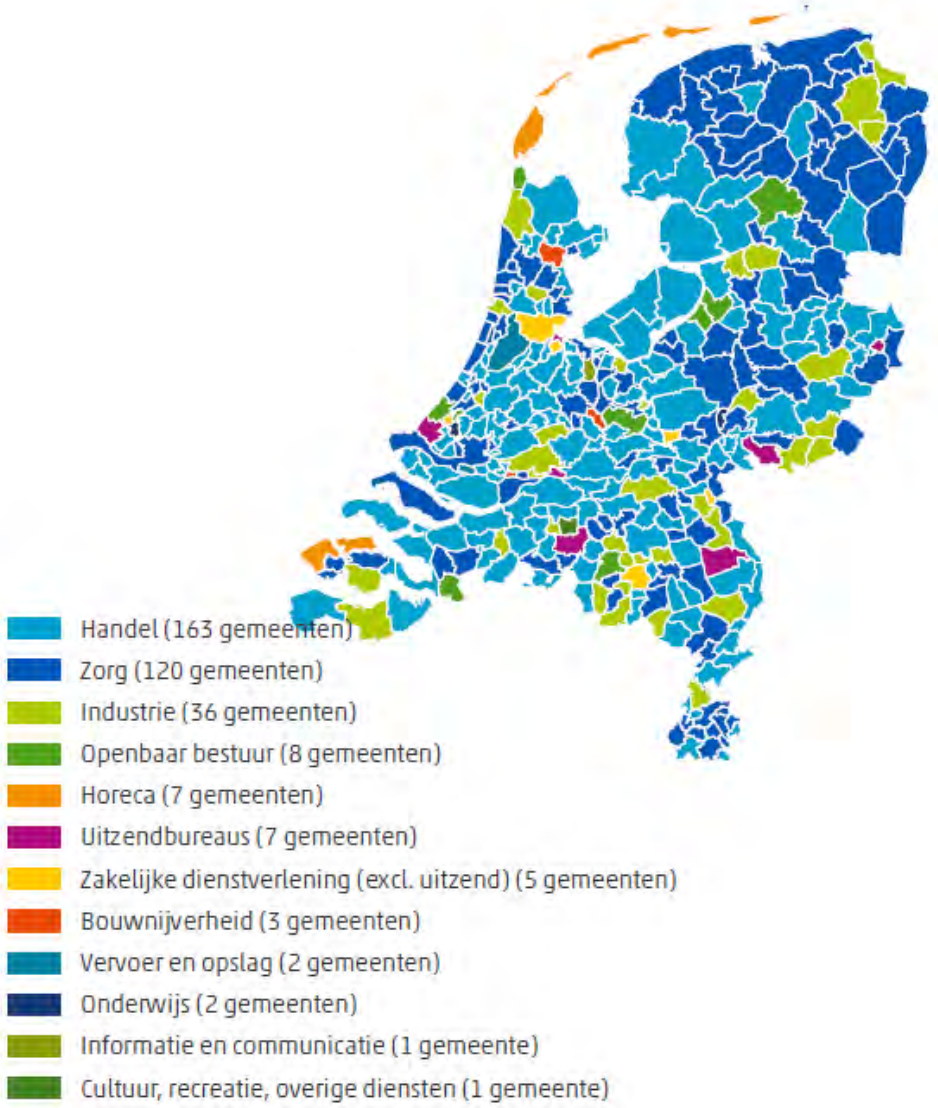
*Bron: Stichting LISA*

Bron: De Stand van het Noorden, Doets et al., 2021

university of groningen

In most municipalities in the North **Health care** is the largest sector in 2020. In other parts of the country this is much less the case.

2.19 Grootste bedrijfstak per werkgemeente, o.b.v. banen van werknemers, december 2020

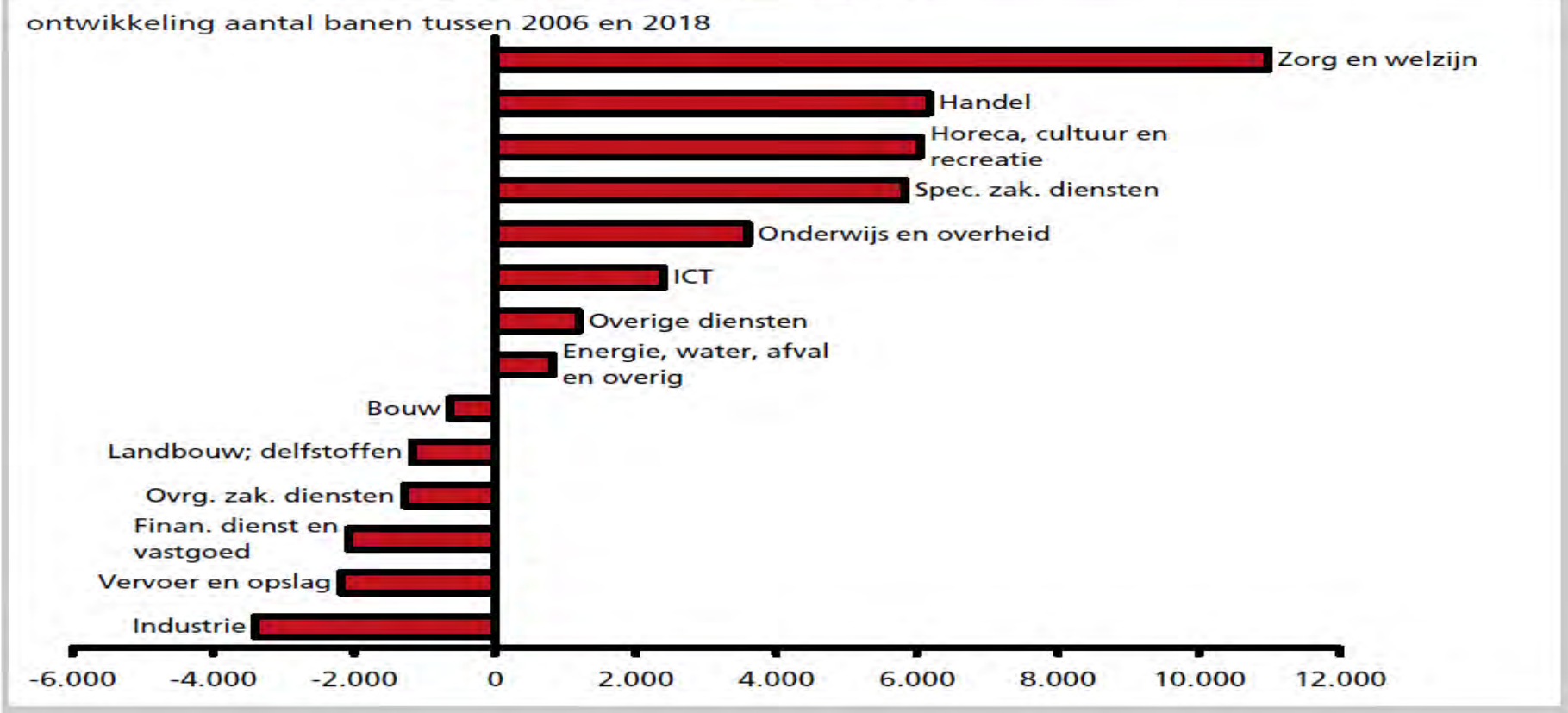



Source: Statline Statistics Netherlands

StatLine: Banen van werknemers naar gemeente waar men werkt.

# Job growth 2006-2018 in Groningen mainly in services

Figuur 2.6 De bijdrage van sectoren aan de groei van de werkgelegenheid in Groningen tussen 2006 en 2018

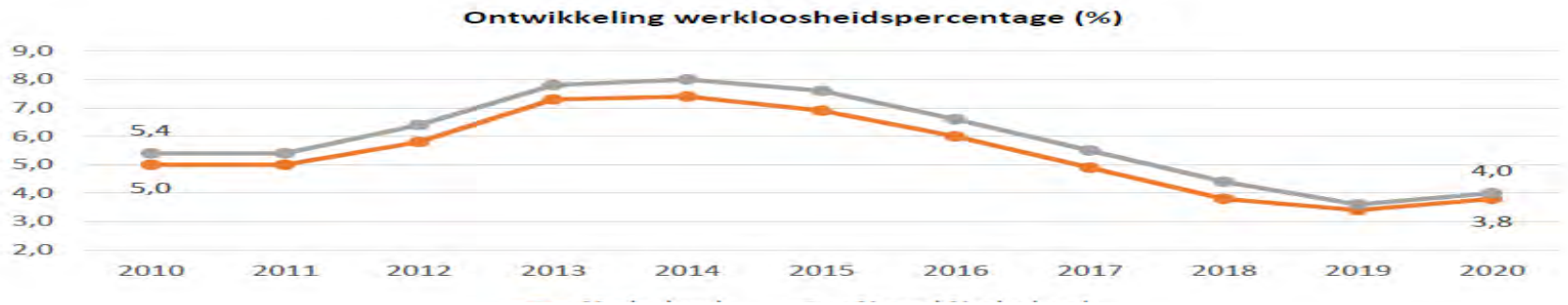



Source: Ponds and Van Woerkens, 2019.

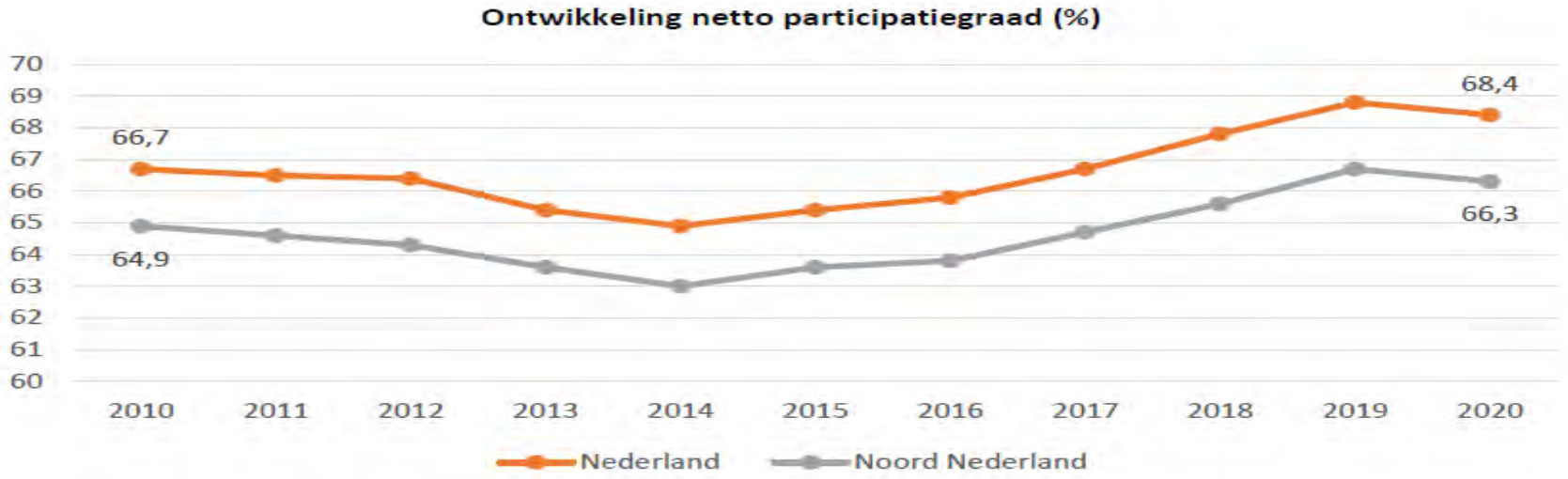
Bron: Atlas voor gemeenten op basis van Lisa



# Unemployment rate: gap North–NL only: 0,2%



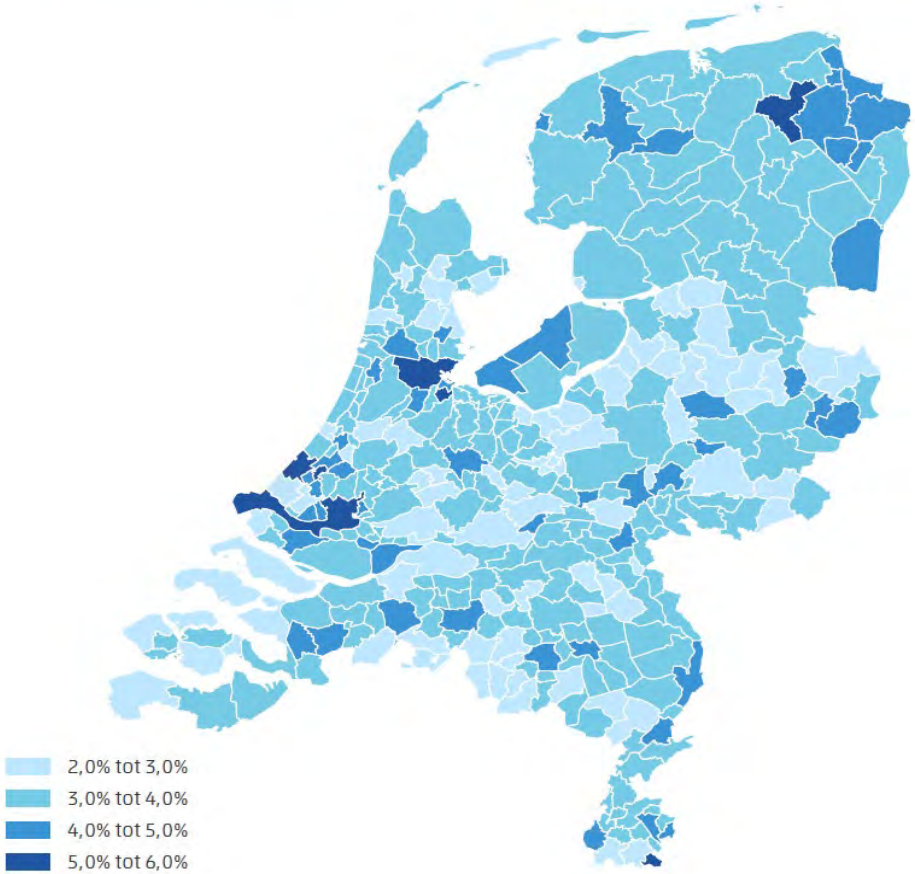

# But gap net-participation rare grows, now 2,1%



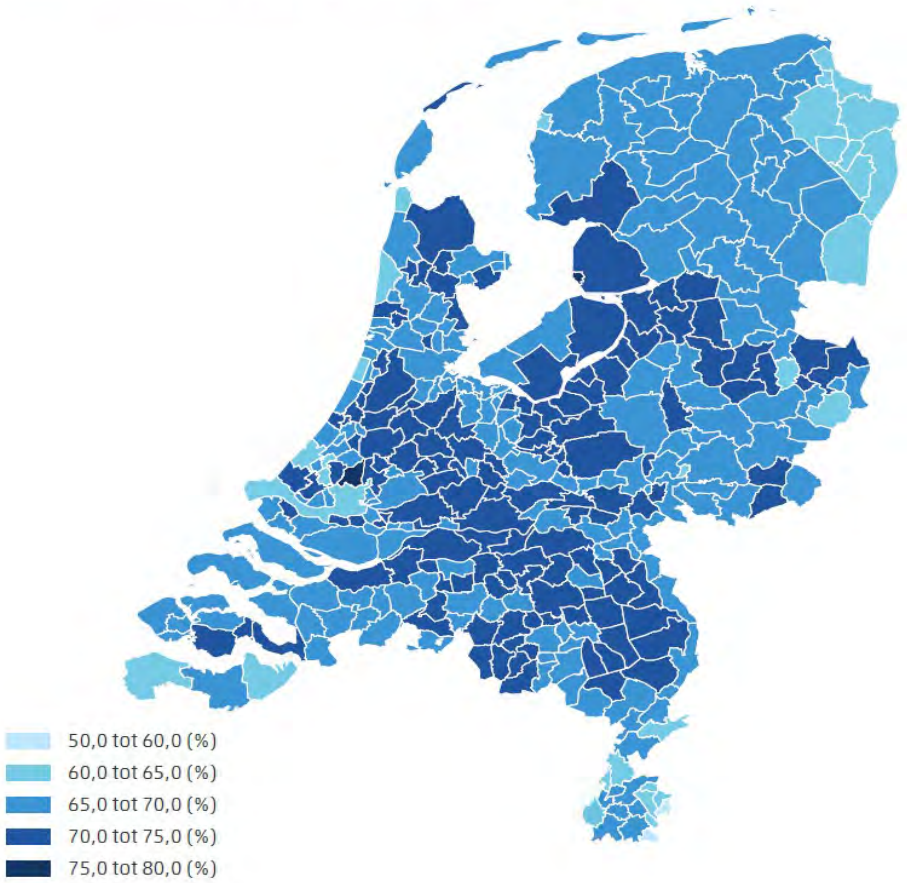

Source: De Stand van het Noorden, Doets et al., 2021 *Bron: CBS, Arbeidsdeelname kerncijfers*

# Unemployment % 2020 Net-participation

3.14 Werkloosheidspercentage naar gemeente, 2020



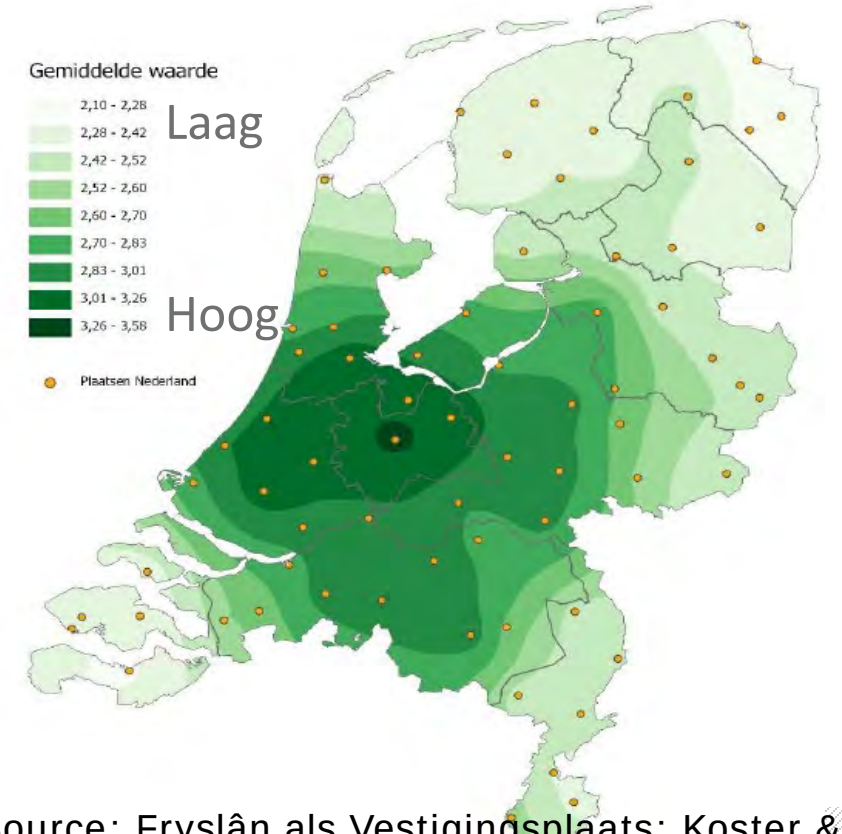

3.6 Nettoarbeidsparticipatie, naar gemeente, 2020




Source: Statistics Netherlands

# Location preferences of entrepreneurs in 2020

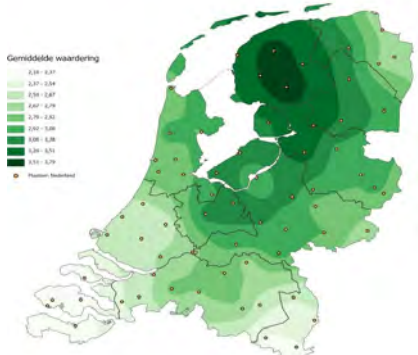
Preference all Dutch firms: central part of the Netherlands most populair



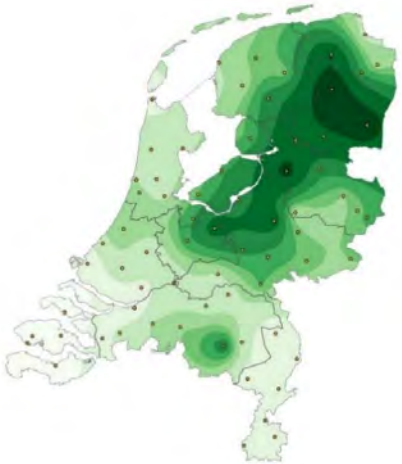

Regional firms have a preference for their own region

Groningen

Fryslân




Drenthe

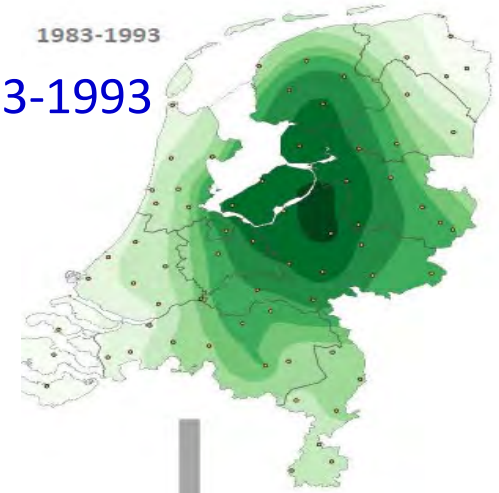


Source: Fryslân als Vestigingsplaats: Koster & Kamminga (januari 2022). Onderzoek in opdracht van: Provincie Fryslân en Innovatiepact Fryslân

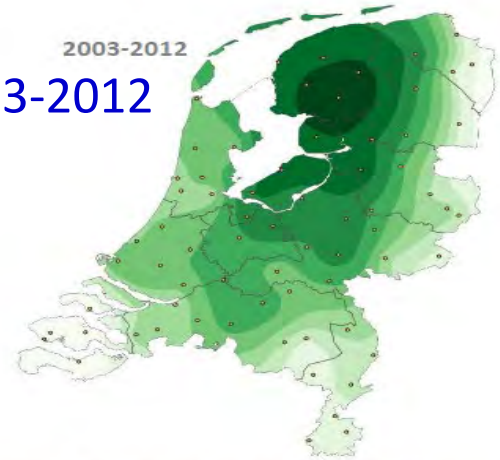
*Afbeelding 1 - Vestigingsplaatsvoorkeuren van Nederlandse bedrijven in 2020*

# Change in locational preferences of Frisian entrepreneurs 1983-2020: the home province Fryslân becomes more and more popular!

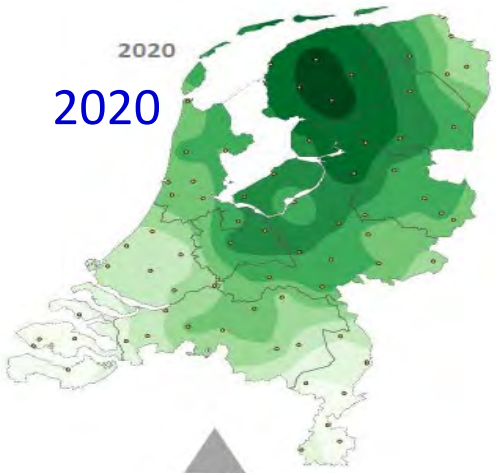
1983-1993




2003-2012




2020




*Afbeelding 6 - Ontwikkeling van het Friese buurteffect over de tijd*

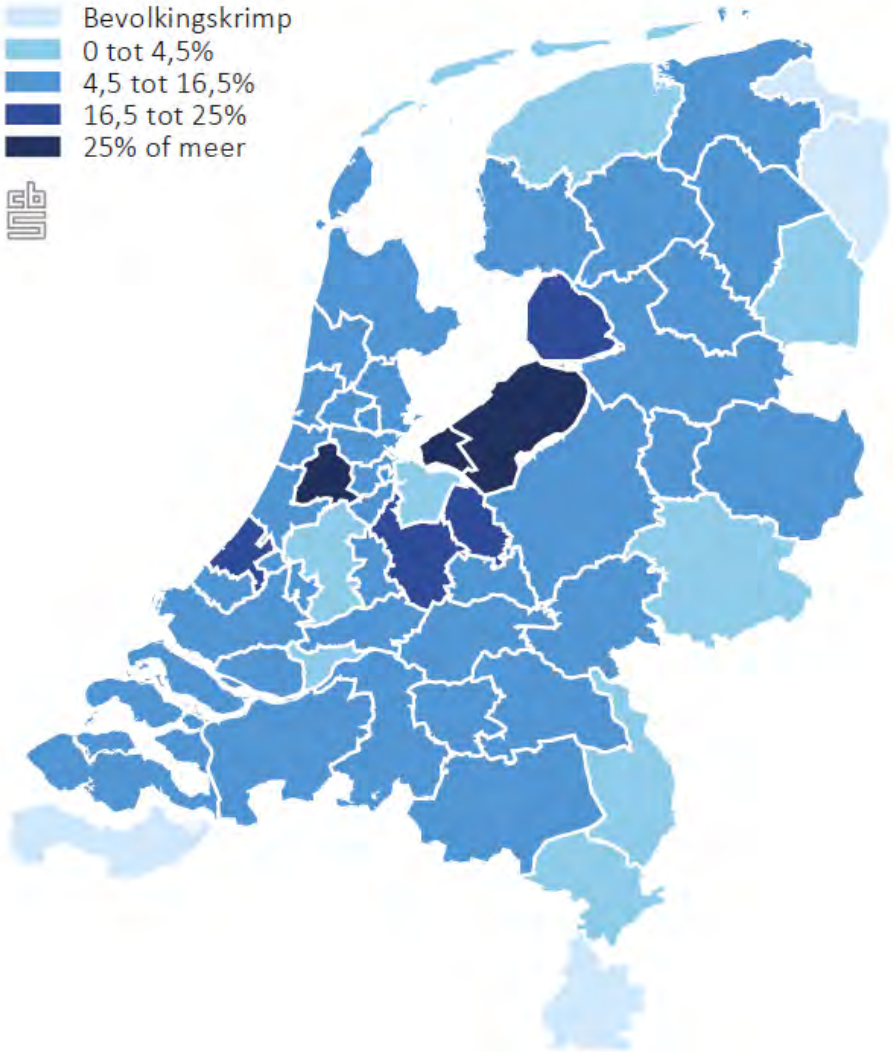
Source: Fryslân als Vestigingsplaats: Koster & Kamminga (januari 2022). Onderzoek in opdracht van: Provincie Fryslân en Innovatiepact Fryslân.



# Demographic developments



### 3.3.1 Ontwikkeling bevolking COROP-plusgebieden, 1996–2016[1)]

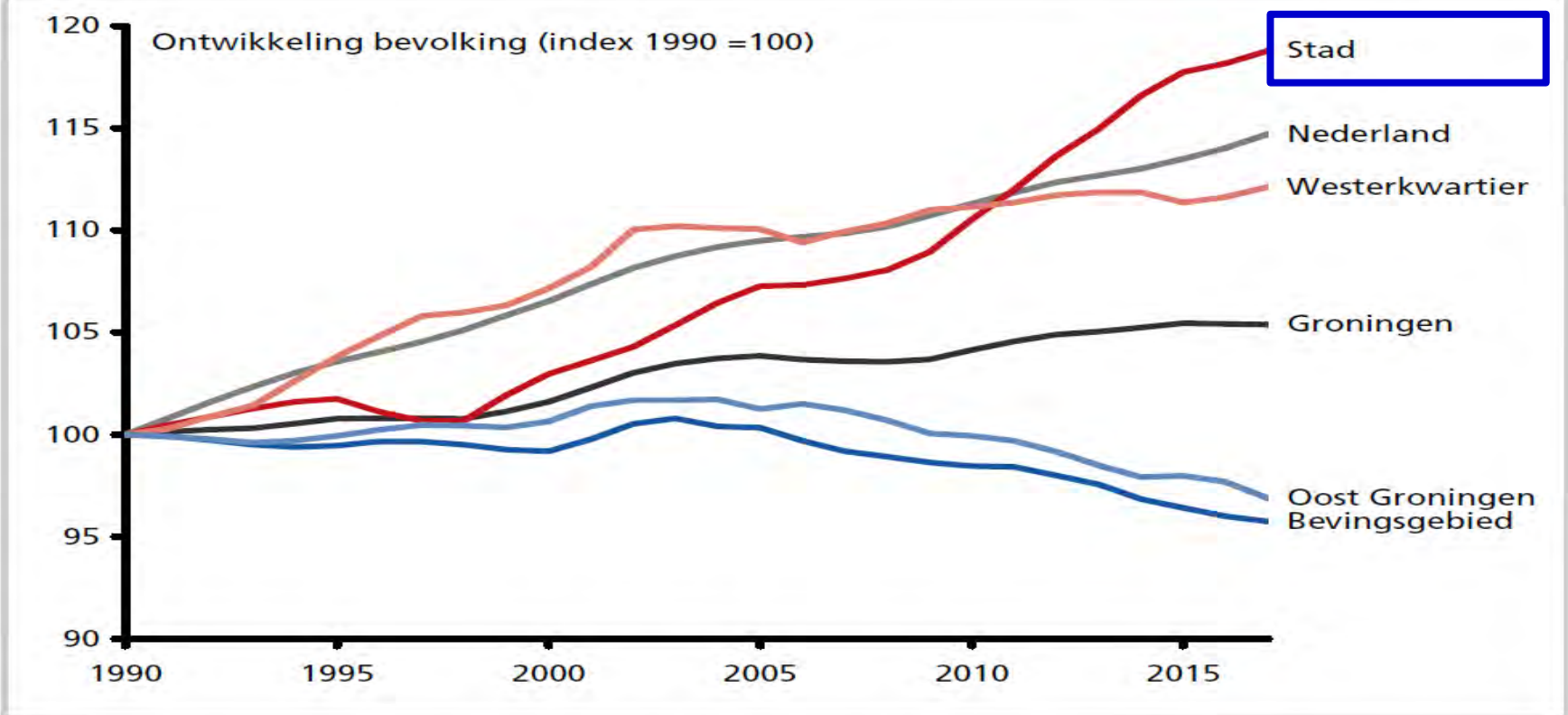



# Change in population 1996 - 2016

Source: Statistics Netherlands

# Population growth since 1990: large differences within the province of Groningen: city wins most, decline in north/east

Figuur S.4 Ontwikkeling bevolking sinds 1990 – index




Source: Ponds and Van Woerkens, 2019.

Bron: Atlas voor gemeenten

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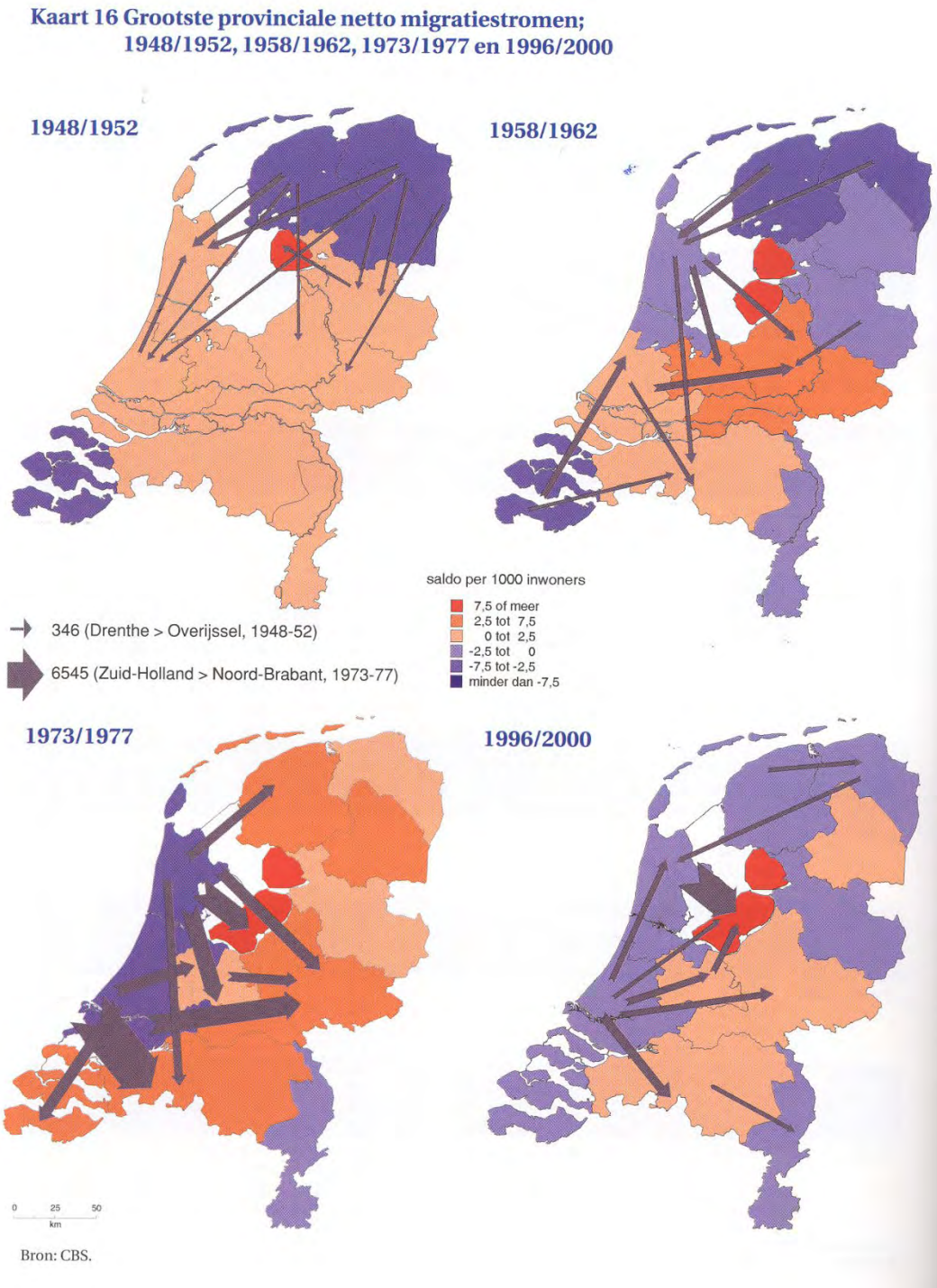
# Net migration flows in the Netherlands:

1948/1952
1958/1962
1973/1977
1996/2000

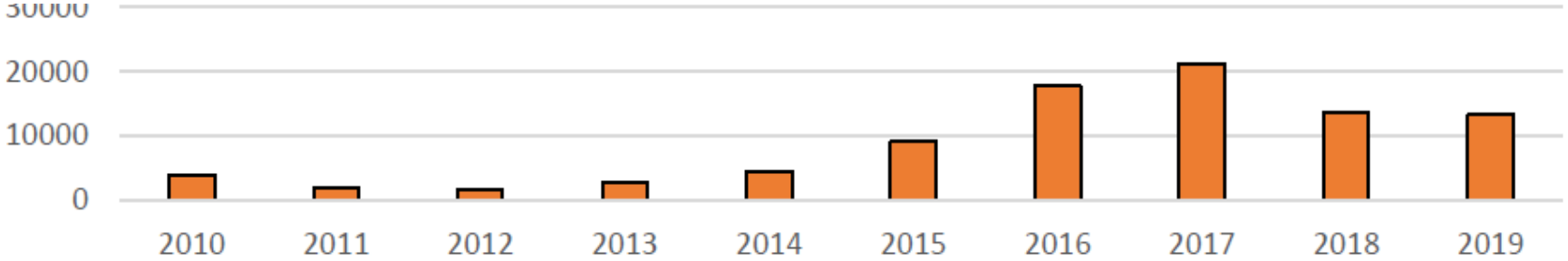




# **Internal** net-migration North is negative


Keep attract more people?

# **Foreign** net-migration North is positive




More labour migrants as solution?

*Bron: CBS, Regionale Kerncijfers*

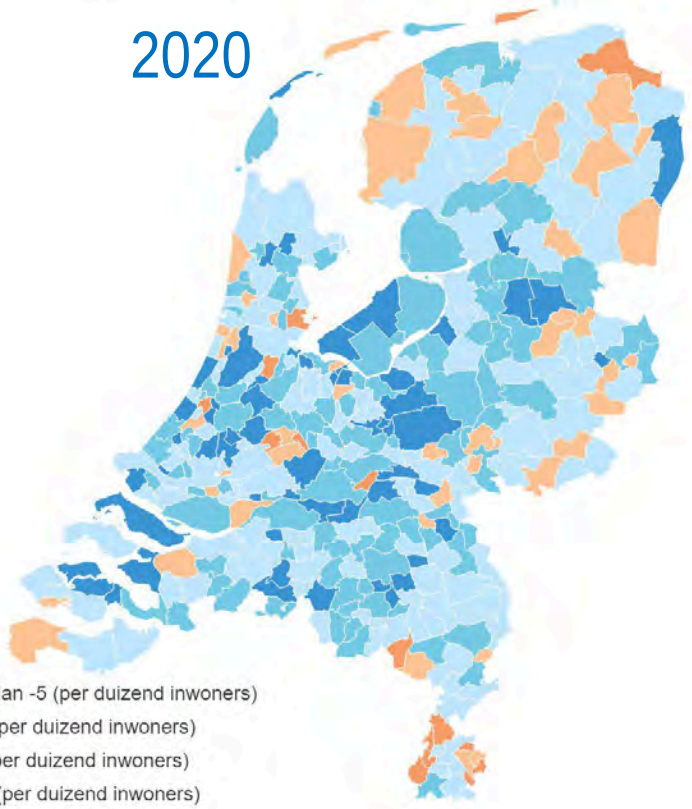
Bron: De Stand van het Noorden, Doets et al., 2021

# Population development 2020 and 2021

Bevolkingsontwikkeling, 20201)

Bevolkingsontwikkeling

2020



Minder dan -5 (per duizend inwoners)
-5 tot 0 (per duizend inwoners)
0 tot 5 (per duizend inwoners)
5 tot 10 (per duizend inwoners)
10 of meer (per duizend inwoners)

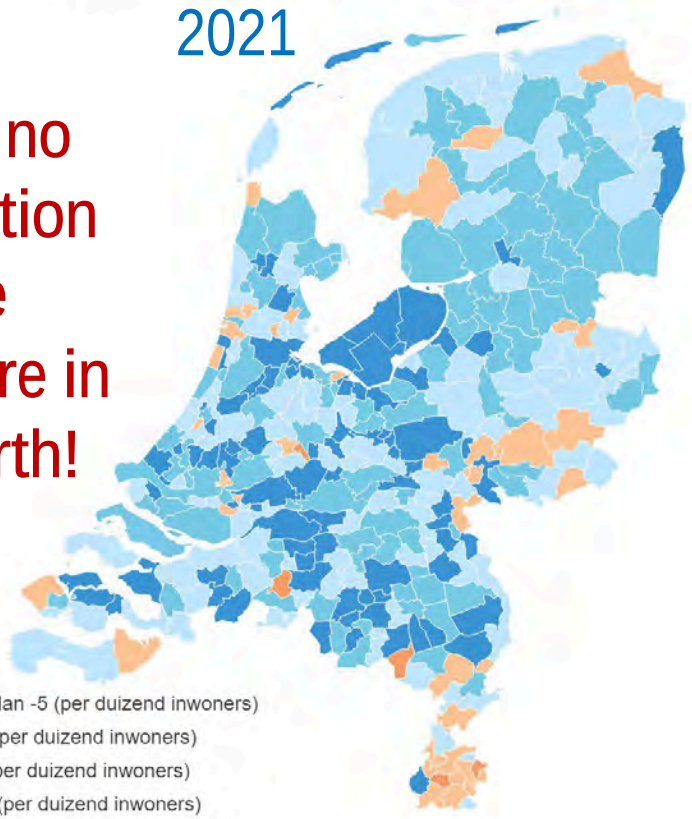
1) Indeling gemeenten gebaseerd op 1 januari 2021.

Hardly no population decline anymore in the North!

Bevolkingsontwikkeling, 2021*

Bevolkingsontwikkeling

2021



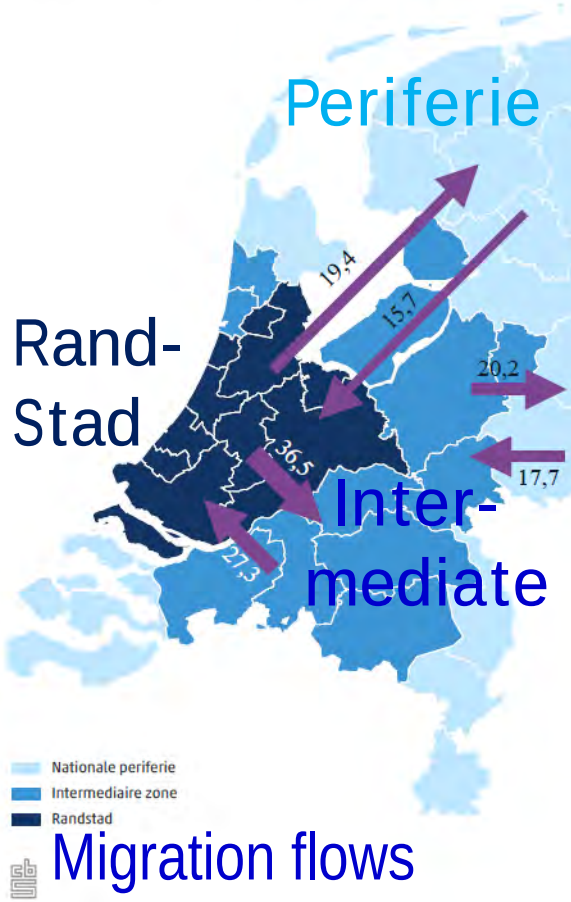
Minder dan -5 (per duizend inwoners)
-5 tot 0 (per duizend inwoners)
0 tot 5 (per duizend inwoners)
5 tot 10 (per duizend inwoners)
10 of meer (per duizend inwoners)

* Voorlopige cijfers tot 1 december

Source: Statistics Netherlands

# Migration numbers april-december 2020→ Randstad looses!

Verhuisde personen, april t/m december 2020 (x 1 000)




Randstad – Intermediate:

In: 15.700 < Out: 19.400

Randstad – Periphery:

In: 27.300 < Out: 36.500

Intermediate – Peripherie

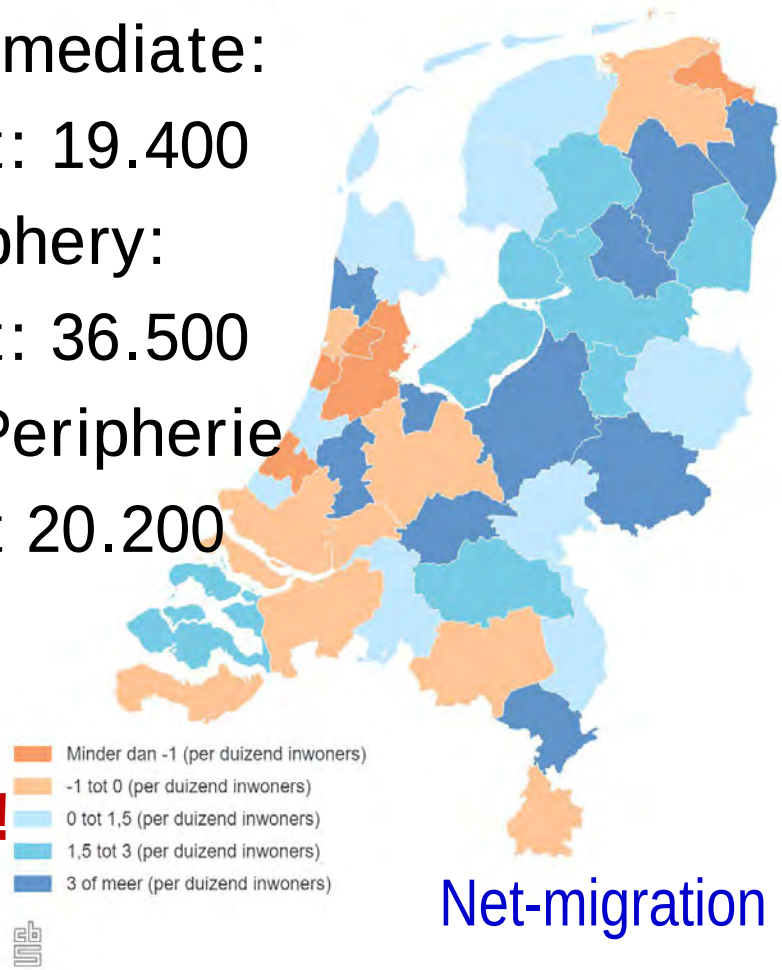
In: 17.700 < Out 20.200

**Randstad loss,**

**Periphery wins!**

Migration flows

Saldo verhuizingen, april t/m december 2020



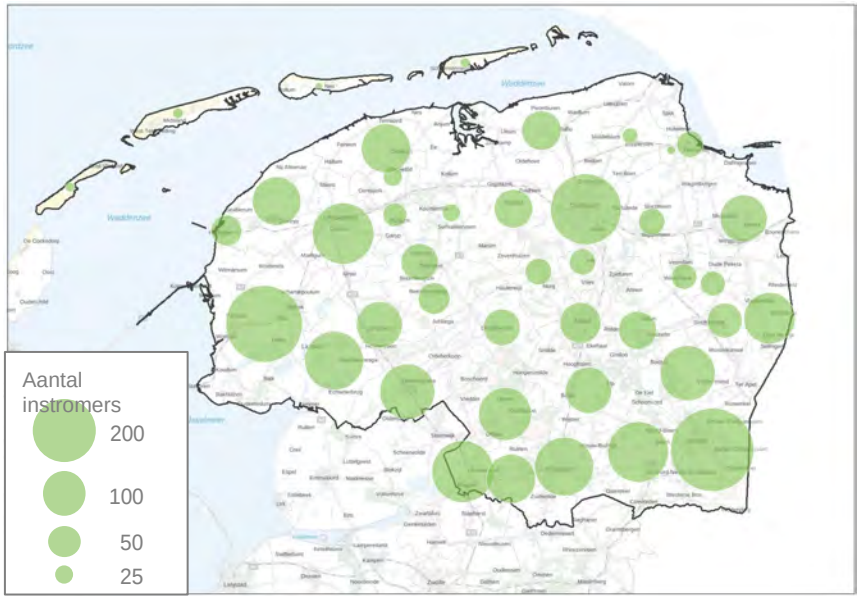

Net-migration

Source: Statistics Netherlands

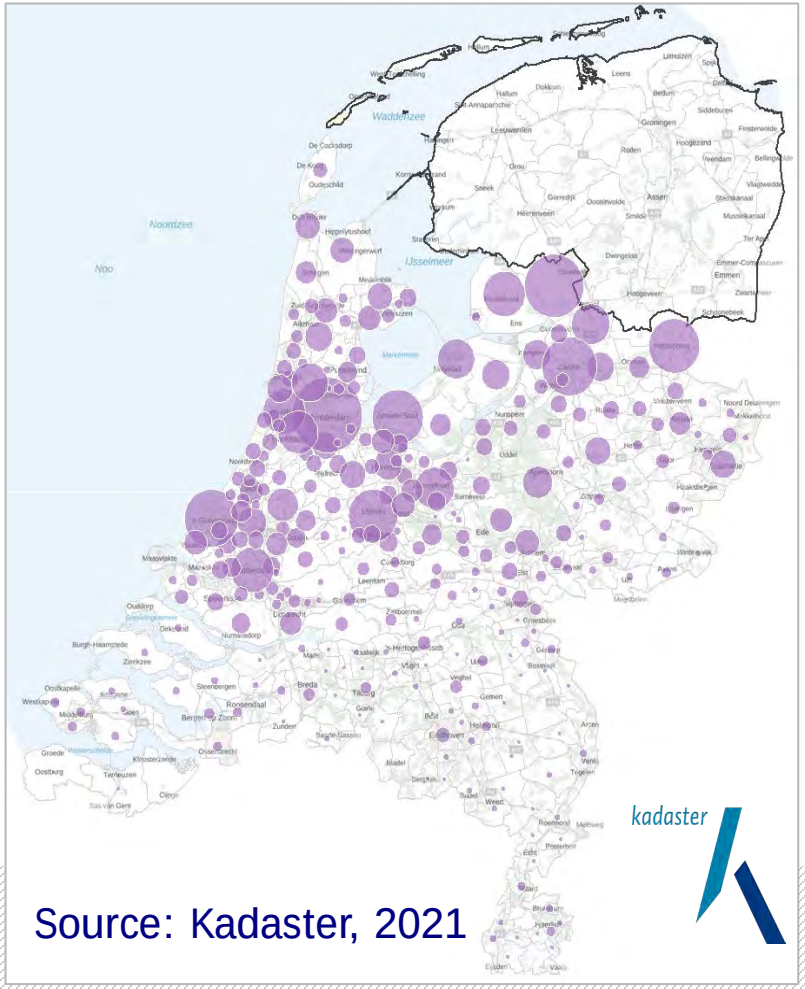
Verhuizingen steeds meer gericht op regio's buiten de Randstad

# House buyers from outside the North 2019-2020

## Bestemmingsgemeente




## Herkomstgemeenten

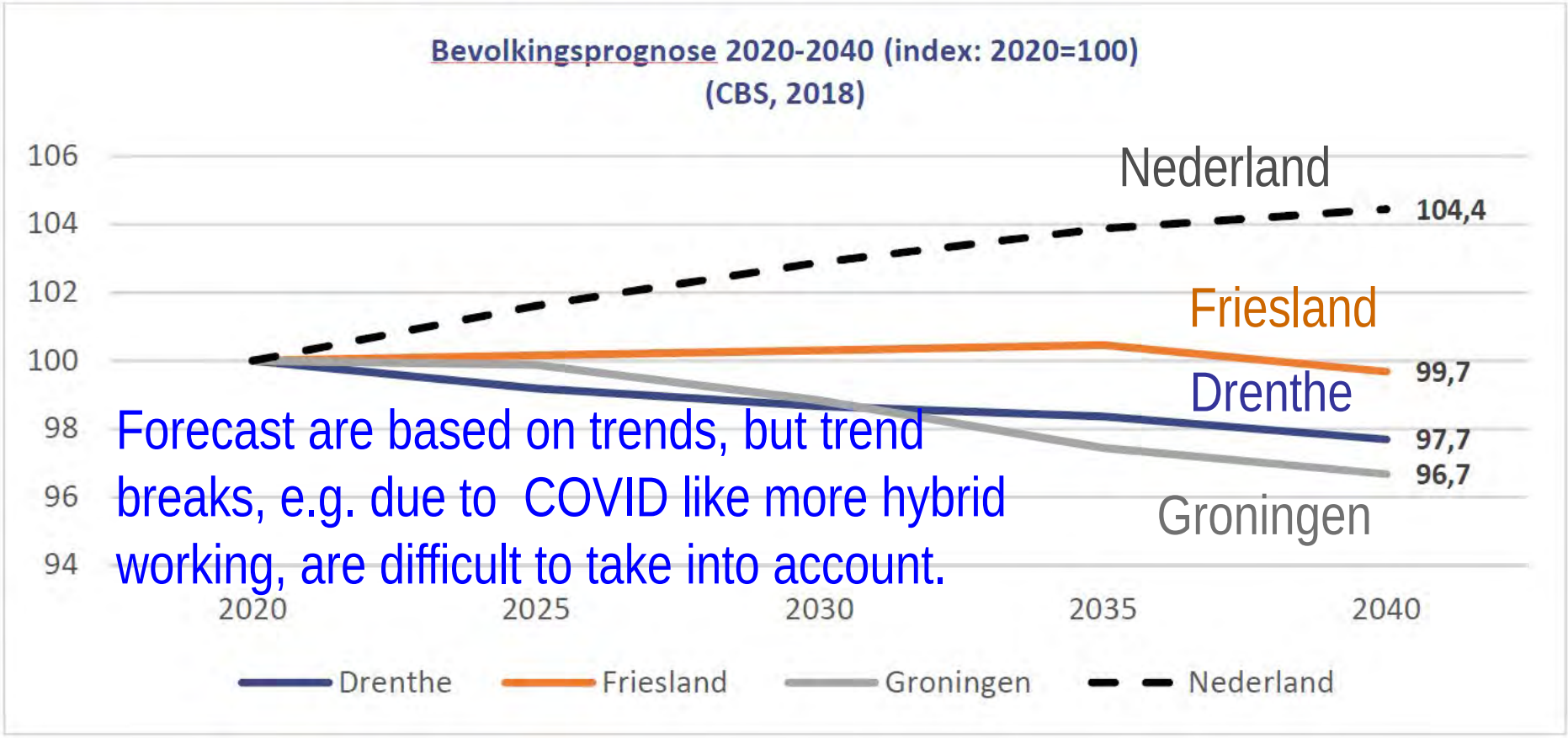



Source: Kadaster, 2021

**The number of house buyers originating from outside the North tripled from 2019-2020 compared to 2013-2014 and they come more often from the Randstad instead as from neighbouring municipalities.**

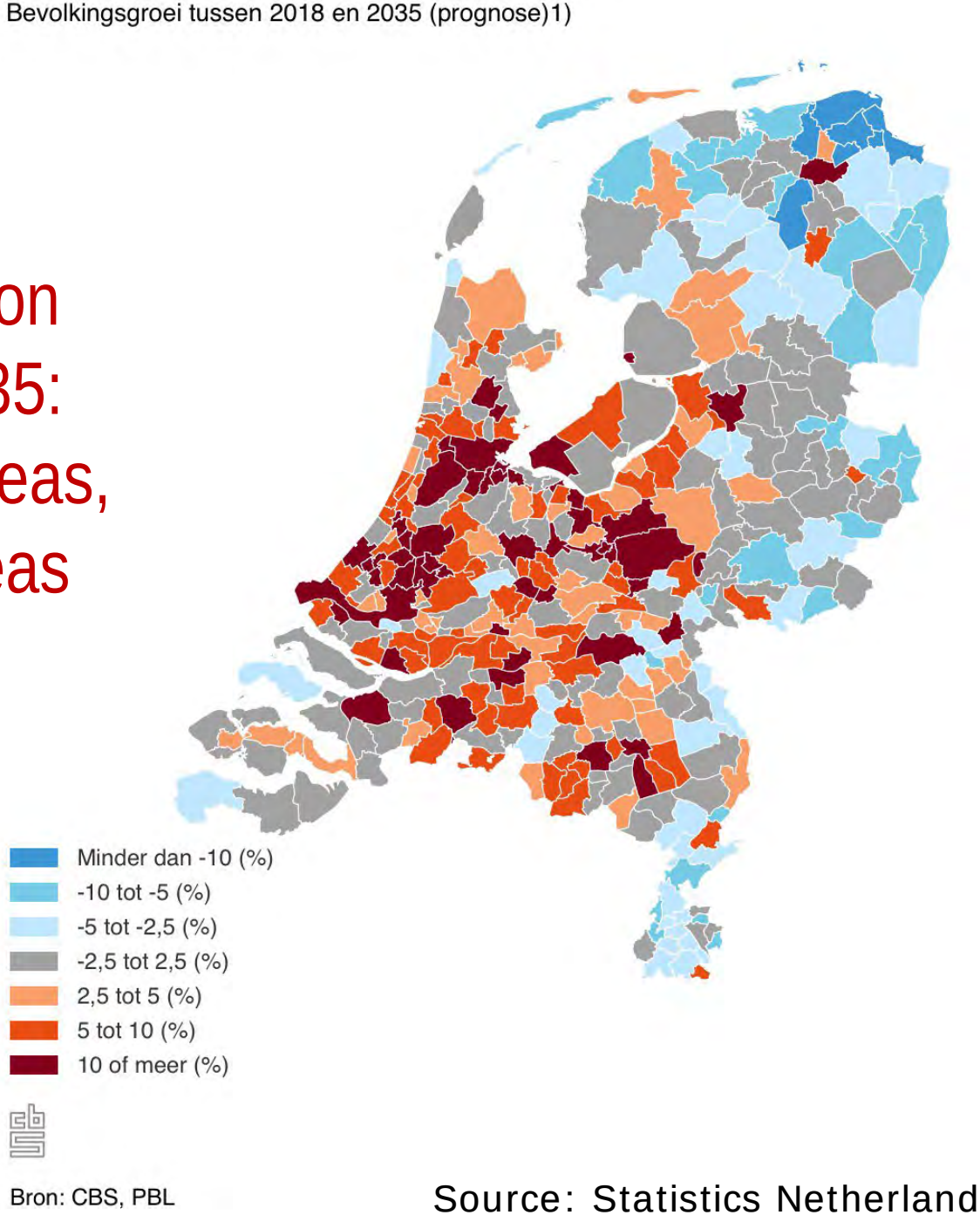
# Population forecast 2020-2040: **decline!**

*Figuur 1: Bevolkingsprognose Noord-Nederland*




Source: De Stand van het Noorden, Doets et al., 2021

# Predicted population change 2018 - 2035: growth in urban areas, decline in rural areas



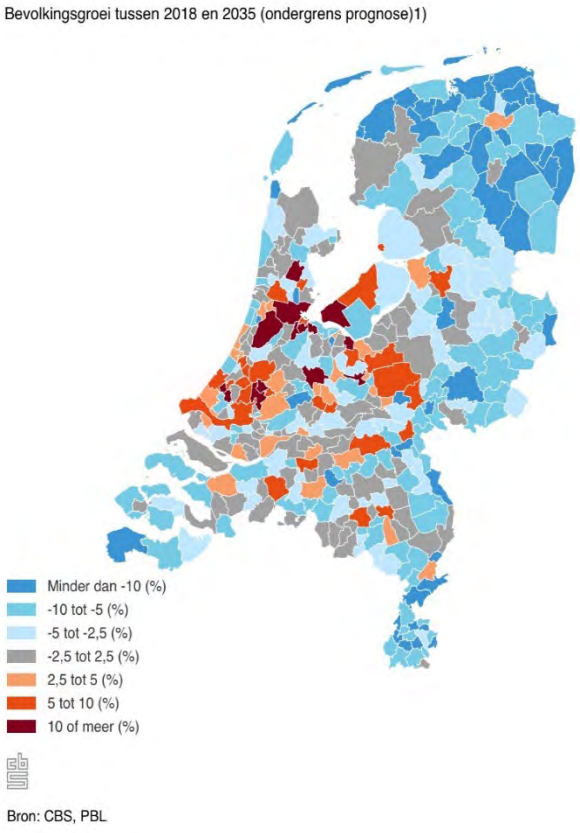

Source: Statistics Netherlands, PBL

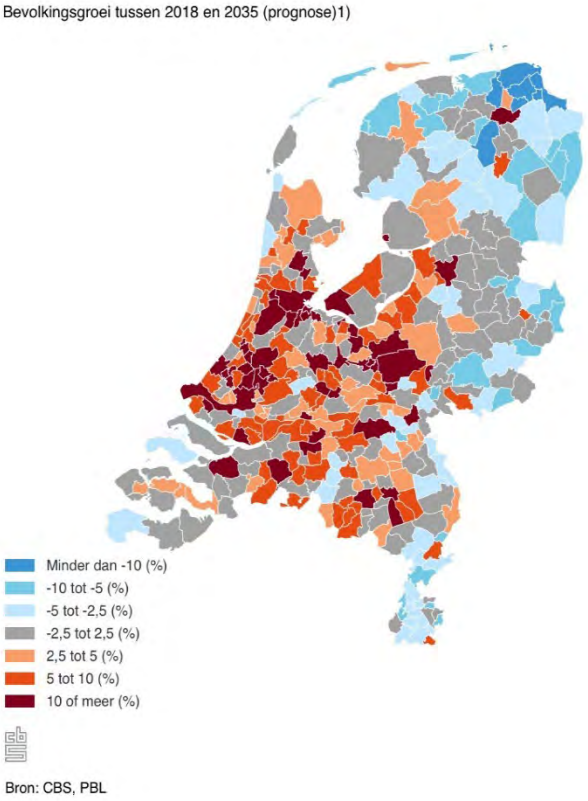
# Population predictions are rather uncertain:

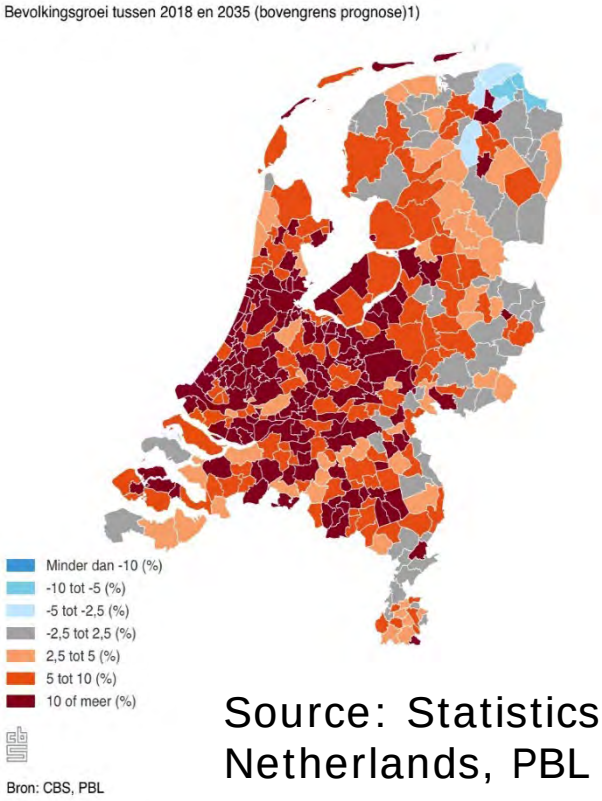
Lower bound: high decline

Prediciton: some declin

Upper bound: hardly decline



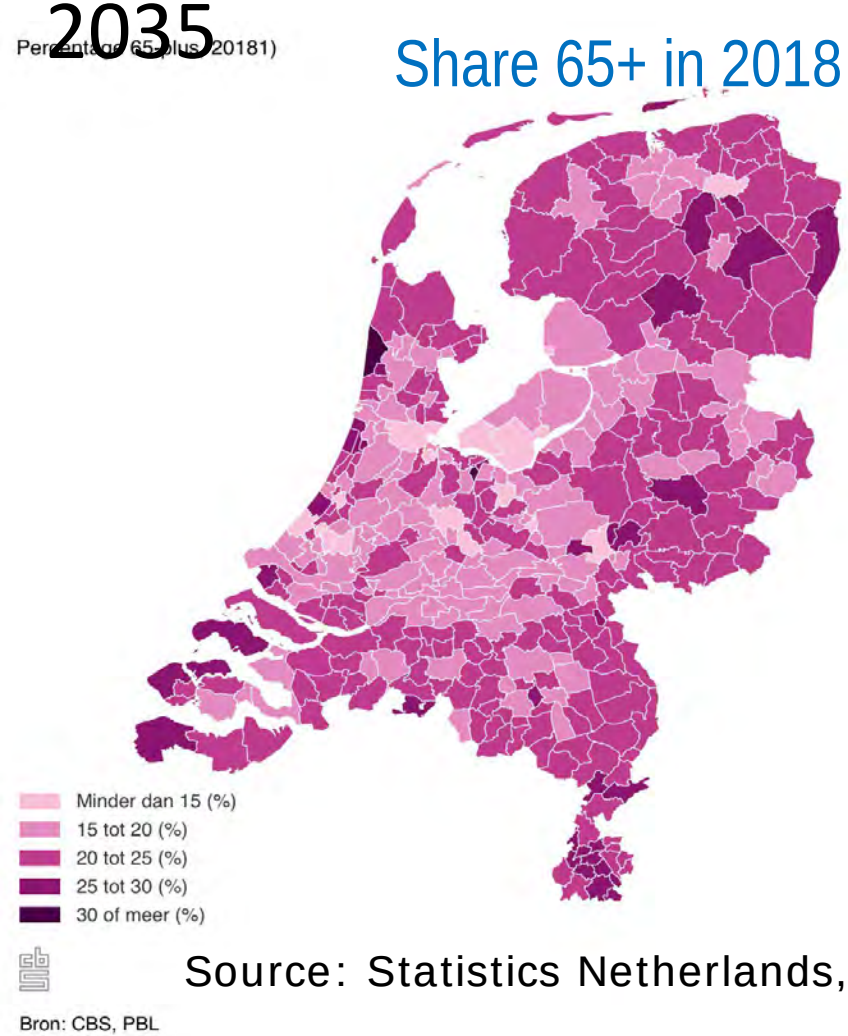




Source: Statistics Netherlands, PBL

# Aging (share 65+) increases over time from 2018 – 2035

Share 65+ in 2018




Share 65+ in 2035

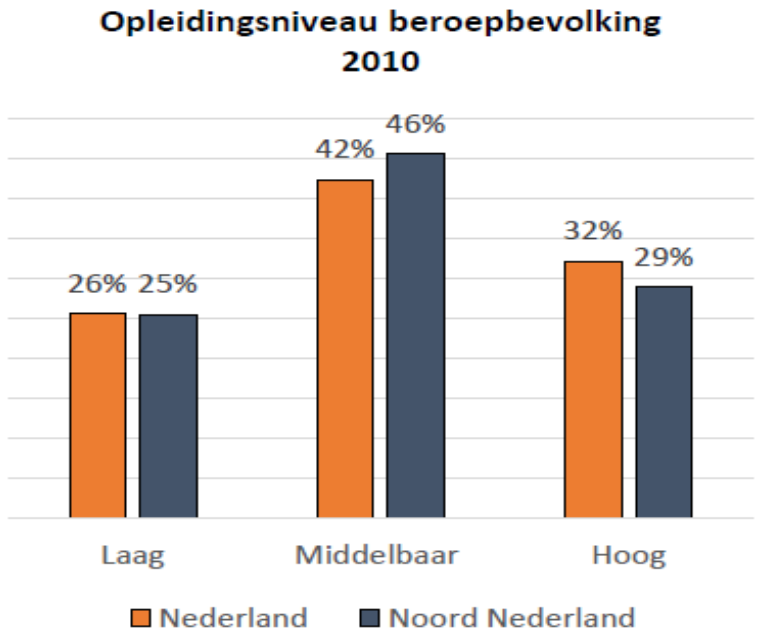

**Aging:** increasing demand for goods and services + decreasing labour force: How to solve this?

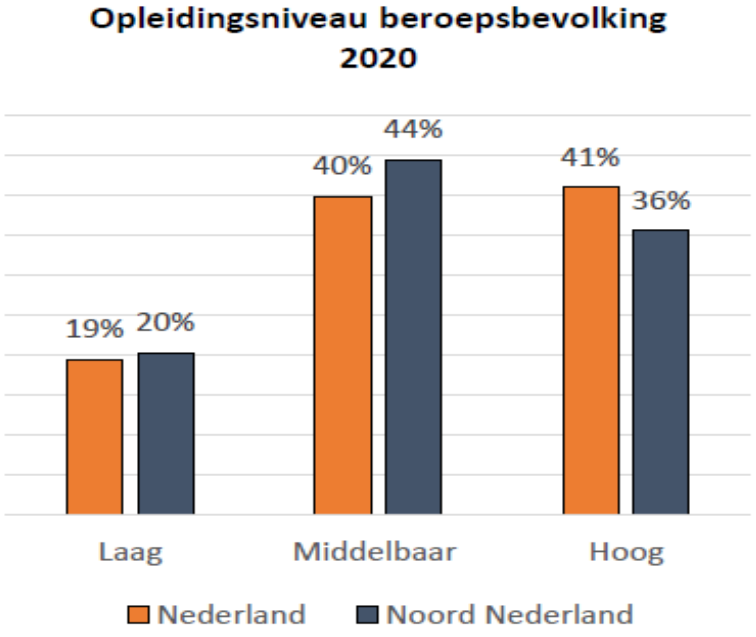
Source: Statistics Netherlands, PBL



# Changes in the labour force 2015-2020 (%)


# Education level of the labour force 2010-2020



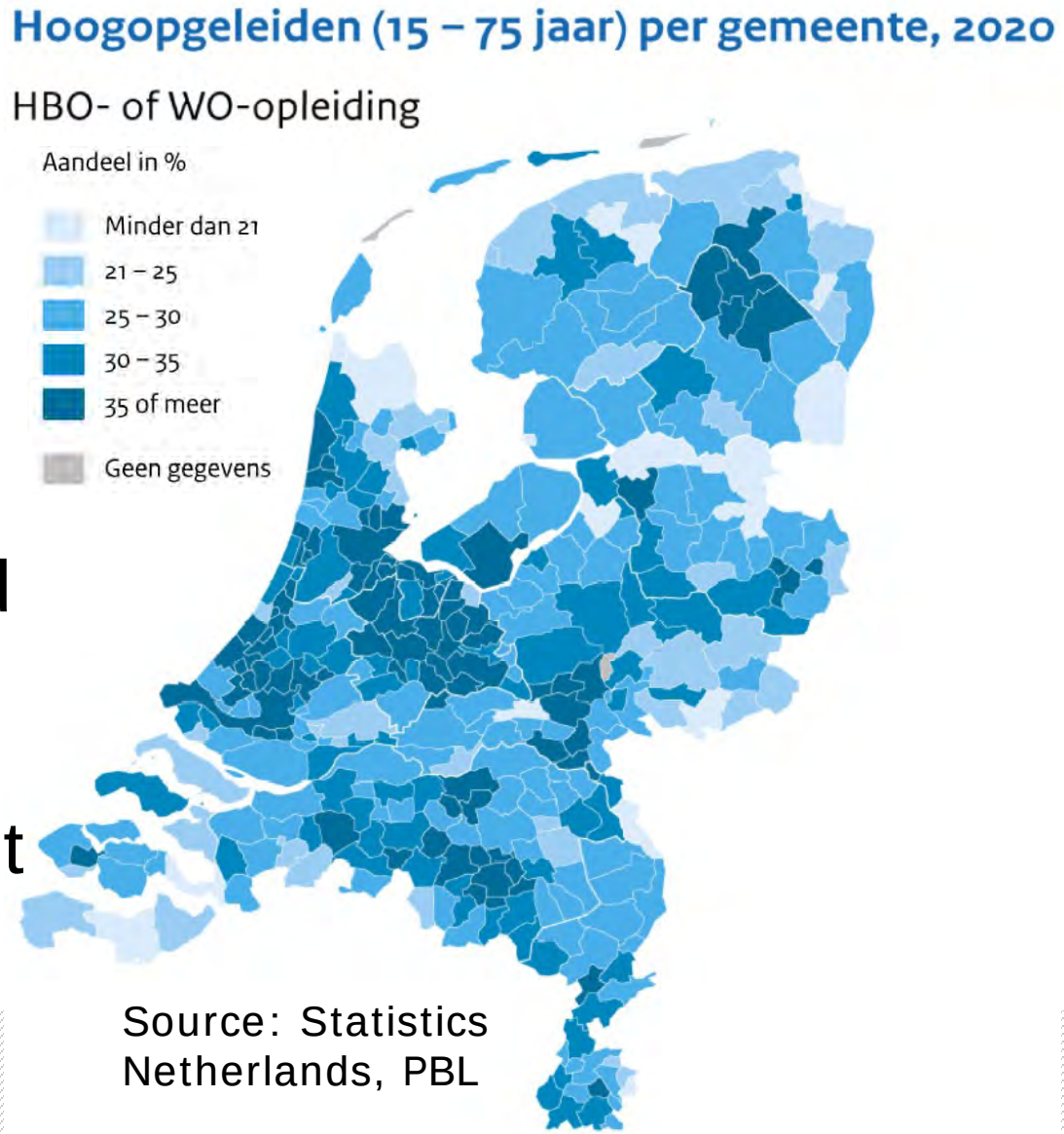

Source: De Stand van het Noorden, Doets et al., 2021

*Bron: CBS, Arbeidsdeelname kerncijfers*



**Higher educated concentrate in urban areas with HEI's.**

**Consequence:**
braindrain of talented people from regions with population decline near the coast and borders where elderly and low educated stay.




Source: Statistics Netherlands, PBL

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# Regions facing population decline subject to policy since 2014:

a. Krimpgebieden: 9 areas with expected strong decline of > 12,5% till 2040

b. Anticipeergebieden: 11 areas with moderate expected decline of > 2,5% till 2040



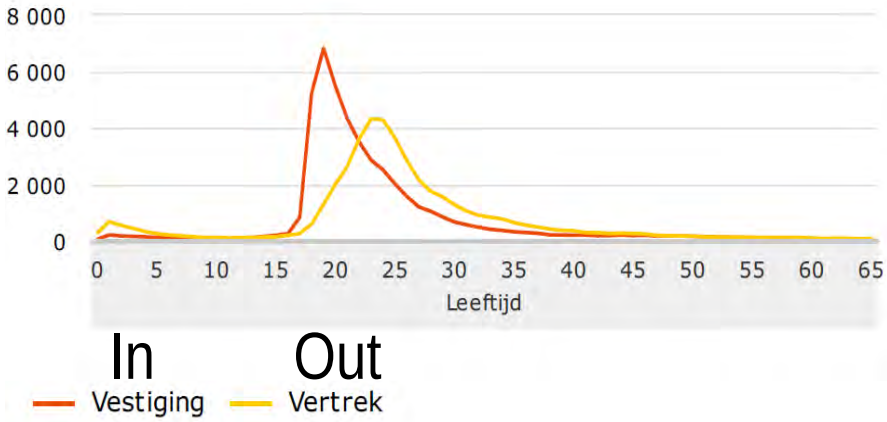
# Braindrain or clean export product?



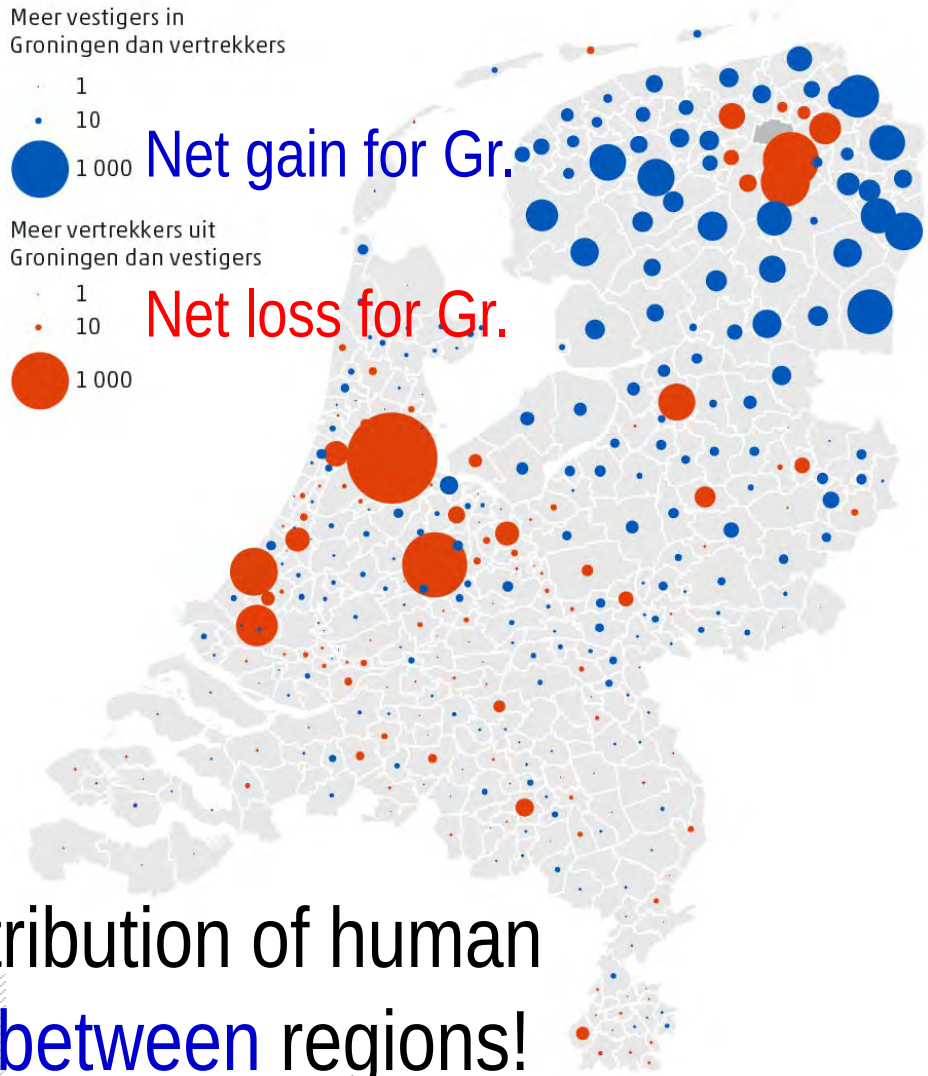
# Migration patterns to / from city of Groningen

## Migration by age:

Binnenlandse verhuizingen van en naar de gemeente Groningen, 2013-2016




Netto migratie van en naar gemeente Groningen, 2013-2016




The escalator-model → redistribution of human capital mainly within, but also between regions!

university of groningen

Growing cities in a shrinking surrounding region:

The escalator-model

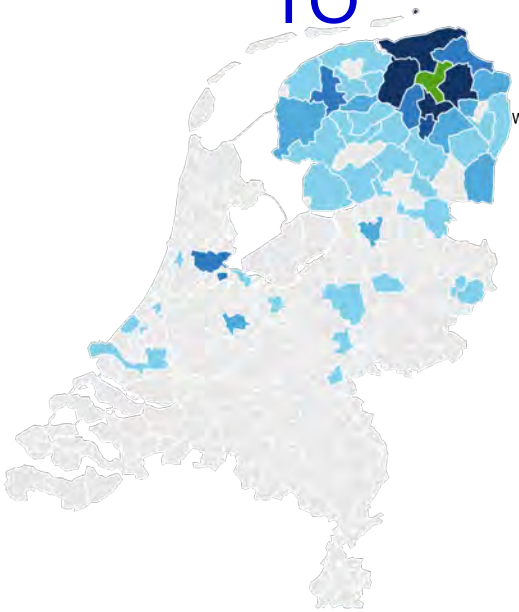
→ redistribution of human capital mainly within, but also between regions!

# All migration to and from Groningen 2020

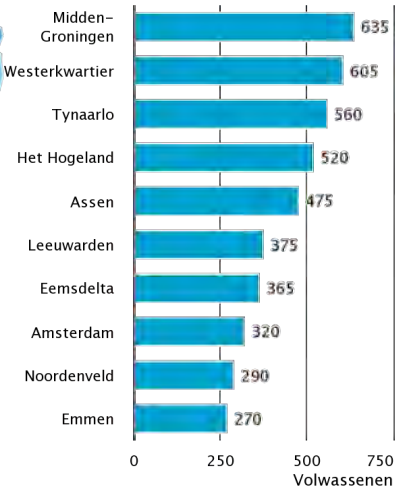
In 2020 verhuisden in totaal 11 045 volwassenen binnen Nederland naar Groningen

Waarvan 11 045 die behoren tot de groep totaal

TO




Top 10 gemeenten

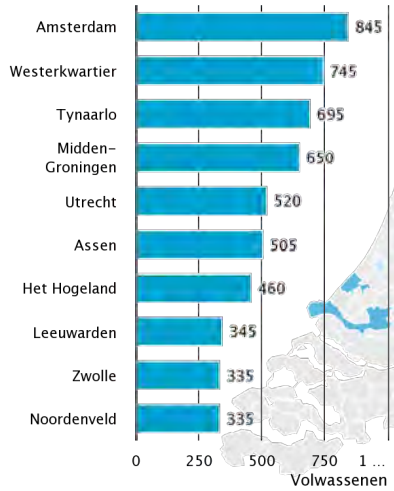



In 2020 verhuisden in totaal 11 135 volwassenen binnen Nederland vanuit Groningen

Waarvan 11 135 die behoren tot de groep totaal

FROM

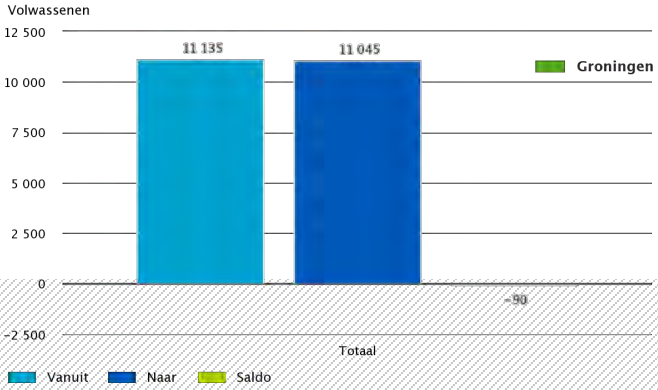
Top 10 gemeenten







Verhuisde personen: Totaal



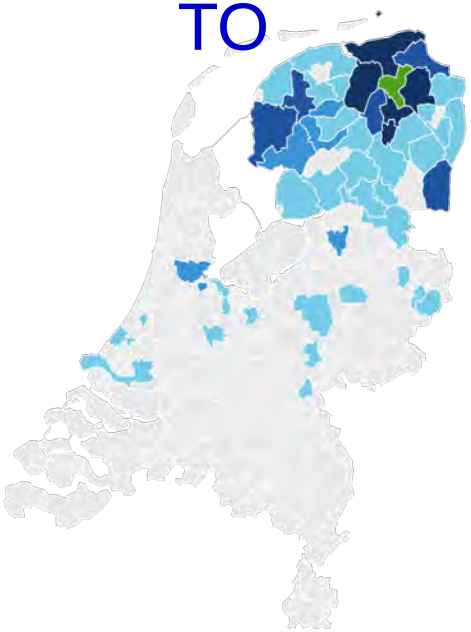

Source: https://dashboards.cbs.nl/v3/Verhuizingendashboard2017tm2020/

# Migration 18-25 year old to/from Groningen 2020

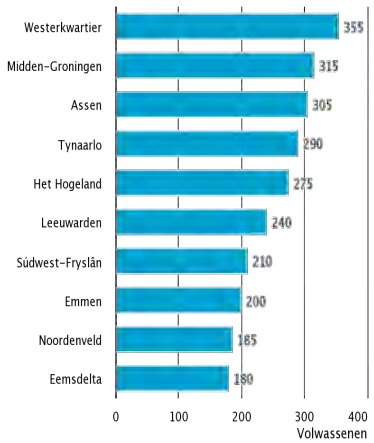
In 2020 verhuisden in totaal 11 045 volwassenen binnen Nederland naar Groningen

Waarvan 7 155 die behoren tot de groep 18-25 jaar

TO




Top 10 gemeenten

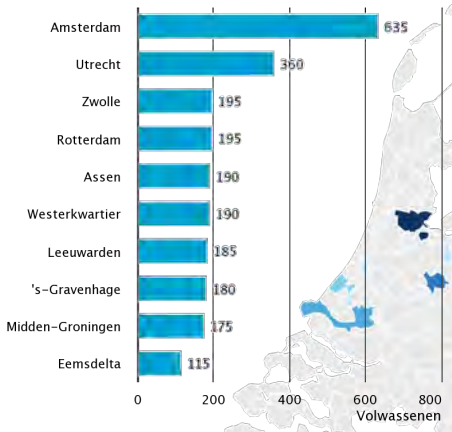



In 2020 verhuisden in totaal 11 135 volwassenen binnen Nederland vanuit Groningen

Waarvan 5 475 die behoren tot de groep 18-25 jaar

FROM

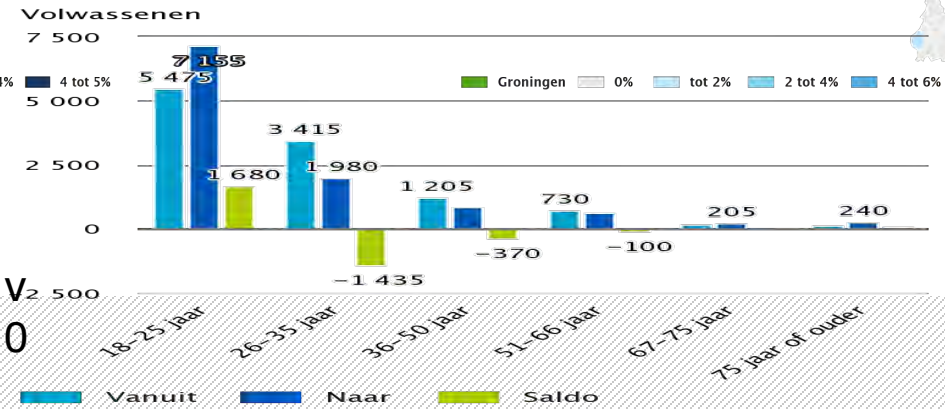
Top 10 gemeenten







Verhuisde personen: Leeftijd



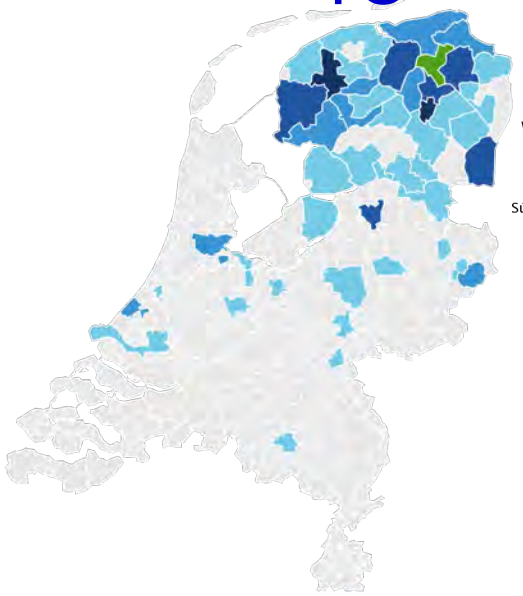

Source: https://dashboards.cbs.nl/v3/Verhuizingendashboard2017tm2020/

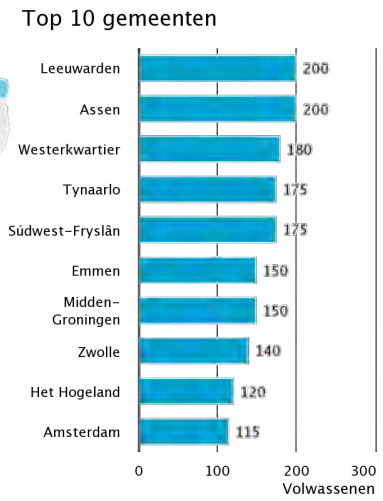
# Migration students higher education Gron. in 2020

In 2020 verhuisden in totaal 11 045 volwassenen binnen Nederland naar Groningen

Waarvan 5 260 die behoren tot de groep student

TO

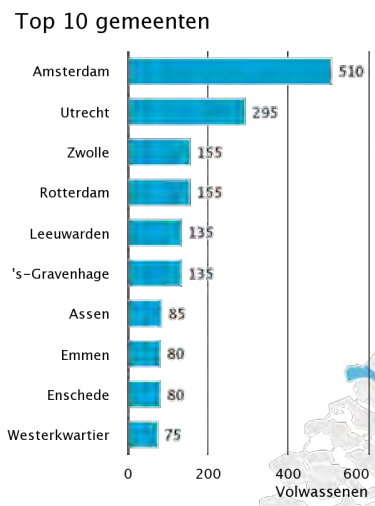


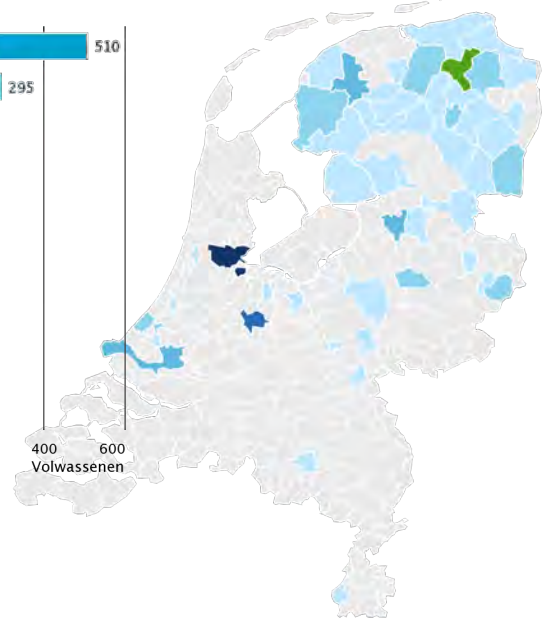



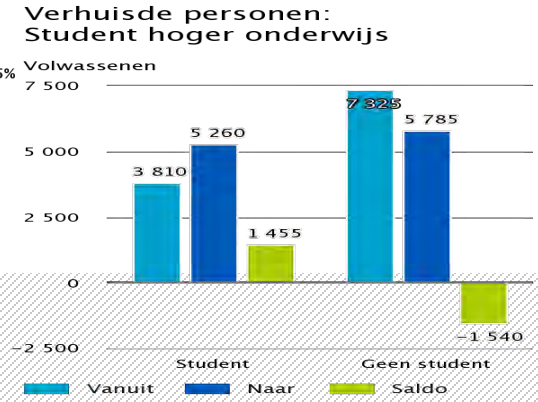

In 2020 verhuisden in totaal 11 135 volwassenen binnen Nederland vanuit Groningen

Waarvan 3 810 die behoren tot de groep student

FROM




Source: https://dashboards.cbs.nl/v3/Verhuizingendashboard2017tm2020/



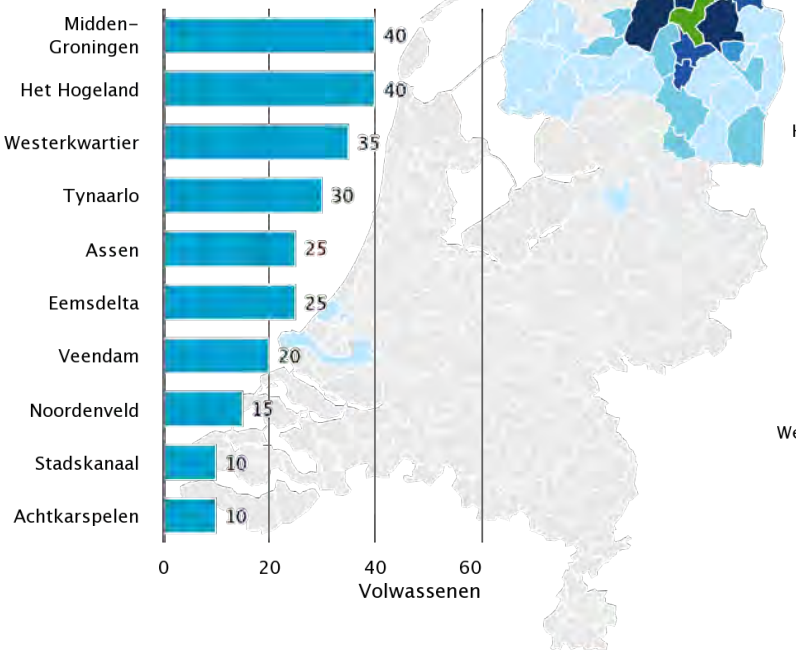
# Migration of medium level (MBO) students, 2020

In 2020 verhuisden in totaal 11 045 volwassenen binnen Nederland naar Groningen

Waarvan 410 die behoren tot de groep student mbo

TO

Top 10 gemeenten

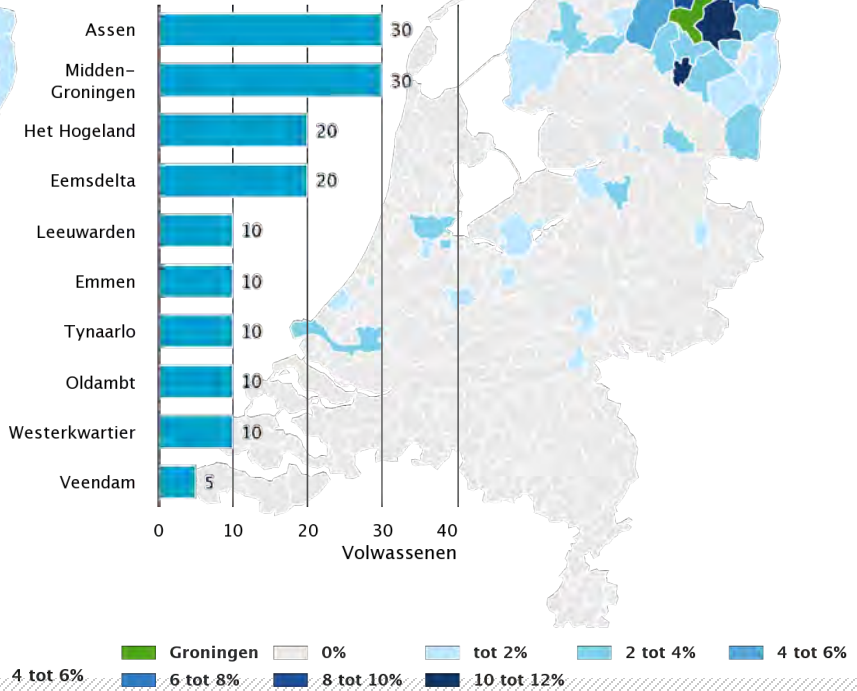



In 2020 verhuisden in totaal 11 135 volwassenen binnen Nederland vanuit Groningen

Waarvan 265 die behoren tot de groep student mbo

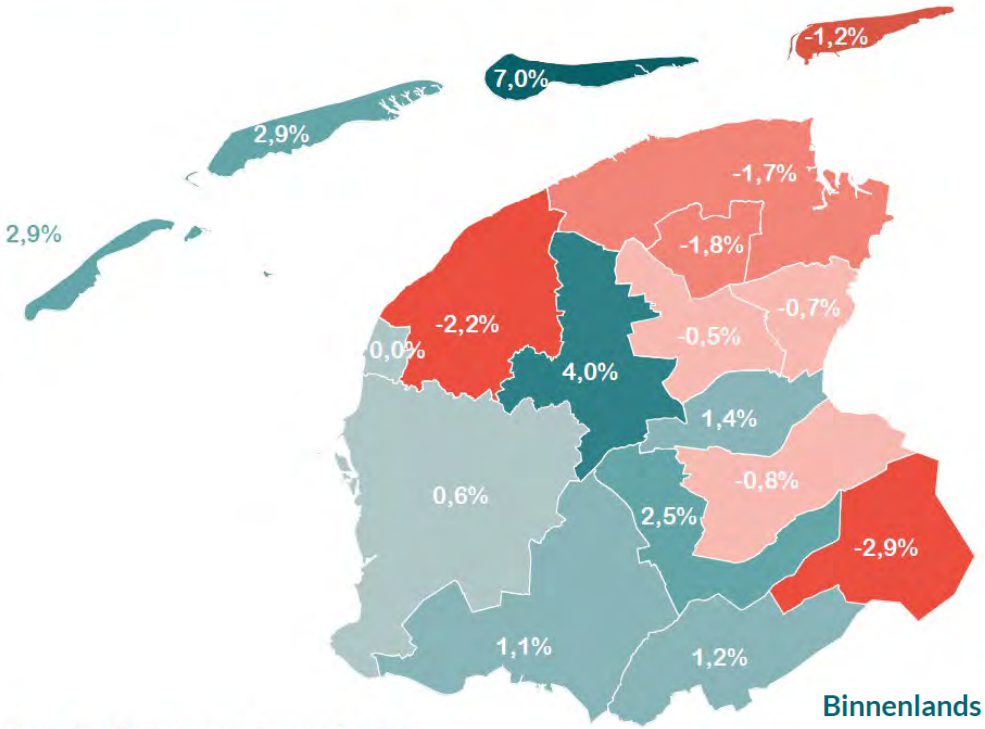
FROM

Top 10 gemeenten




Source: https://dashboards.cbs.nl/v3/Verhuizingendashboard2017tm2020/

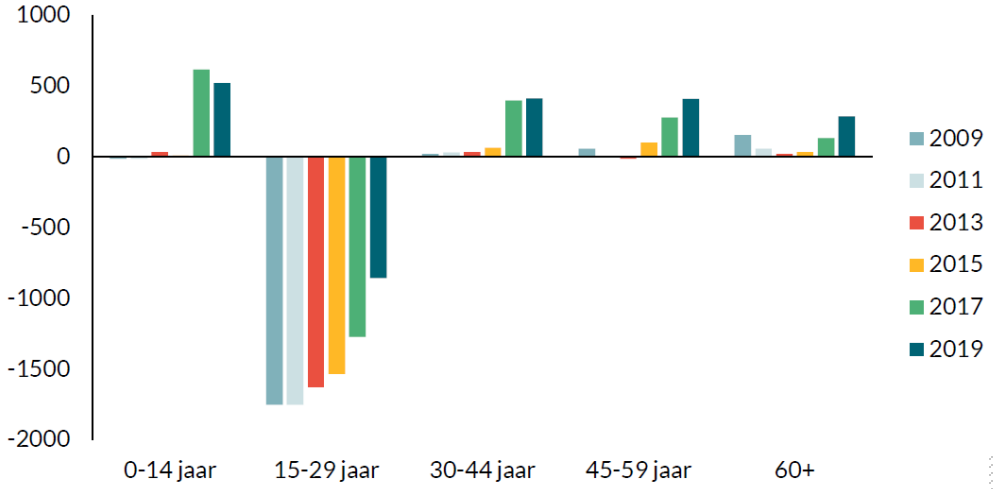
## Bevolkingsontwikkeling 2010-2021 per Friese gemeente




Bron: Provincie Fryslân, bewerking FSP

# Fryslân: population growth in southwest and decline in northeast 2010-2021

## Binnenlands migratiesaldo Fryslân naar leeftijd, 2009-2019




Bron: CBS, Bewerking FSP

Positive net-migration for all age groups, except for 15-29 jaar, although it improves!

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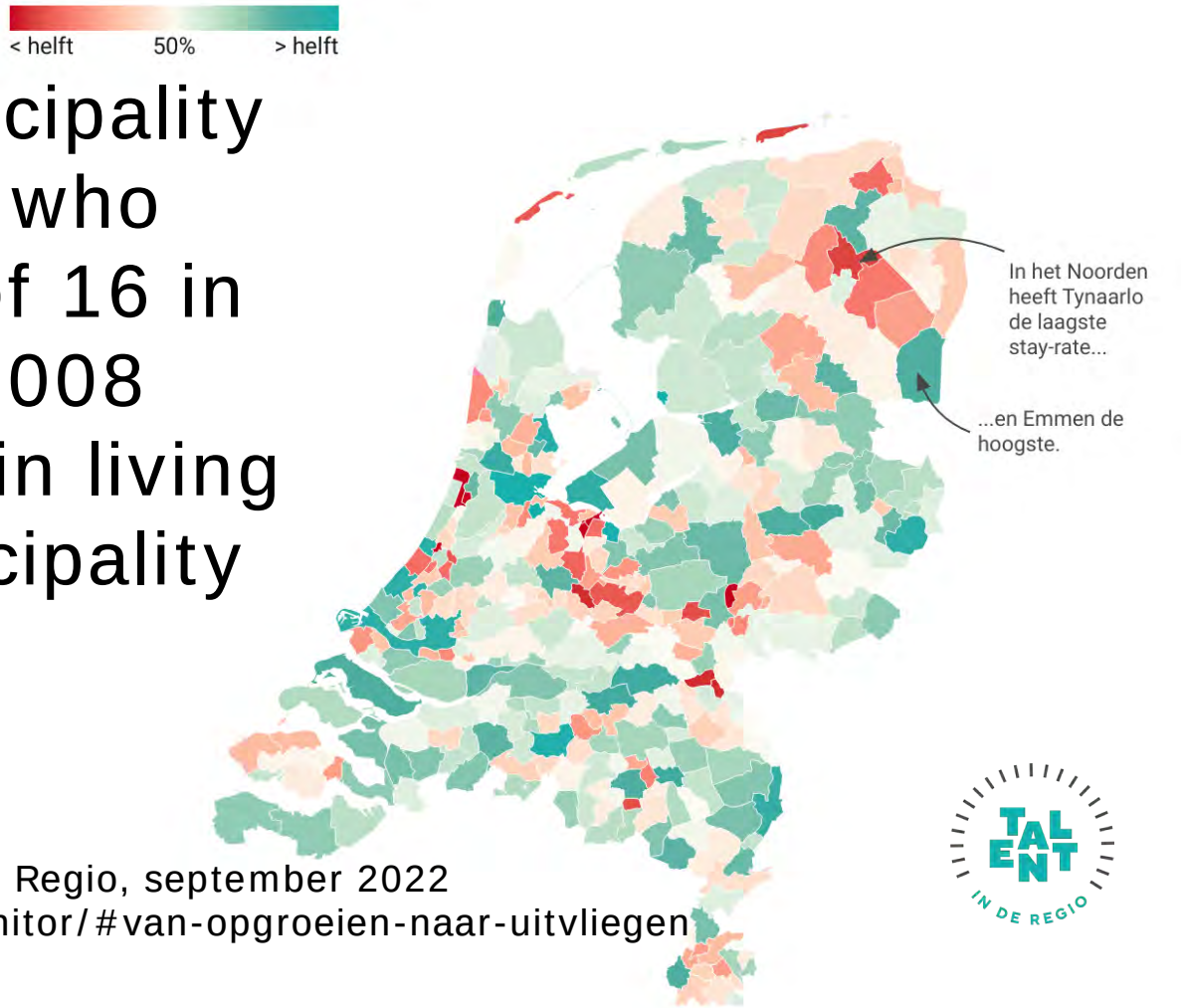
Stay rate by municipality for all youngsters who reached the age of 16 in the period 1995-2008 and are still / again living in the same municipality at the age of 28




Source: Femke Cnossen – Talent in de Regio, september 2022
https://talentinderegio.com/talentmonitor/#van-opgroeien-naar-uitvliegen

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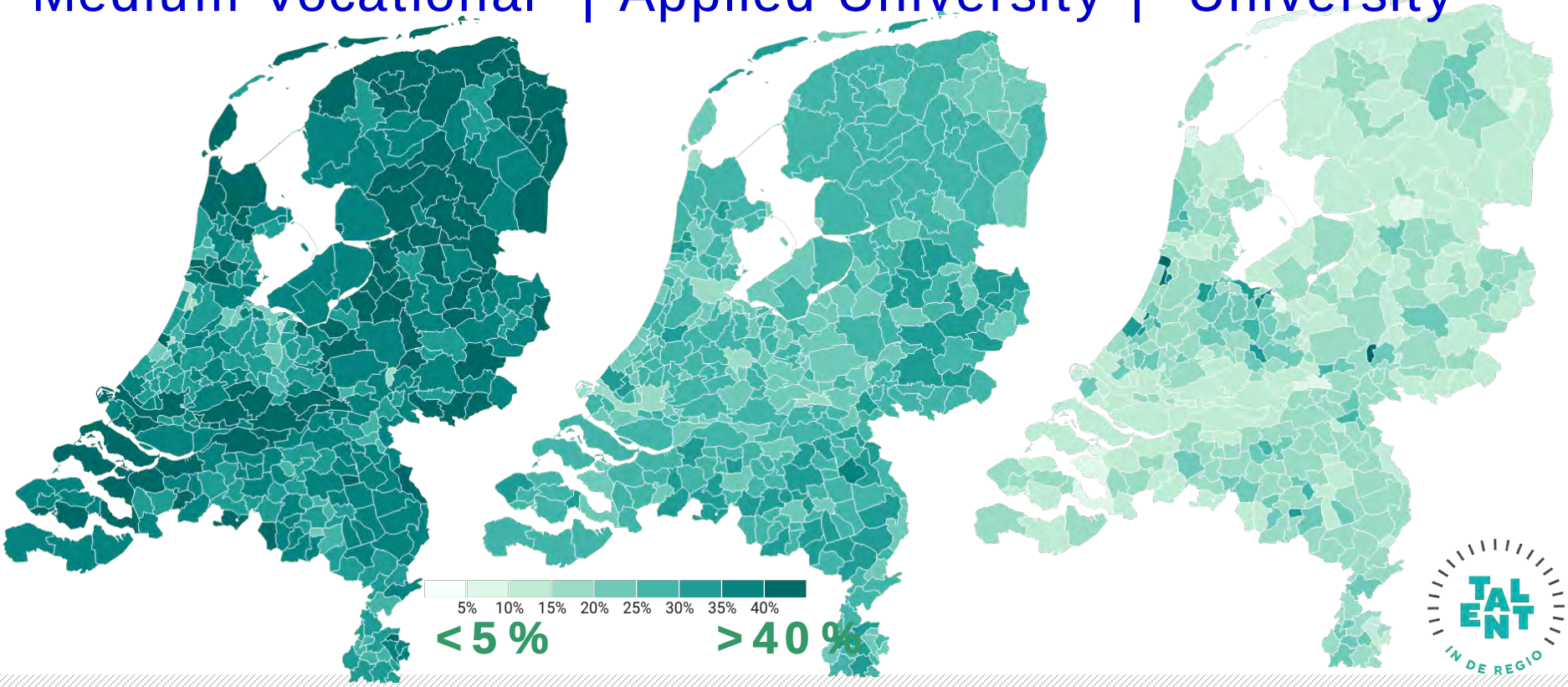
# Share % of youngster living at the age of 16 in a municipality by educational level at age of 28

Medium Vocational | Applied University | University




Source: Femke Cnossen – Talent in de Regio, september 2022
https://talentinderegio.com/talentmonitor/#van-opgroeien-naar-uitvliegen

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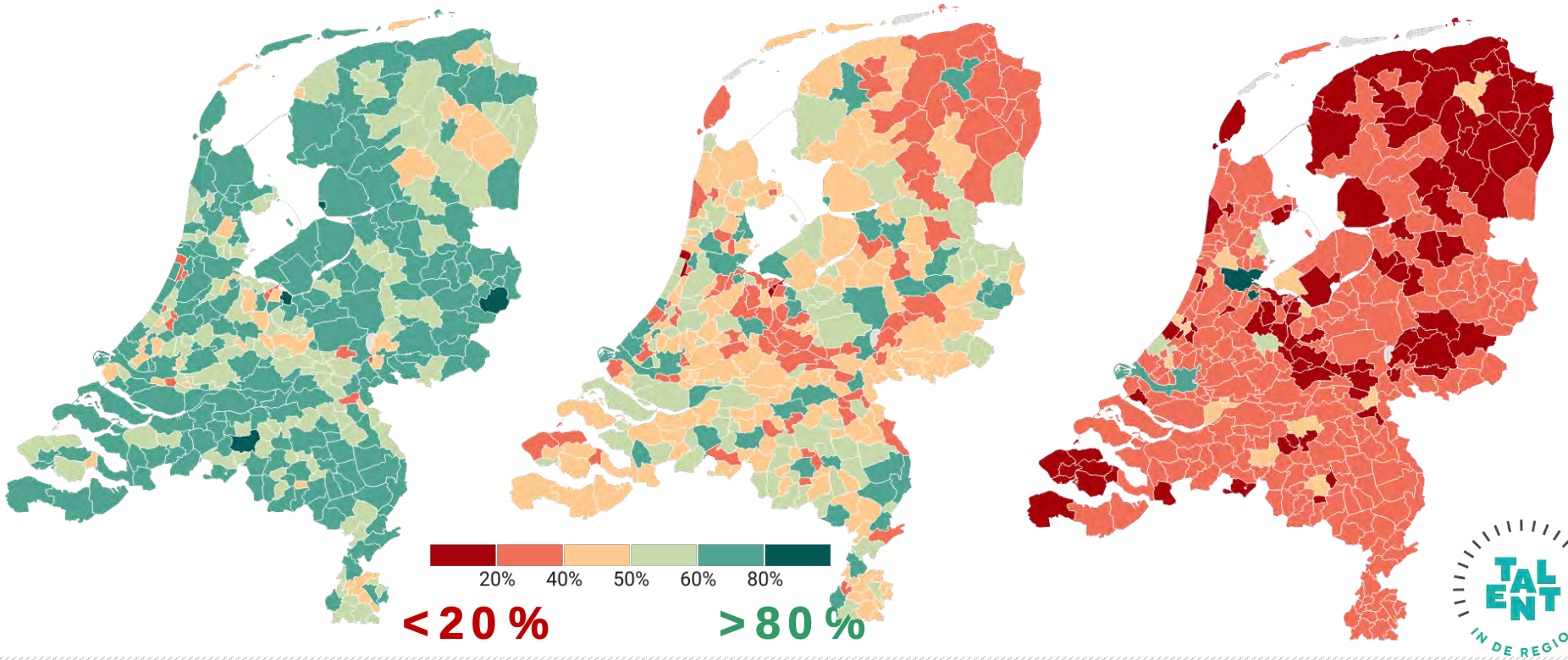
# Share % of youngster living at the age of 28 still / again in the same municipality as at the age of 16

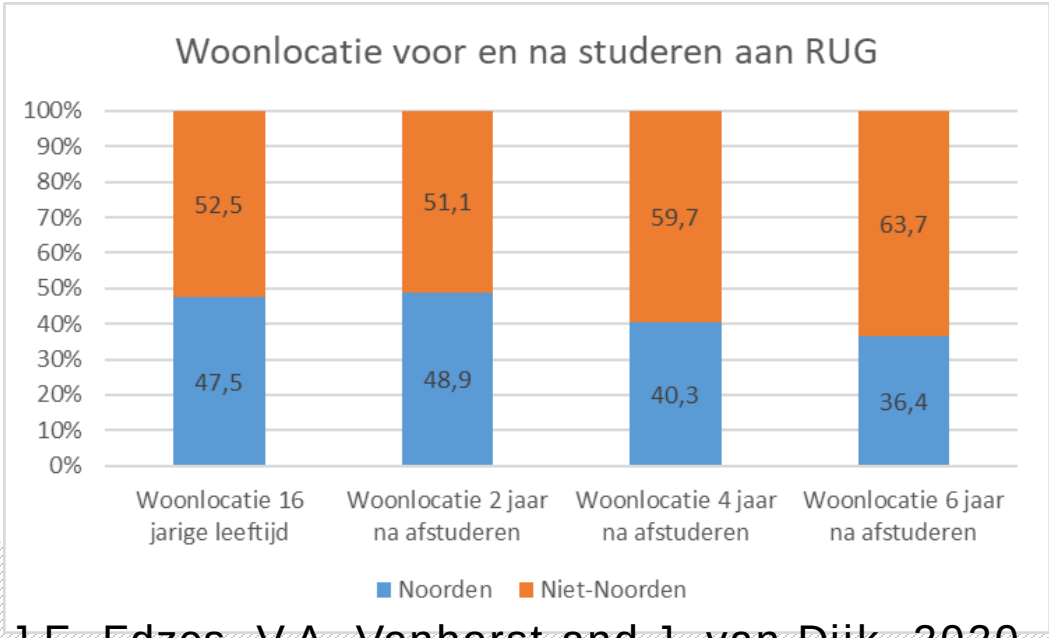
## Medium Vocational | Applied University | University




Source: Femke Cnossen – Talent in de Regio, september 2022
https://talentinderegio.com/talentmonitor/#van-opgroeien-naar-uitvliegen

# Where do UoG students come from and go later?

- 65% of the university students living in the North at the age of 16 graduate from UoG, **35%** goes elswhere, mainly to Technical Universities in Delft, Eindhoven en Enschede.
- 47% of the UoG students is born in the North and thus **53%** from outside the North.
- Two year after gaduation **49%** of the UoG gradautes lives in the North. Four-six year after graduation this lowers to respectively **40%** en **36%**.




Source: A.J.E. Edzes, V.A. Venhorst and J. van Dijk, 2020

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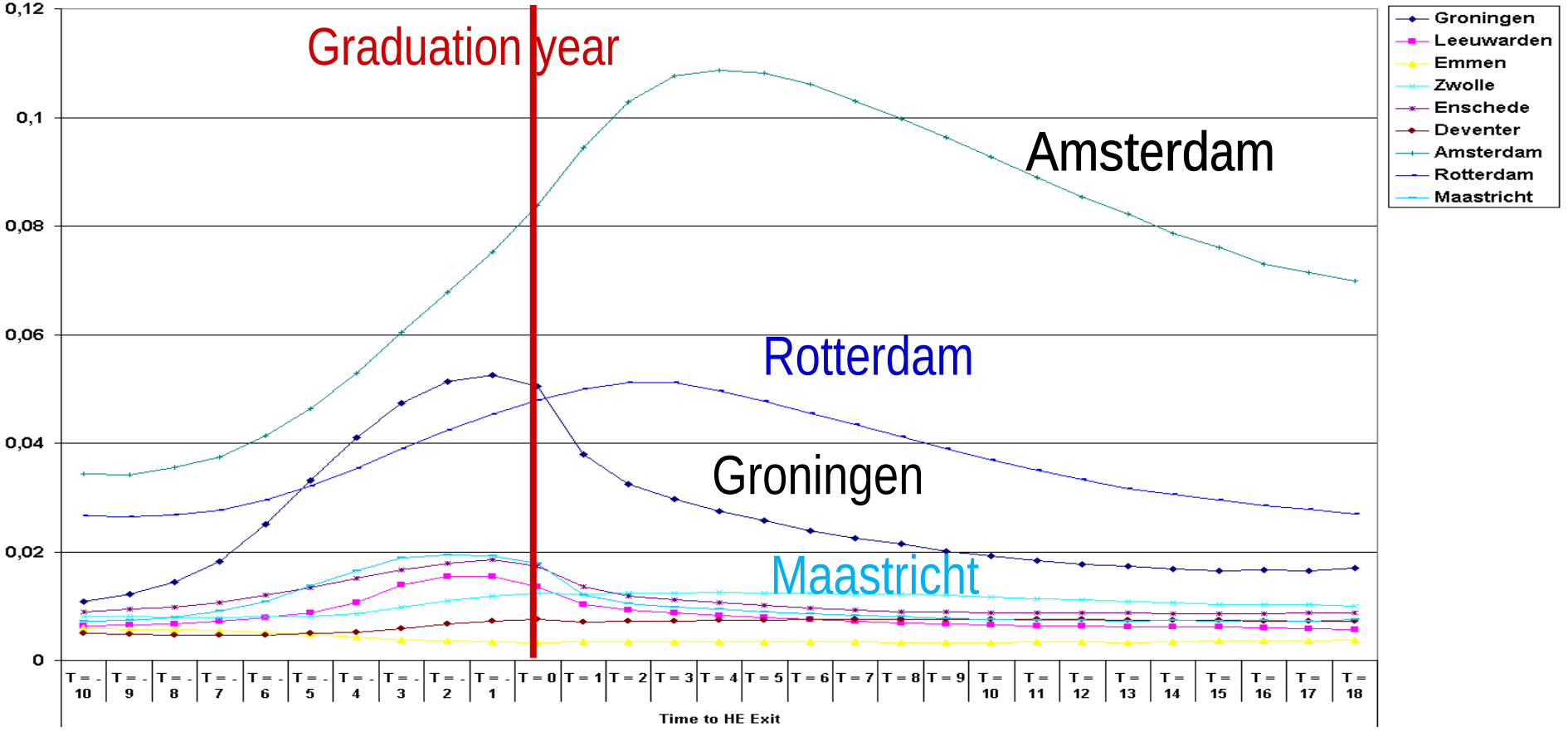
# Mobility of students from 10 years before till 18 years after graduation



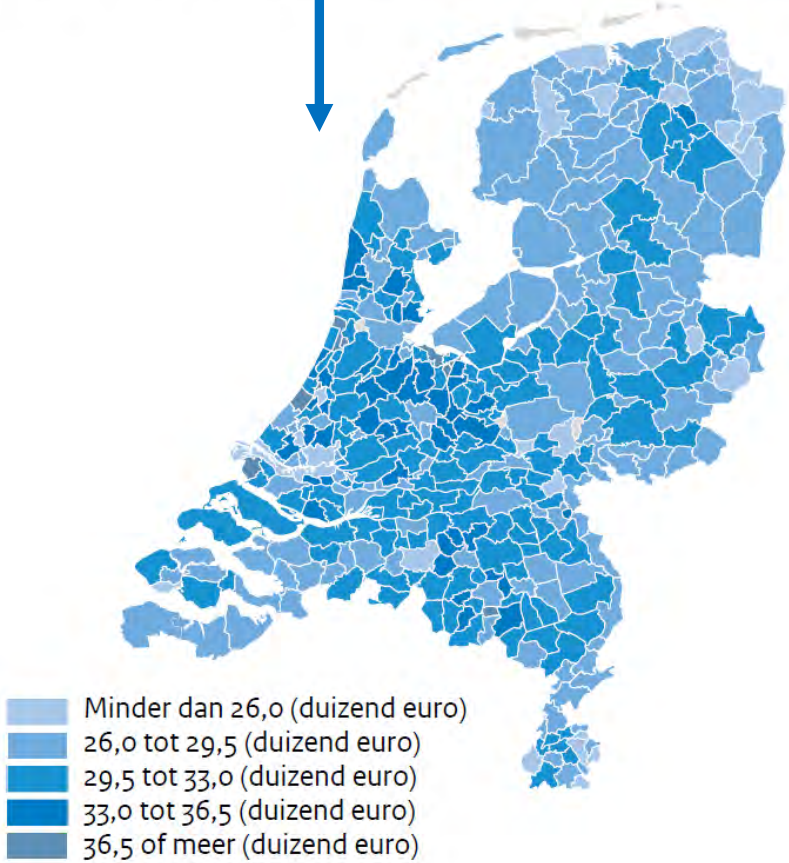

Source: Venhorst, V.A., Koster, S. en Van Dijk, J. (2013), Geslaagd in de Stad.



# Wellbeing and liveability in the North of the Netherlands and policy issues

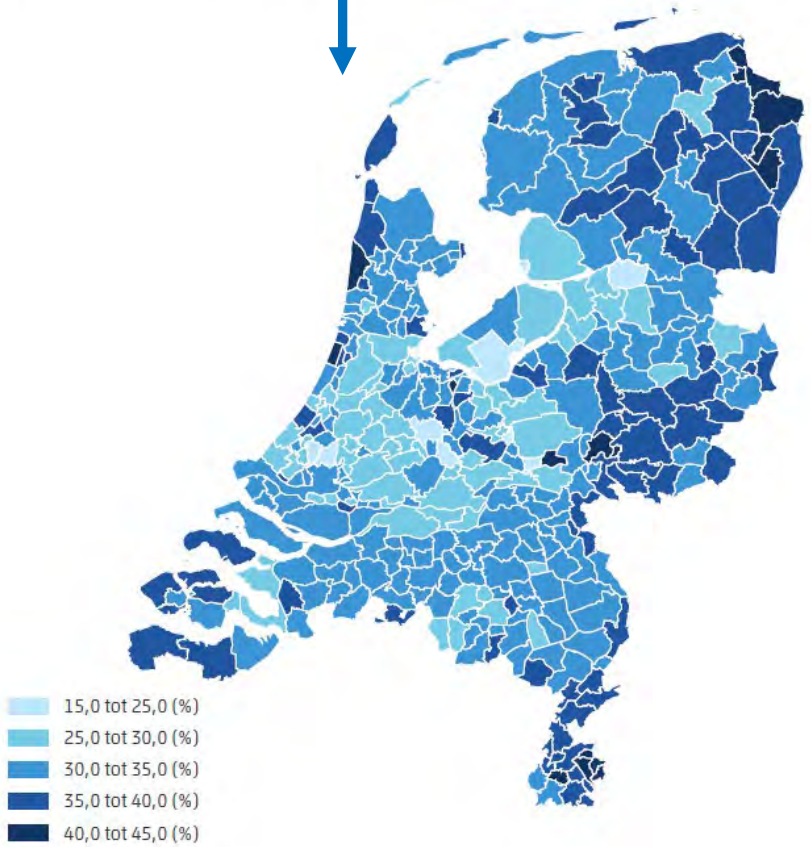
# Disposable household income and share of inhabitants receiving social security benefits

**Figuur 1** *Gestandaardiseerd besteedbaar huishoudeninkomen, 2020 (in duizend euro)*



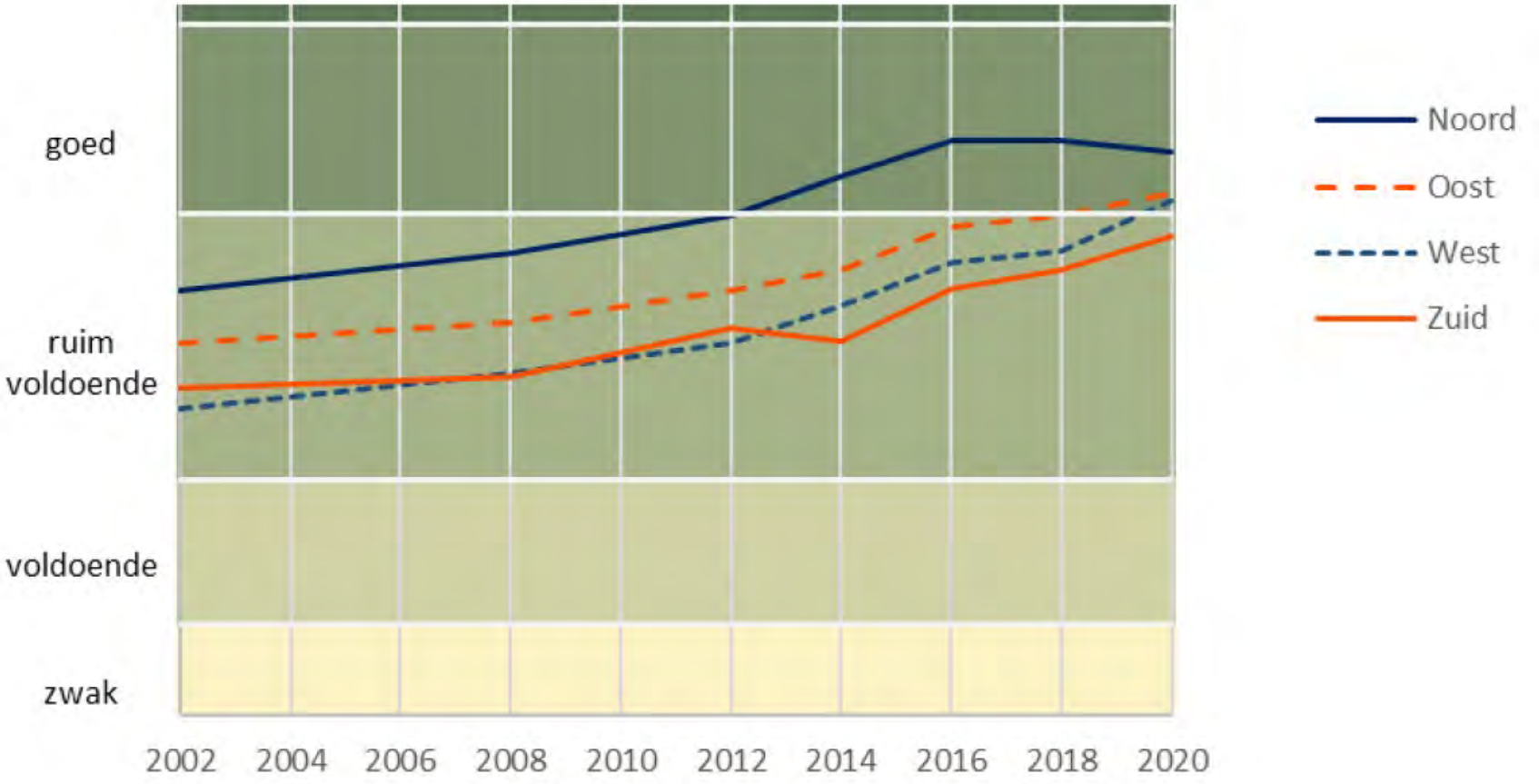

*Bron: CBS*

**7.3 Personen van 15 jaar of ouder met een uitkering, naar gemeente, juni 2020**




Source: Statistics Netherlands, PBL

*Figuur 2.3 Ontwikkeling score Leefbaarometer 2002-2020 naar landsdeel*




Source: Mandemakers & Burema (2022), Leefbaarheid in Nederland 2020, Atlas Research.

# High and low well-being scores of based on 33 indicators for Dutch municipalities

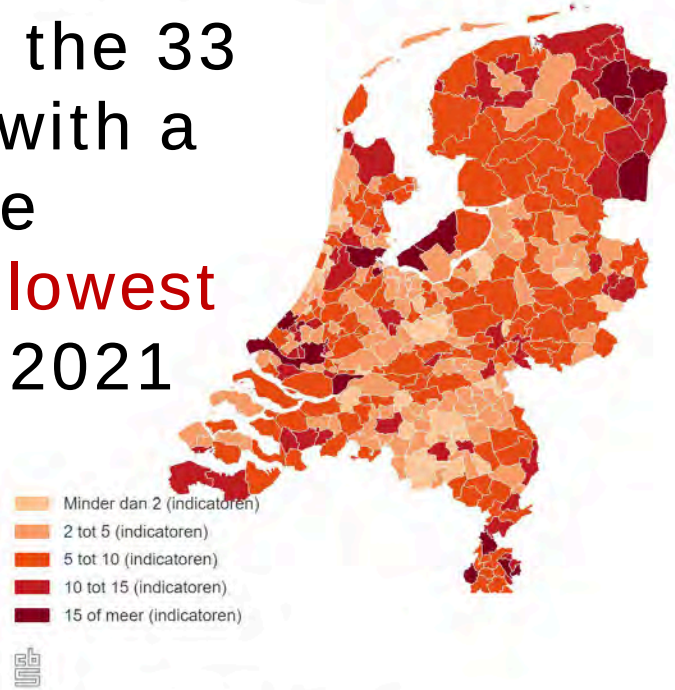
Scores van de gemeenten op de ranglijst brede welvaart 'hier en nu'1)


Bron: CBS, regionale Monitor Brede Welvaart 2021

1)Deze kaart toont per gemeente het aantal indicatoren van de Regionale Monitor Brede Welvaart 'hier en nu' waarmee deze gemeente in het bovenste kwart van de ranglijst van gemeenten staat. Er zijn in totaal 33 indicatoren.

Number of the 33 indicators with a score in the highest or lowest quartile in 2021

Scores van de gemeenten op de ranglijst brede welvaart 'hier en nu'1)

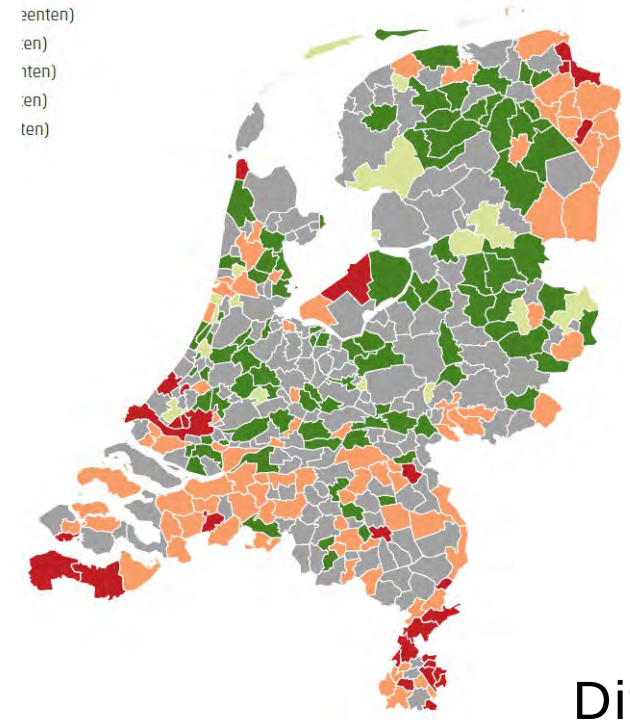


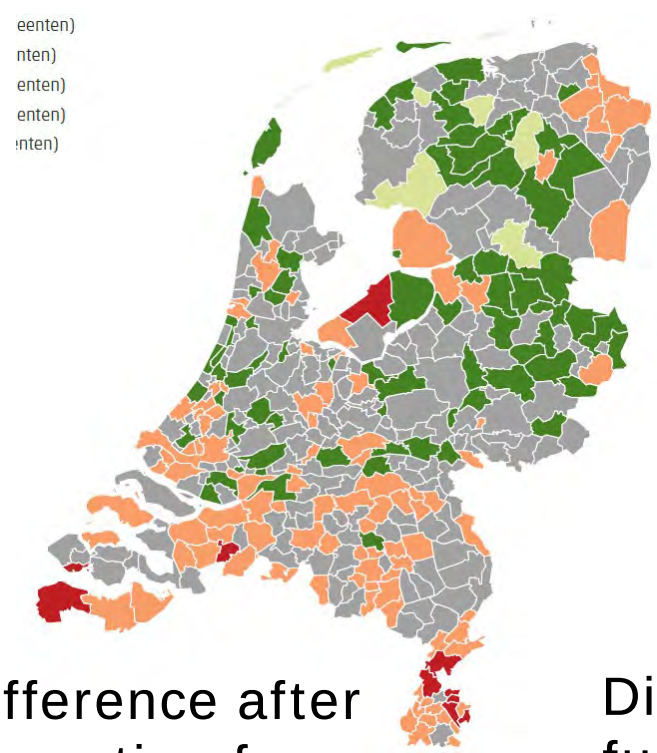

Bron: CBS, regionale Monitor Brede Welvaart 2021

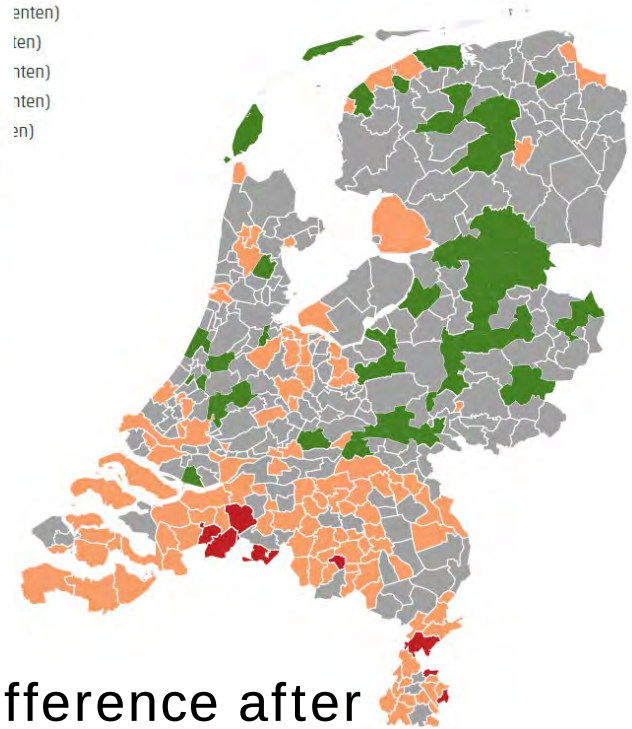
1)Deze kaart toont per gemeente het aantal indicatoren van de Regionale Monitor Brede Welvaart 'hier en nu' waarmee deze gemeente in het onderste kwart van de ranglijst van gemeenten staat. Er zijn in totaal 33 indicatoren.

Source: https://www.cbs.nl/nl-nl/nieuws/2021/49/regionale-brede-welvaart-in-nederland-stabiel-wonen-onder-druk

# Differences in perceived less good health per municipality in 2016: many high risk groups in the east







Minder dan 17% (0 gemeenten)
17% tot 21% (54 gemeenten)
21% tot 25% (211 gemeenten)
25% tot 29% (115 gemeenten)
29% of meer (8 gemeenten)
Te weinig data

Difference after correction for: income, education, migration background

Difference after further corrections for 'chronic deseases' and `health limitations'

Source: https://www.cbs.nl/nl-nl/nieuws/2021/49/regionale-brede-

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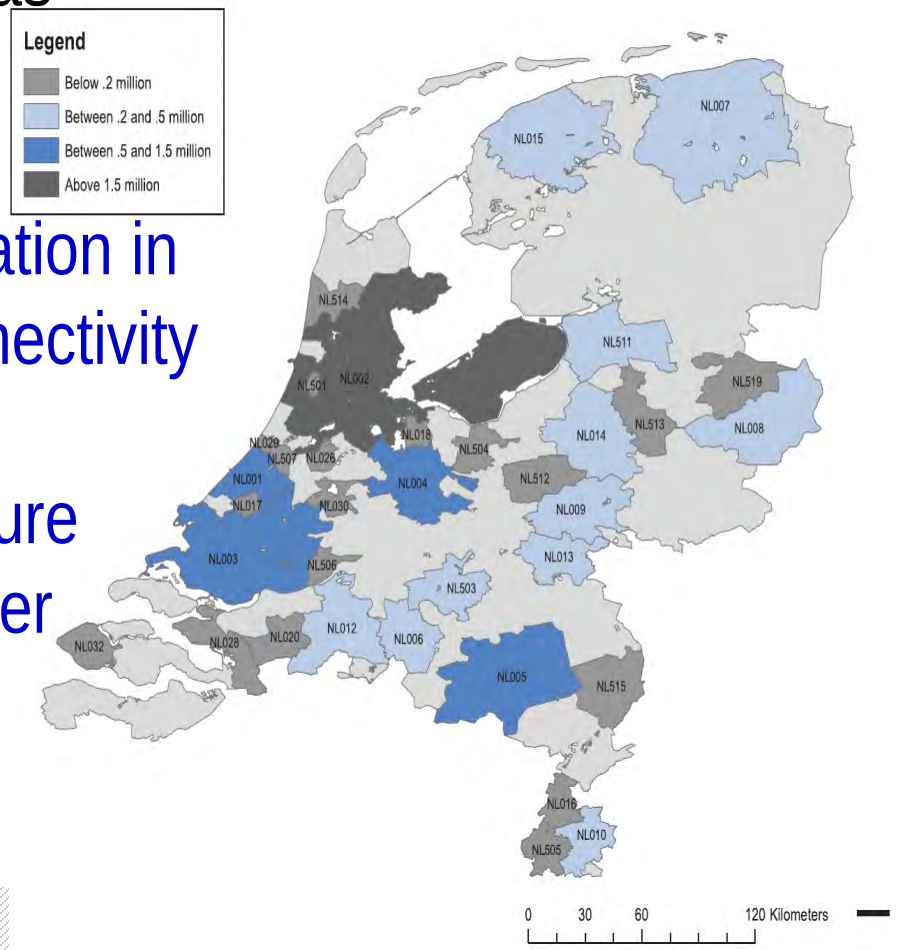
# OECD (2014) Territorial Review for the Netherlands "Functional Urban Areas"

Figure 1.21. **Location and size of functional urban areas in the Netherlands**

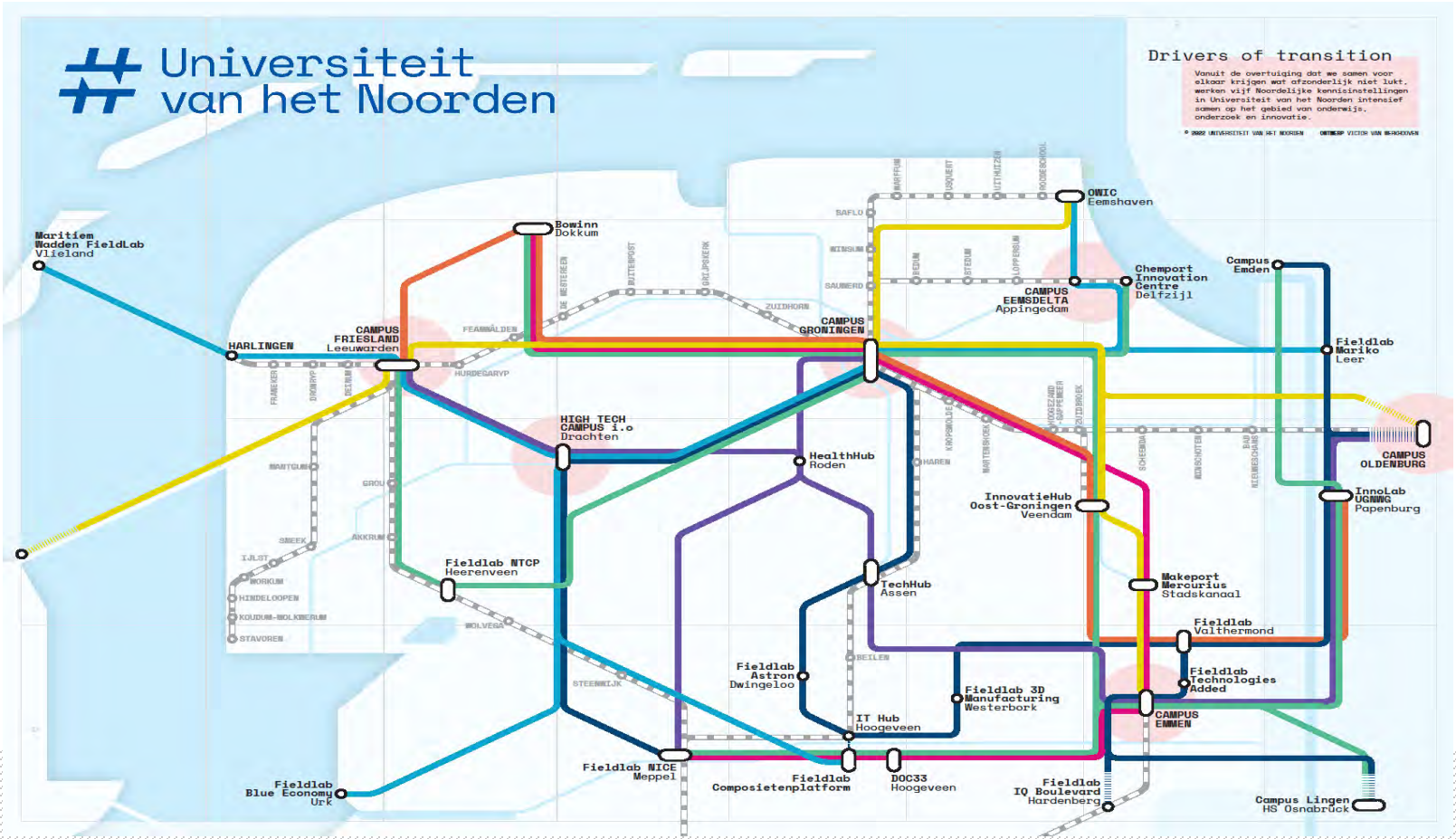
Population data, 2008

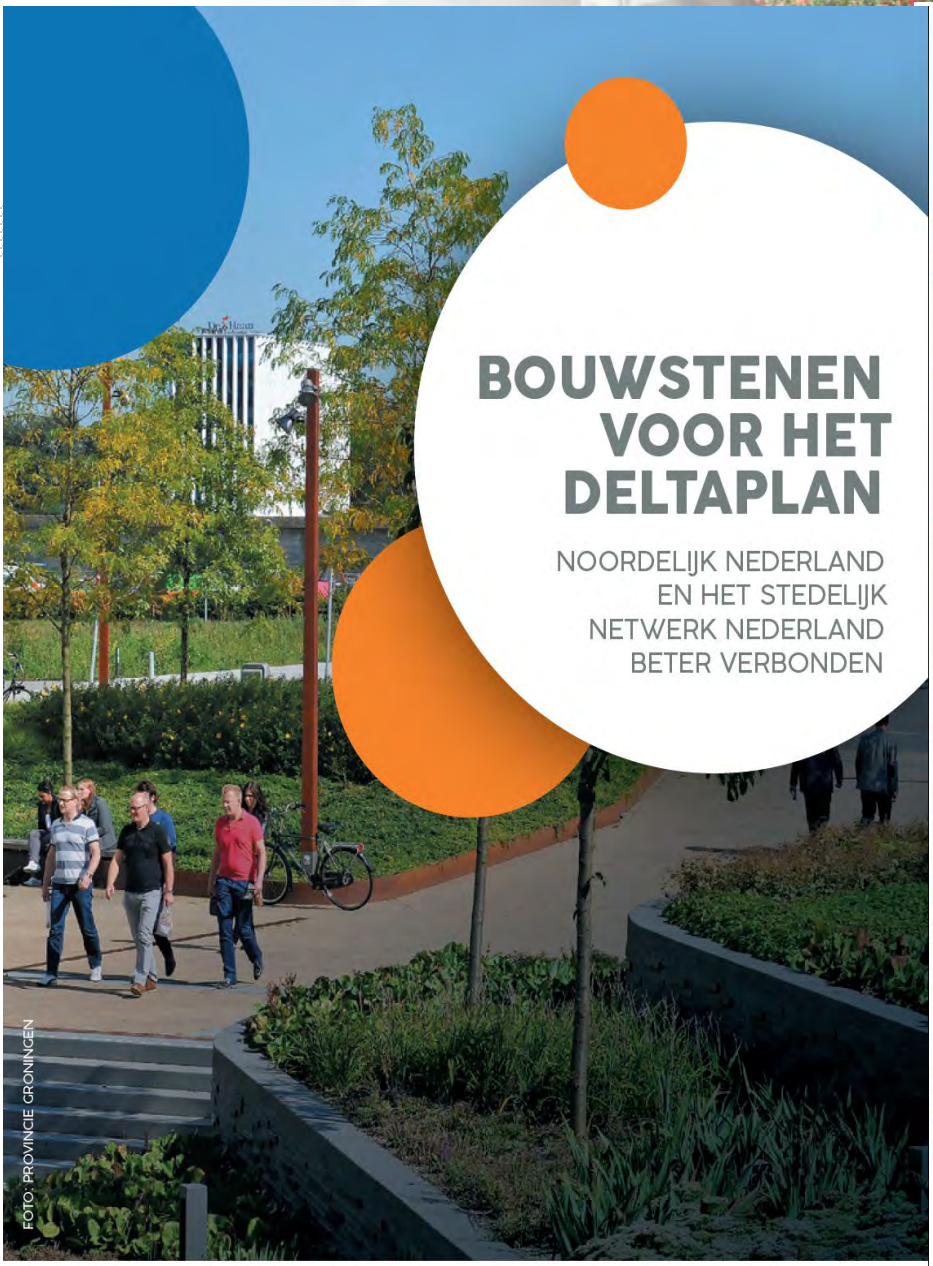



## Recommendations OECD:

* Enhance economies of agglomeration in The Neherlands by improving connectivity between functional urban areas.
* The National Policy for Infrastructure and Spatial Planning needs to further take into account the input and participation of all provinces in the definition of national priorities.

# University of the North: location and links of campuses, hubs and field labs






Gemeente Leeuwarden · Gemeente Assen · Gemeente Groningen · Gemeente Emmen · provincie Drenthe · Provincie Flevoland · provinsje fryslân provincie fryslân · provincie groningen

# Railways investments:

## Lelylijn

## Saksenlijn


De Tweede Kamer wil de haalbaarheid onderzoeken van twee spoorlijnen: de Lelylijn en de Nedersaksenlijn.

+ building 140.000 houses in the North!

university of groningen

# The long-term consequences of brain drain related to depopulation on social and territorial cohesion with a focus on the North of the Netherlands and a short comparison with Germany and Denmark


## Jouke van Dijk

Professor of Regional Labour Market Analysis, University of Groningen, Faculty of Spatial Sciences, Department Economic Geography

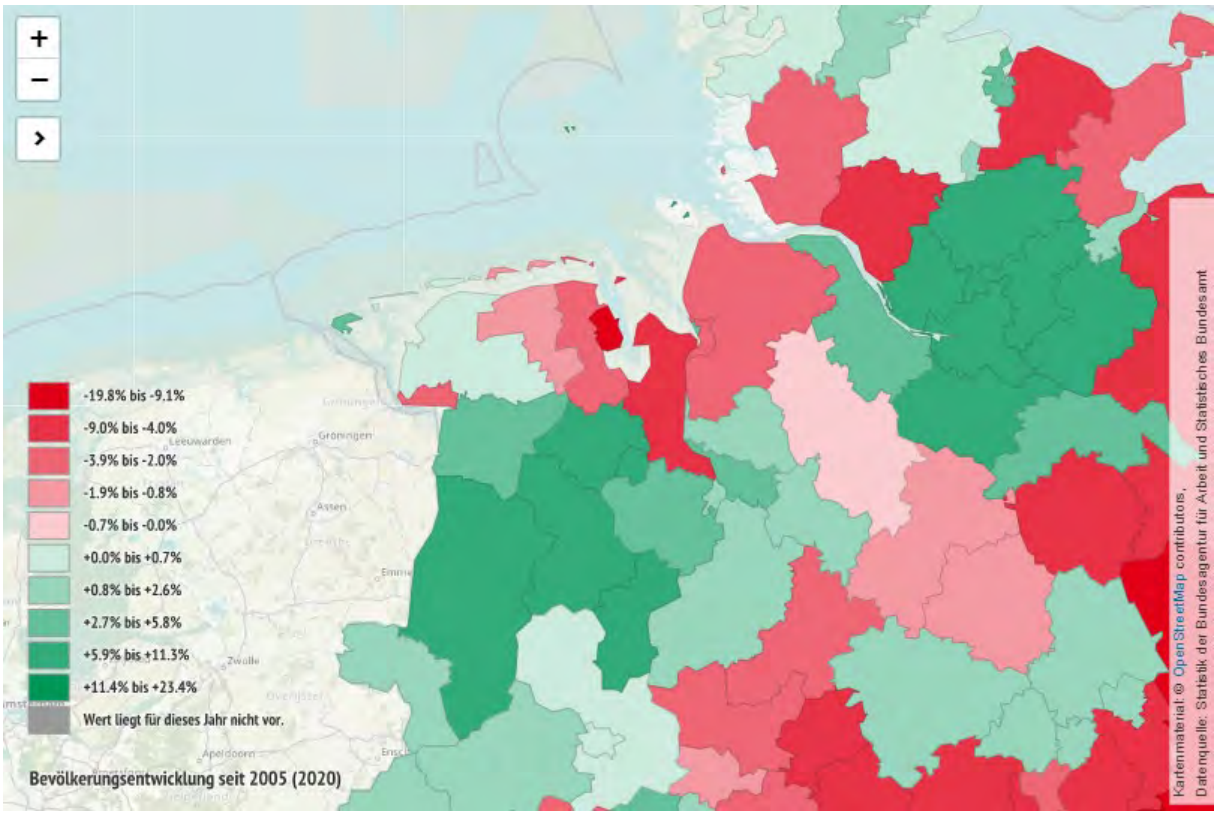

PowerPoint slides belonging to the Academic paper written on request of the European Commission for preparing a Communication on brain drain and the challenges associated with population decline in line with the Commission Work Programme for 2022.


Email: Jouke.van.dijk@rug.nl

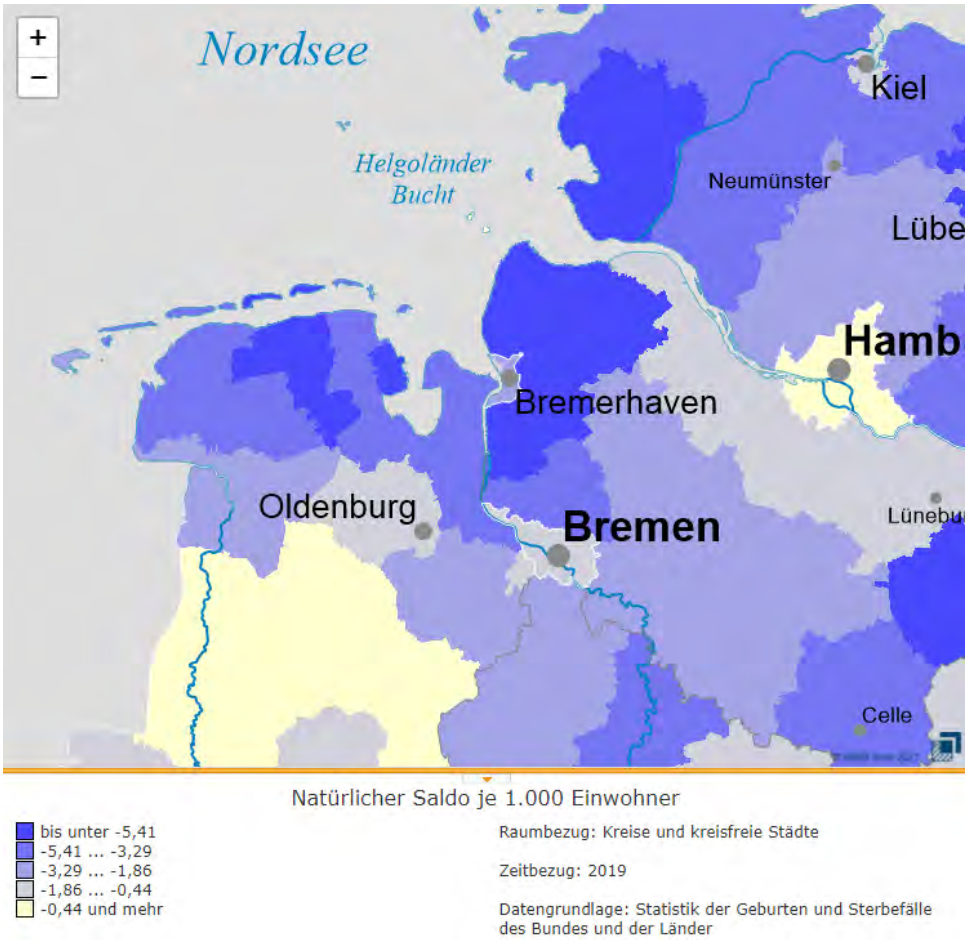
Website: www.joukevandijk.nl

# Appendix B:

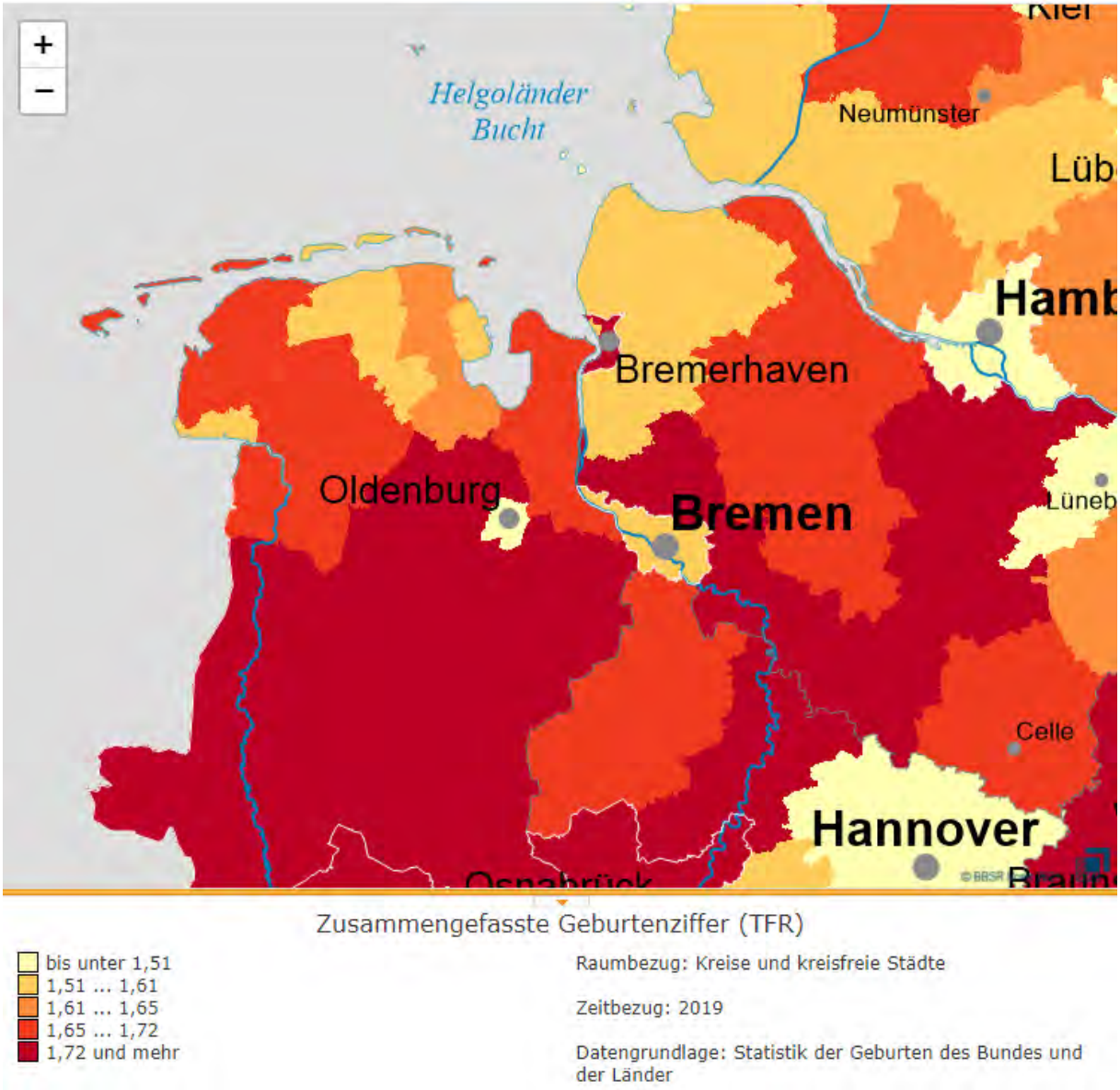
Series of maps belonging to the Box Germany: Demographic and regional economic development in rural and urban regions in North-west Germany.




Population growth 2005-2020
Source: Arbeitsmarktmonitor der BA

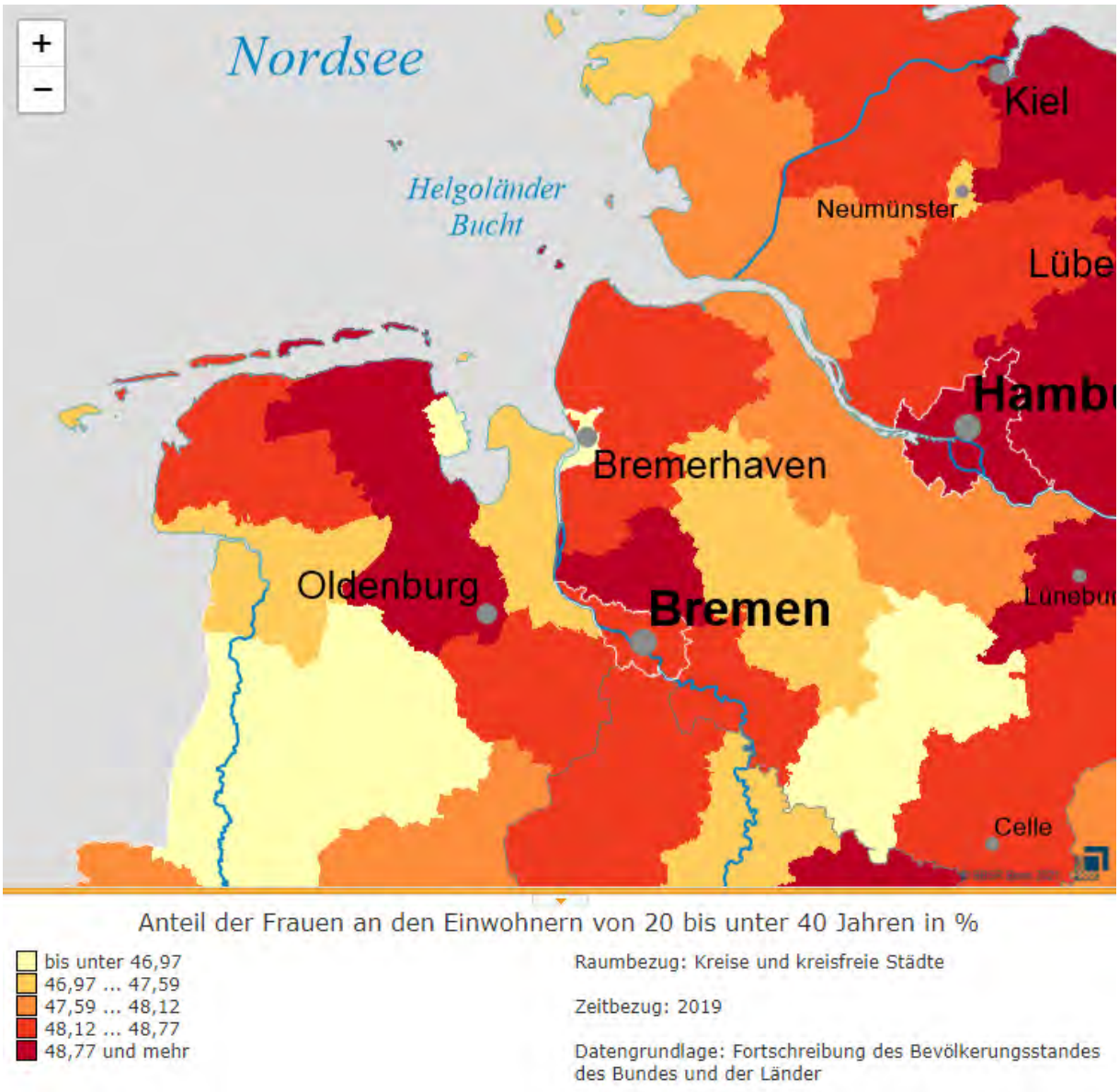



Natural population change (2019), Source: INKAR

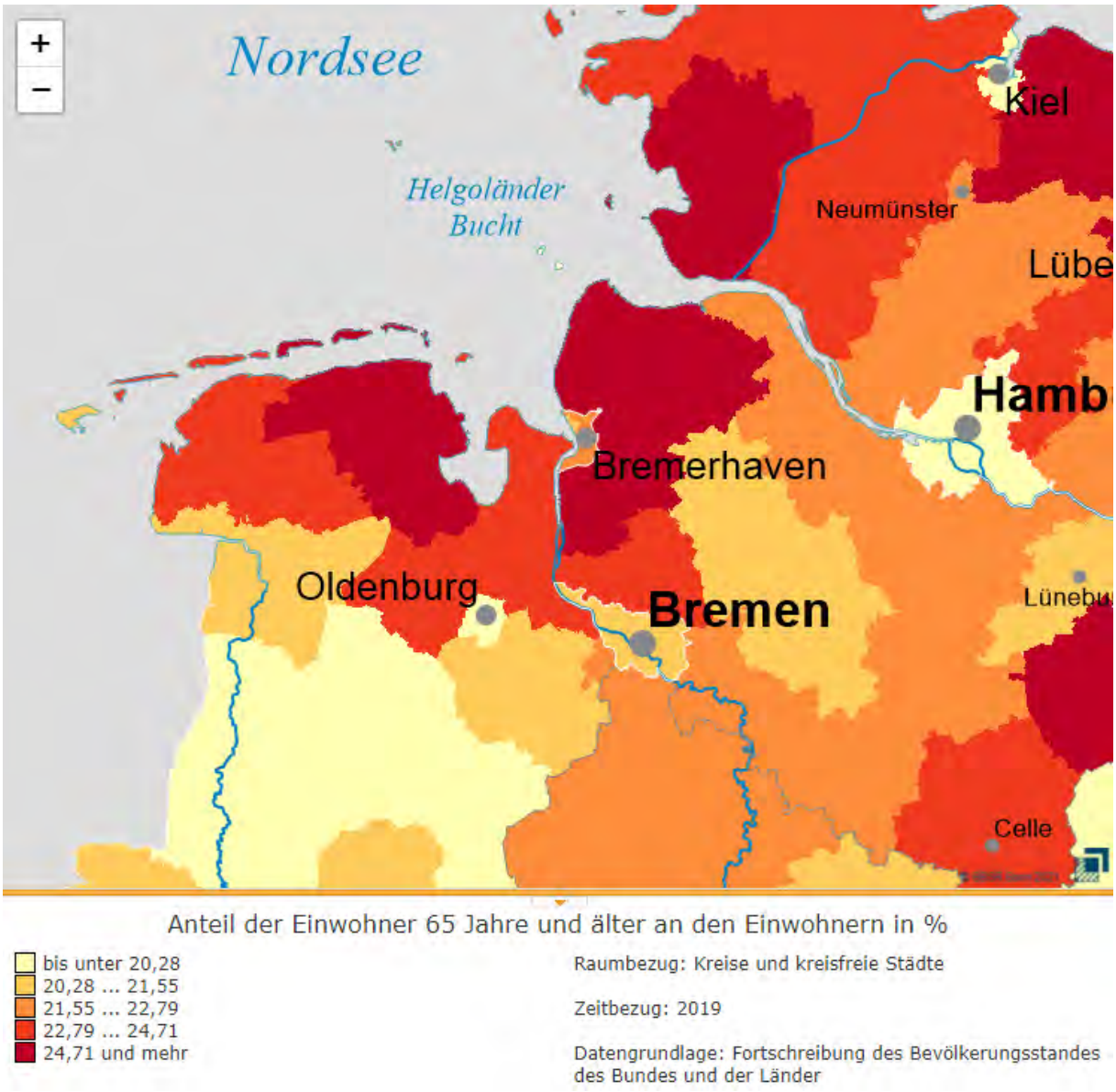



Fertility Rate (2019)

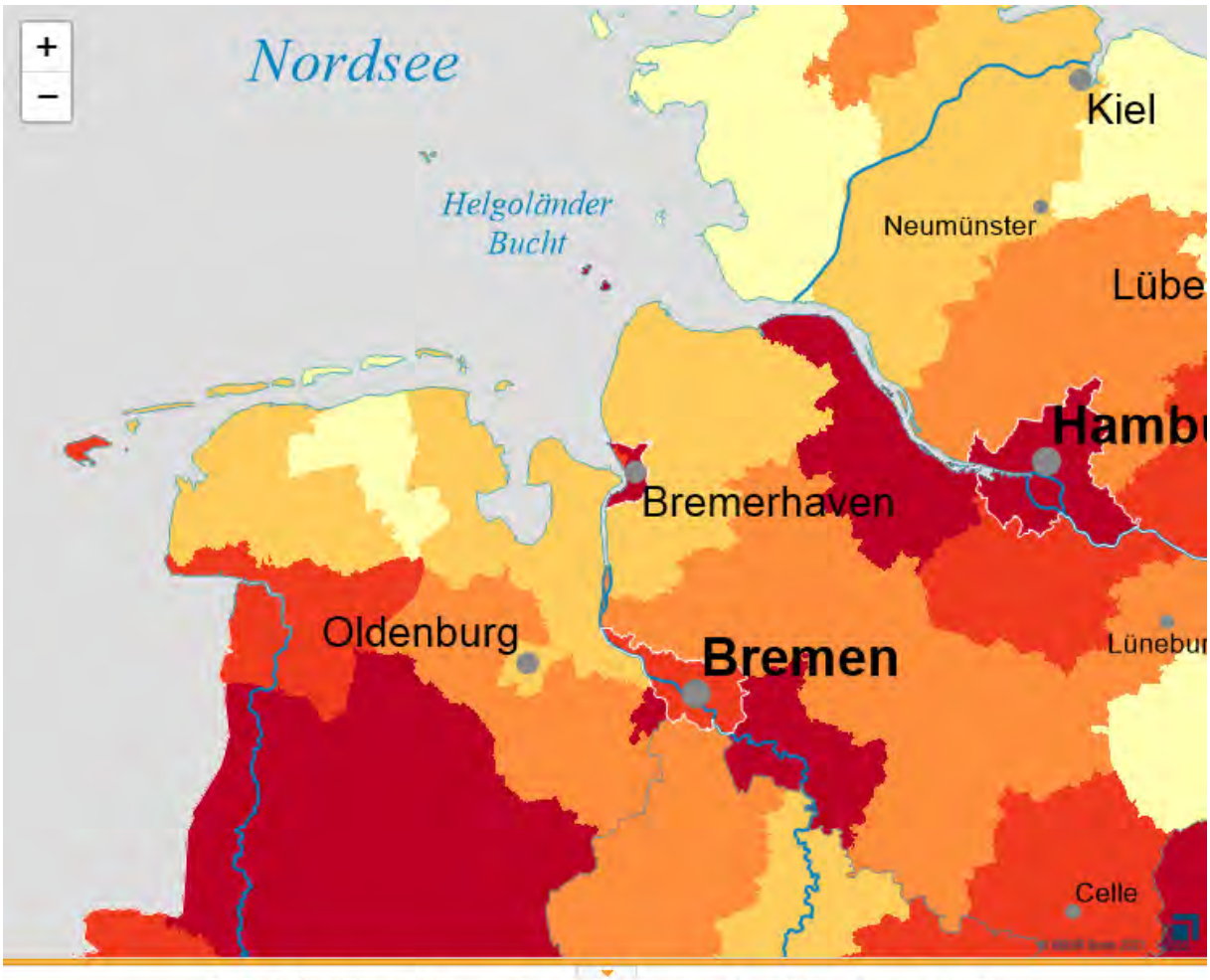
Source: INKAR




Share of females in an age of 20 to 40 years (2019)
Source: INKAR




Share of individuals of age 65 and older
Source: INKAR



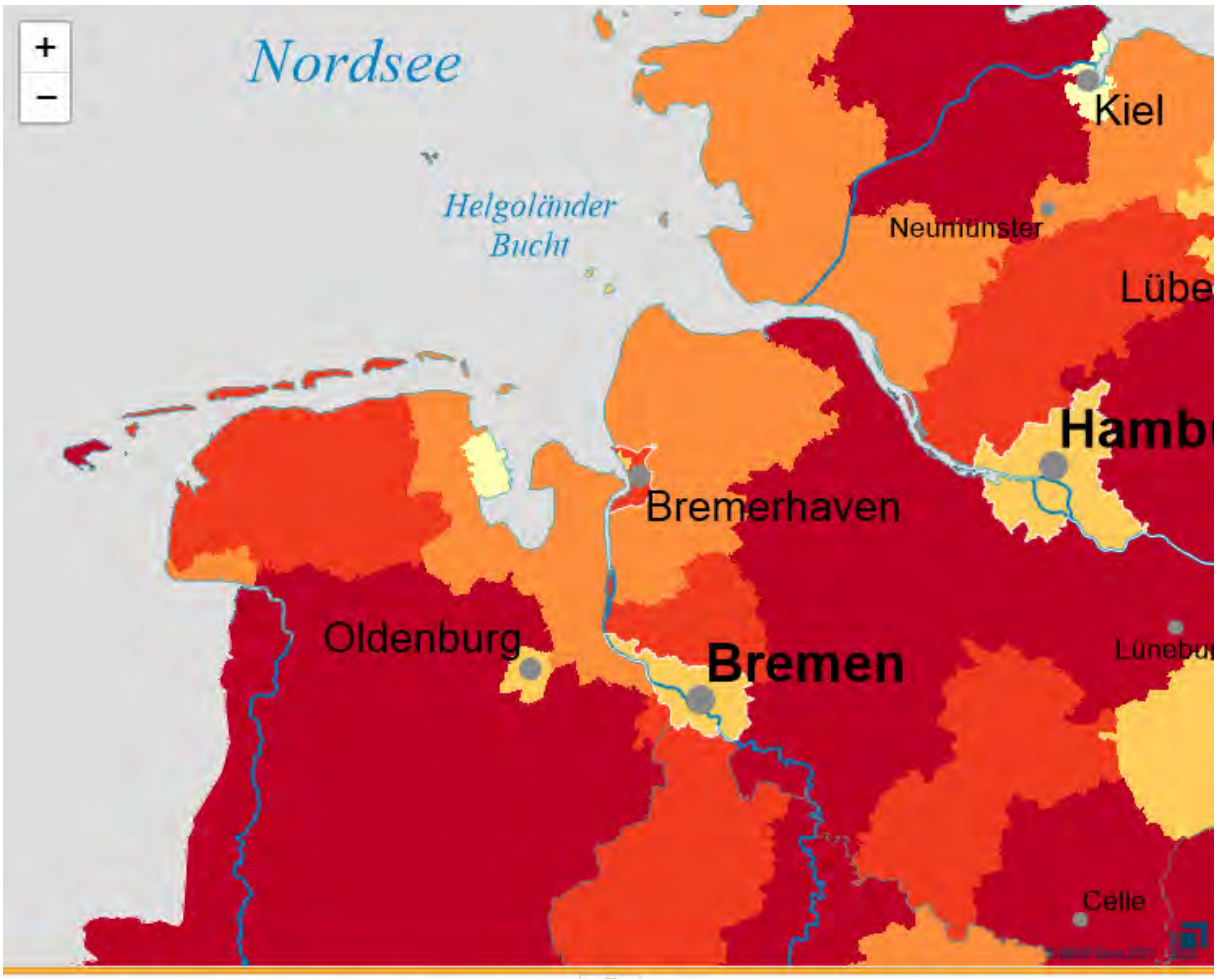

Anteil der Einwohner unter 6 Jahren an den Einwohnern in %

- bis unter 5,15
- 5,15 ... 5,46
- 5,46 ... 5,70
- 5,70 ... 5,93
- 5,93 und mehr

Raumbezug: Kreise und kreisfreie Städte

Zeitbezug: 2019

Datengrundlage: Fortschreibung des Bevölkerungsstandes des Bundes und der Länder



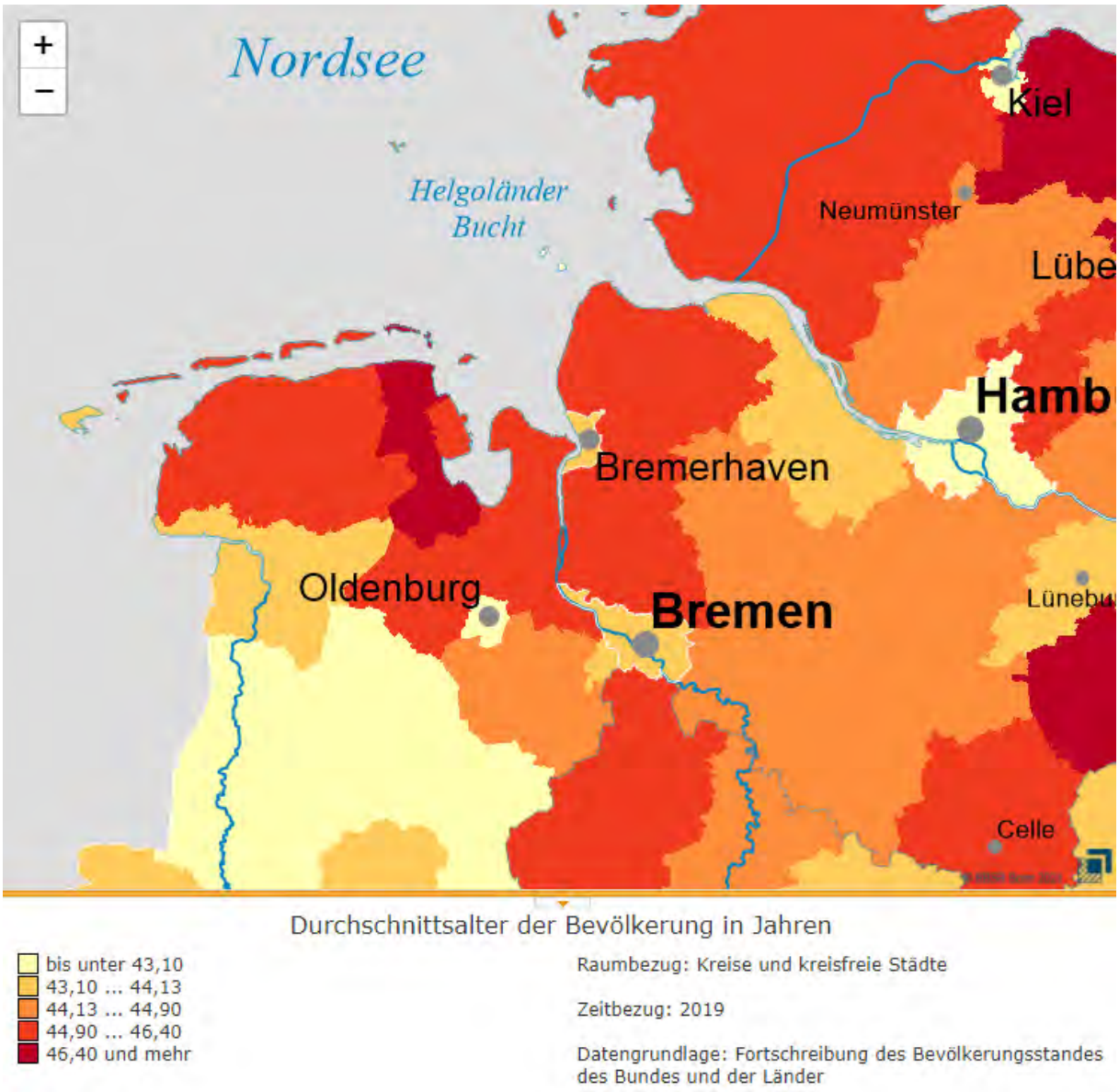

Anteil der Einwohner von 6 bis unter 18 Jahren an den Einwohnern in %

- bis unter 10,01
- 10,01 ... 10,53
- 10,53 ... 11,03
- 11,03 ... 11,42
- 11,42 und mehr

Raumbezug: Kreise und kreisfreie Städte

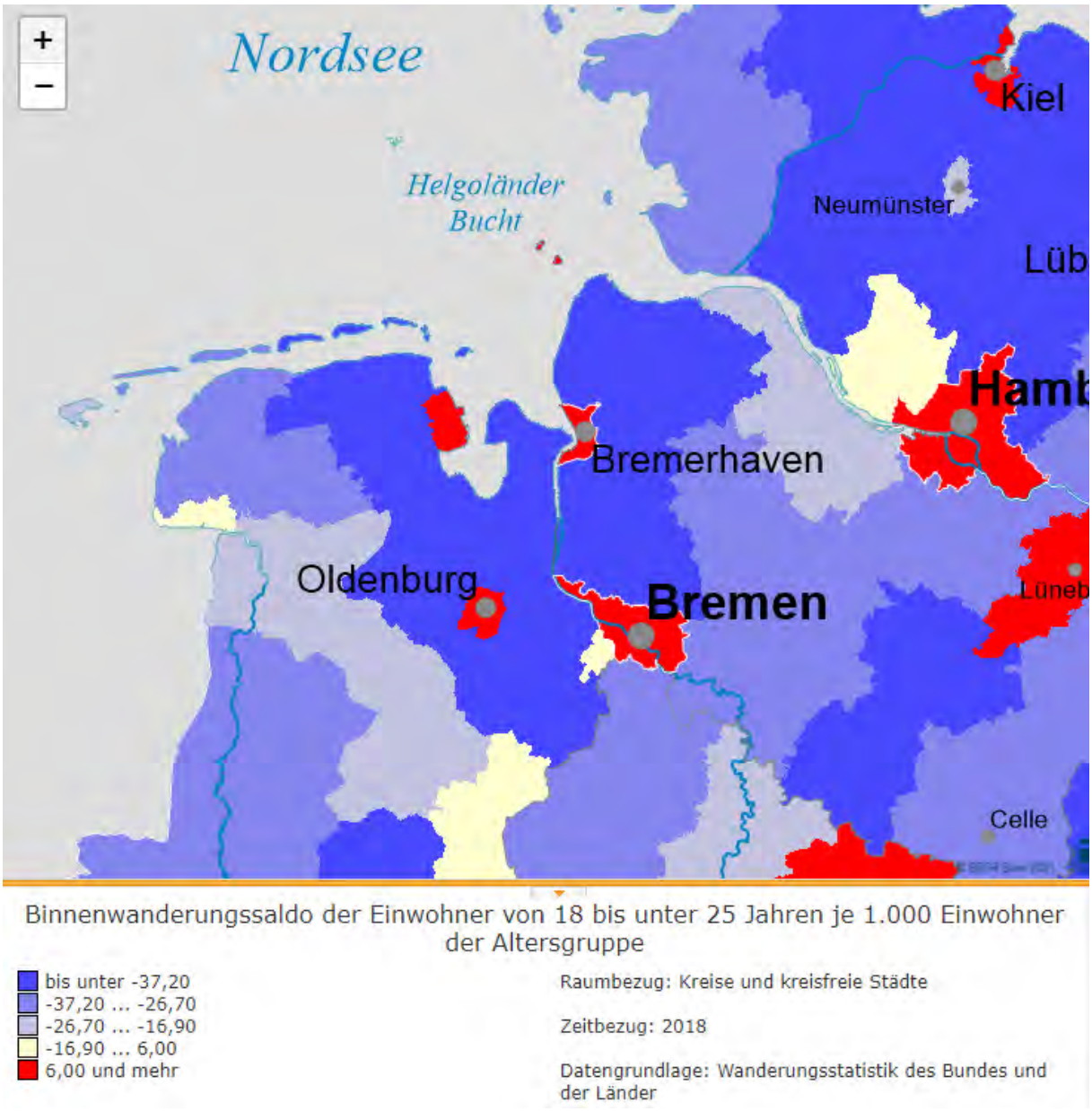
Zeitbezug: 2019

Datengrundlage: Fortschreibung des Bevölkerungsstandes des Bundes und der Länder



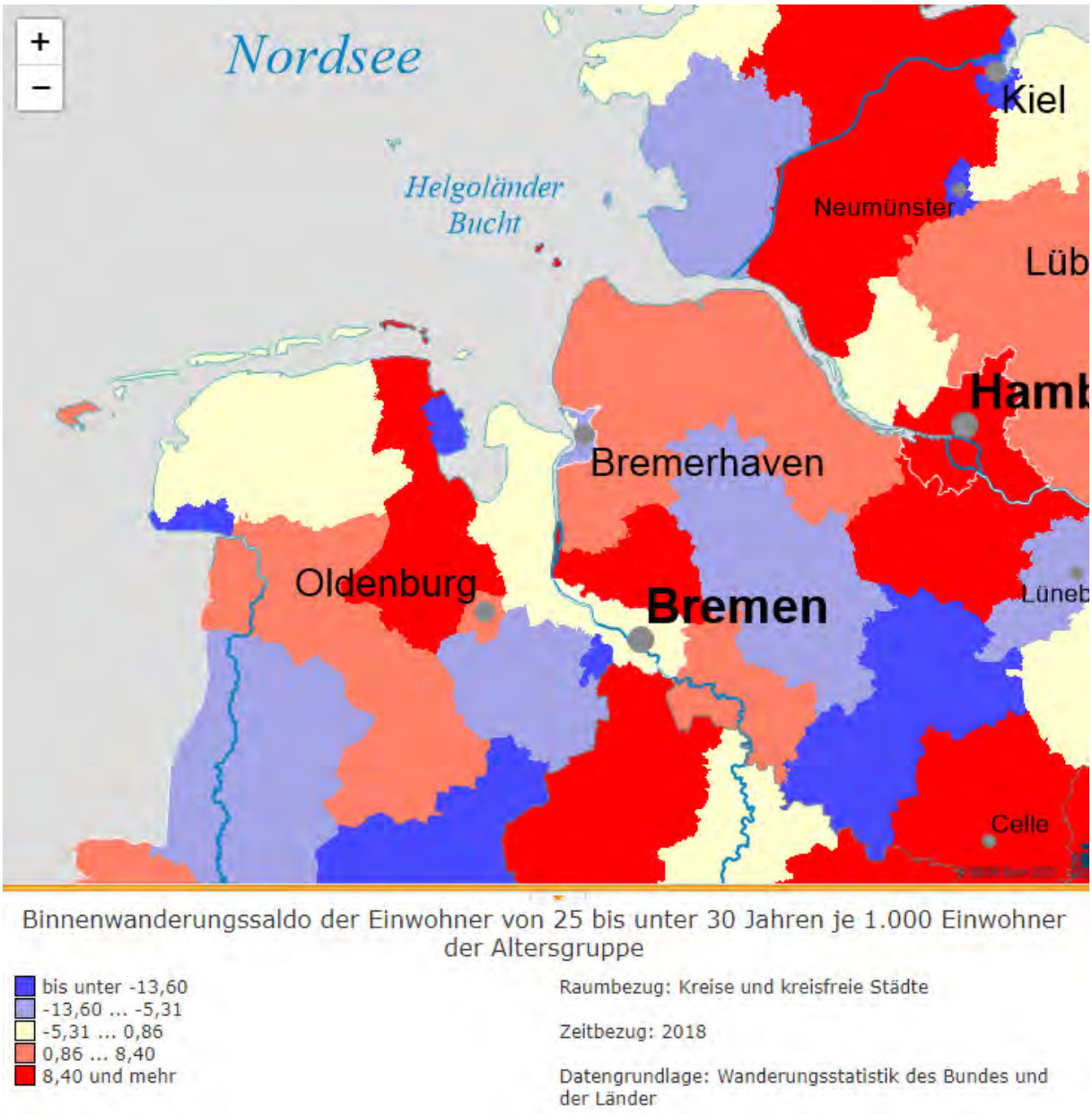

Average age (2019)

Source: INKAR



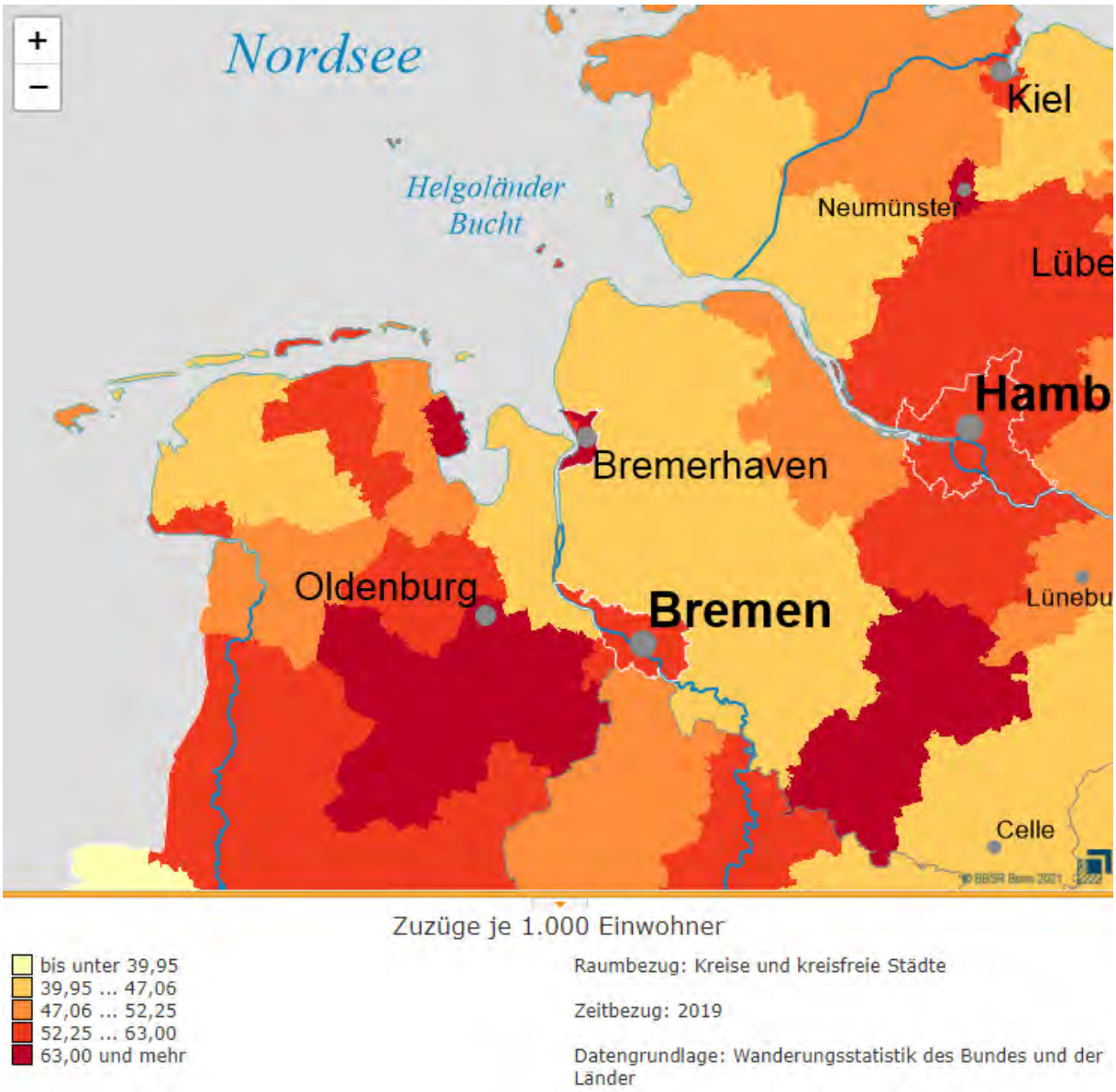

Net migration within Germany [(Inflow-Outflow)/1000 Inhabitants] in 2018, age 18 to under 25 years

Source: INKAR



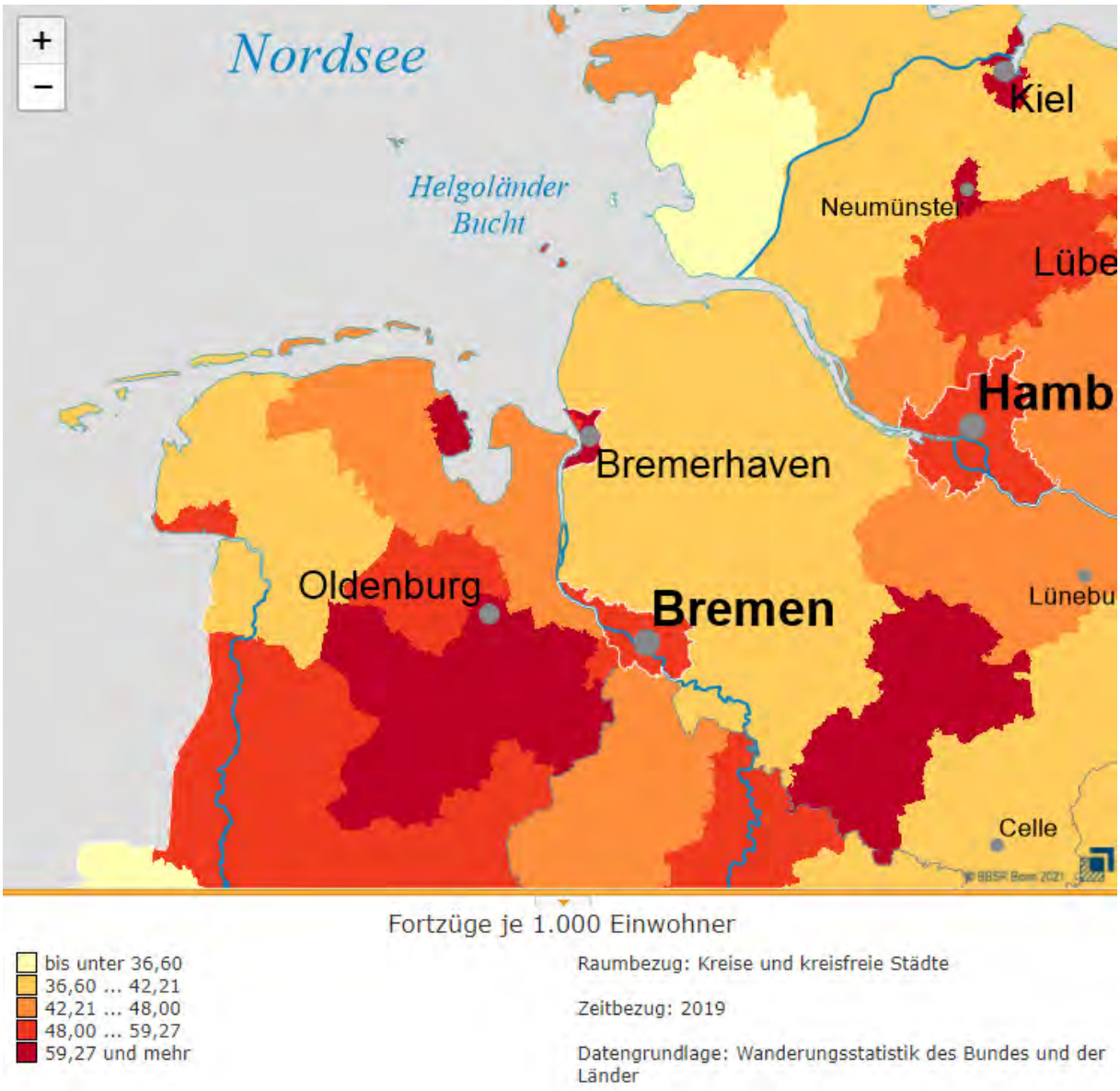

Net migration within Germany [(Inflow-Outflow)/1000 Inhabitants] in 2018, age 25 to under 30 years

Source: INKAR



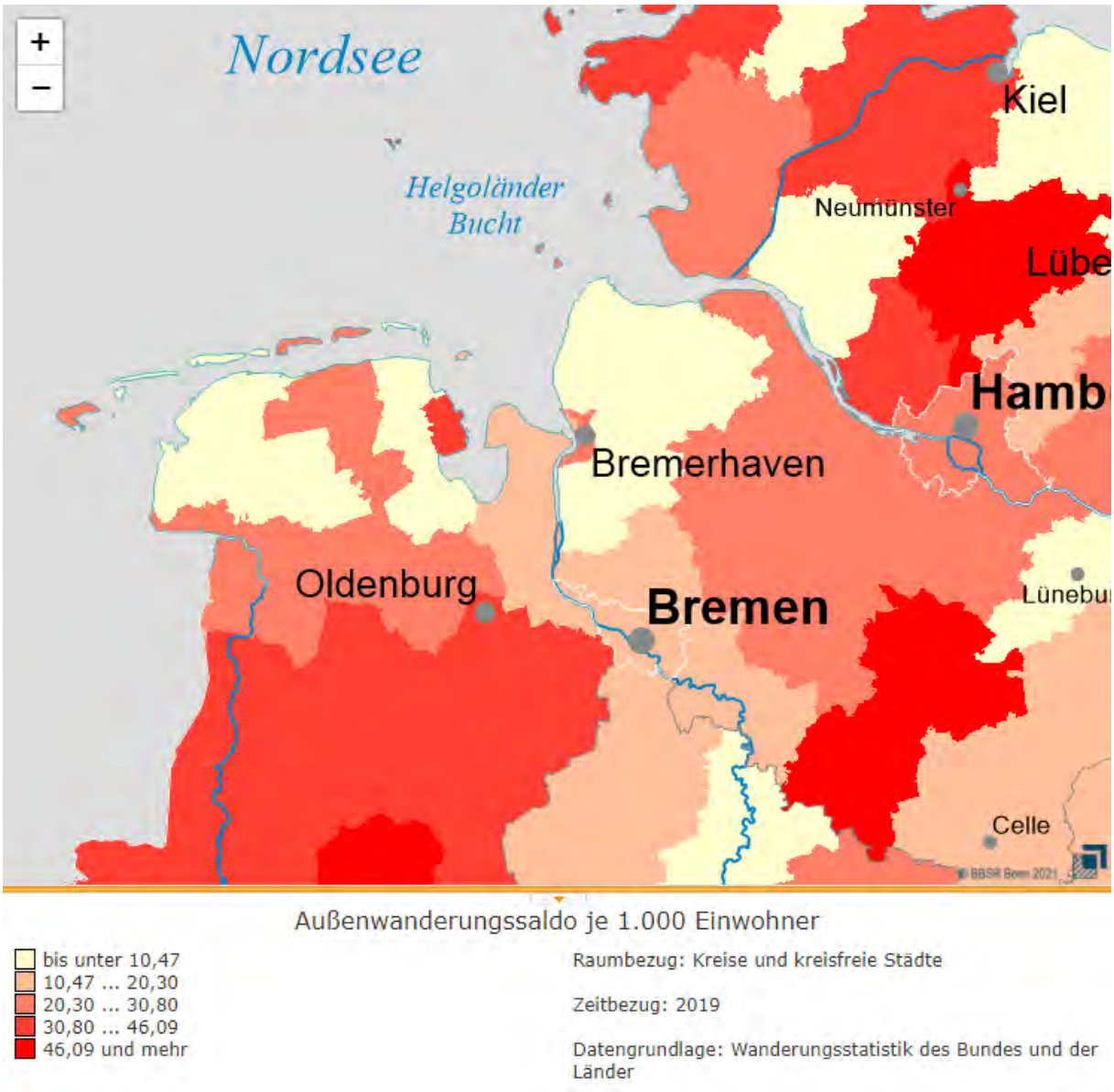

Inmigration per 1000 residents (2019)

Source: INKAR



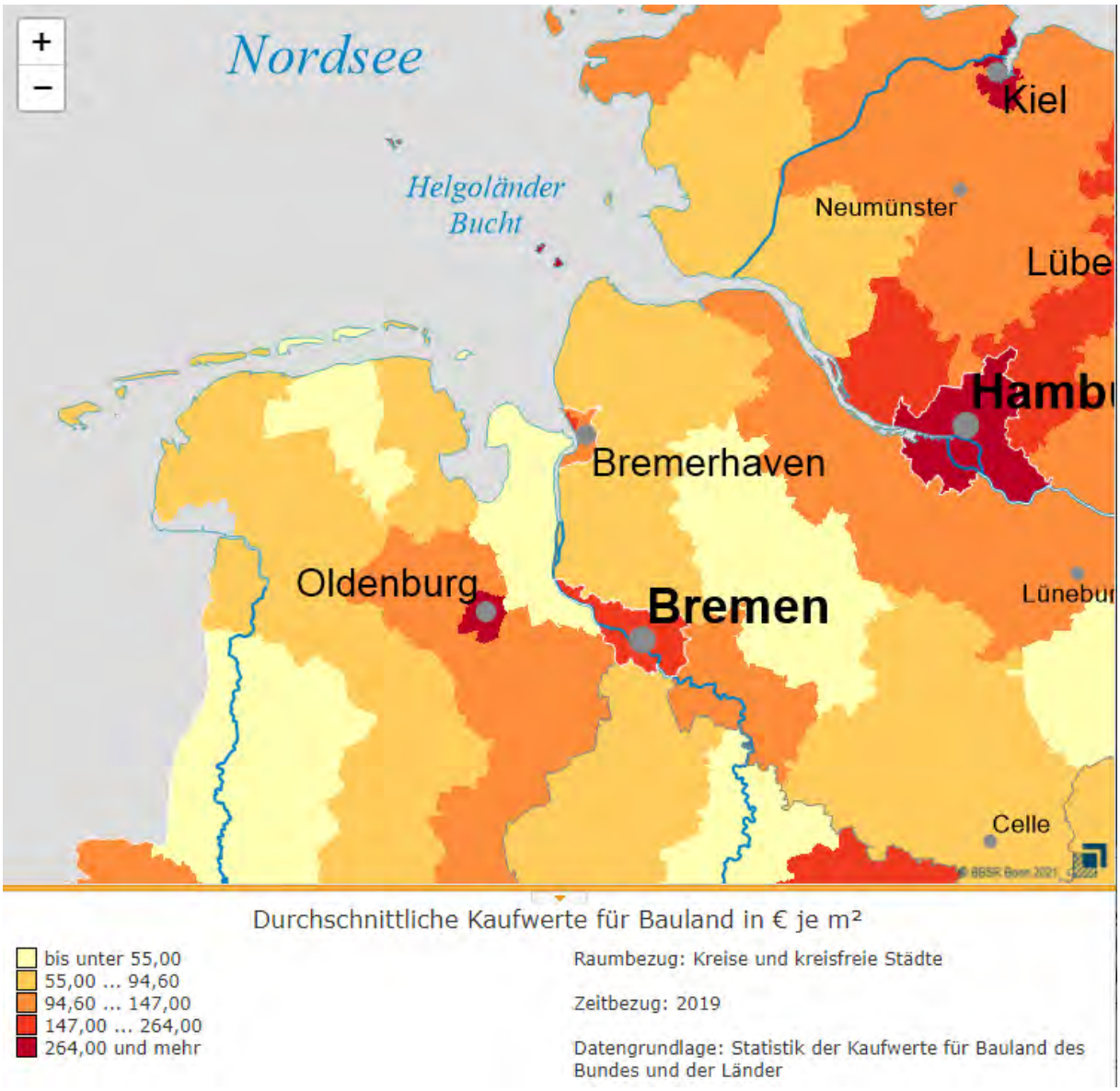

Outmigration per 1000 residents (2019)

Source: INKAR

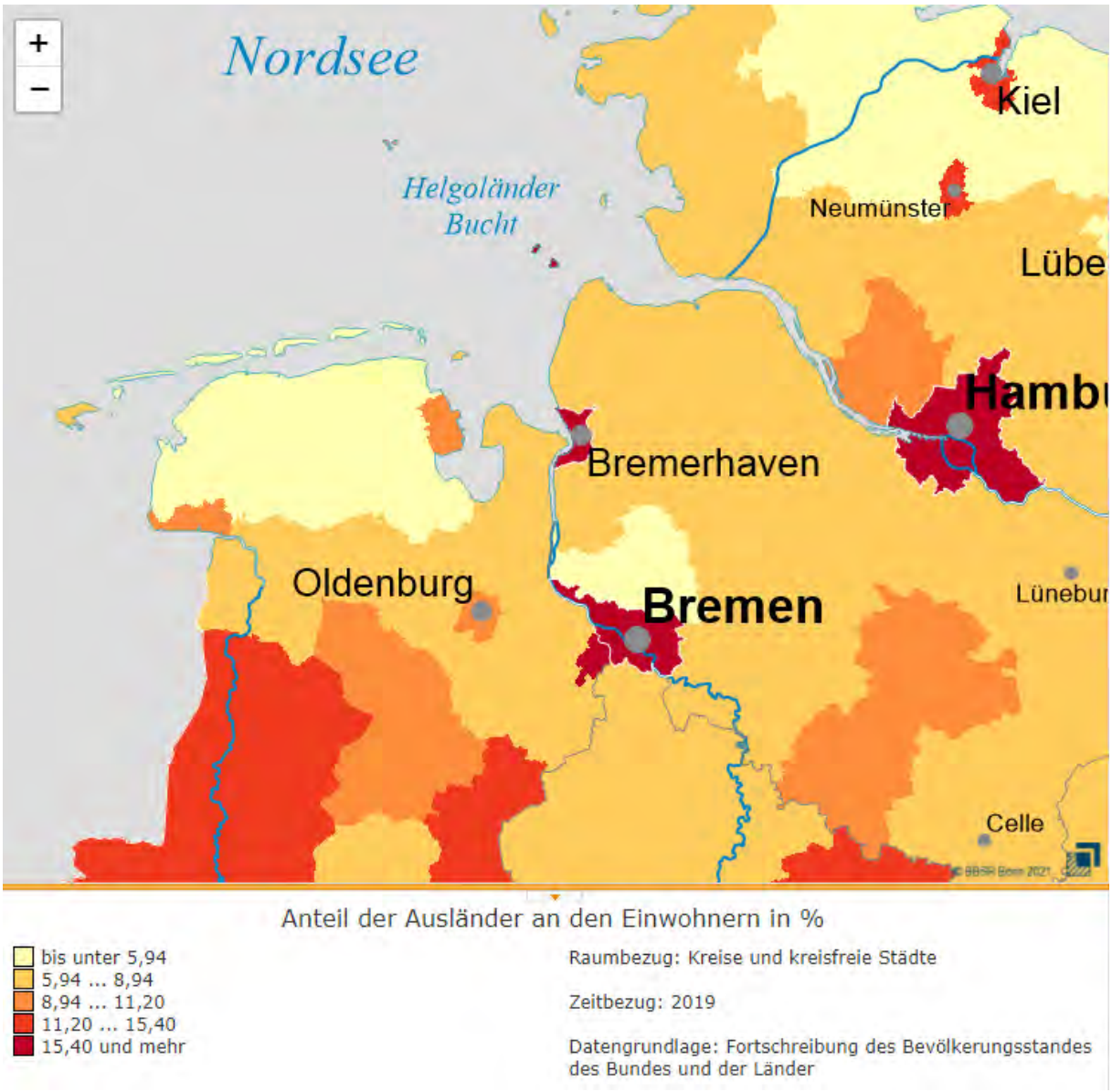



Net migration from and to Germany from abroad
(Inmigration to Germany – Outmigration to abroad)/1000 residents

Source: INKAR

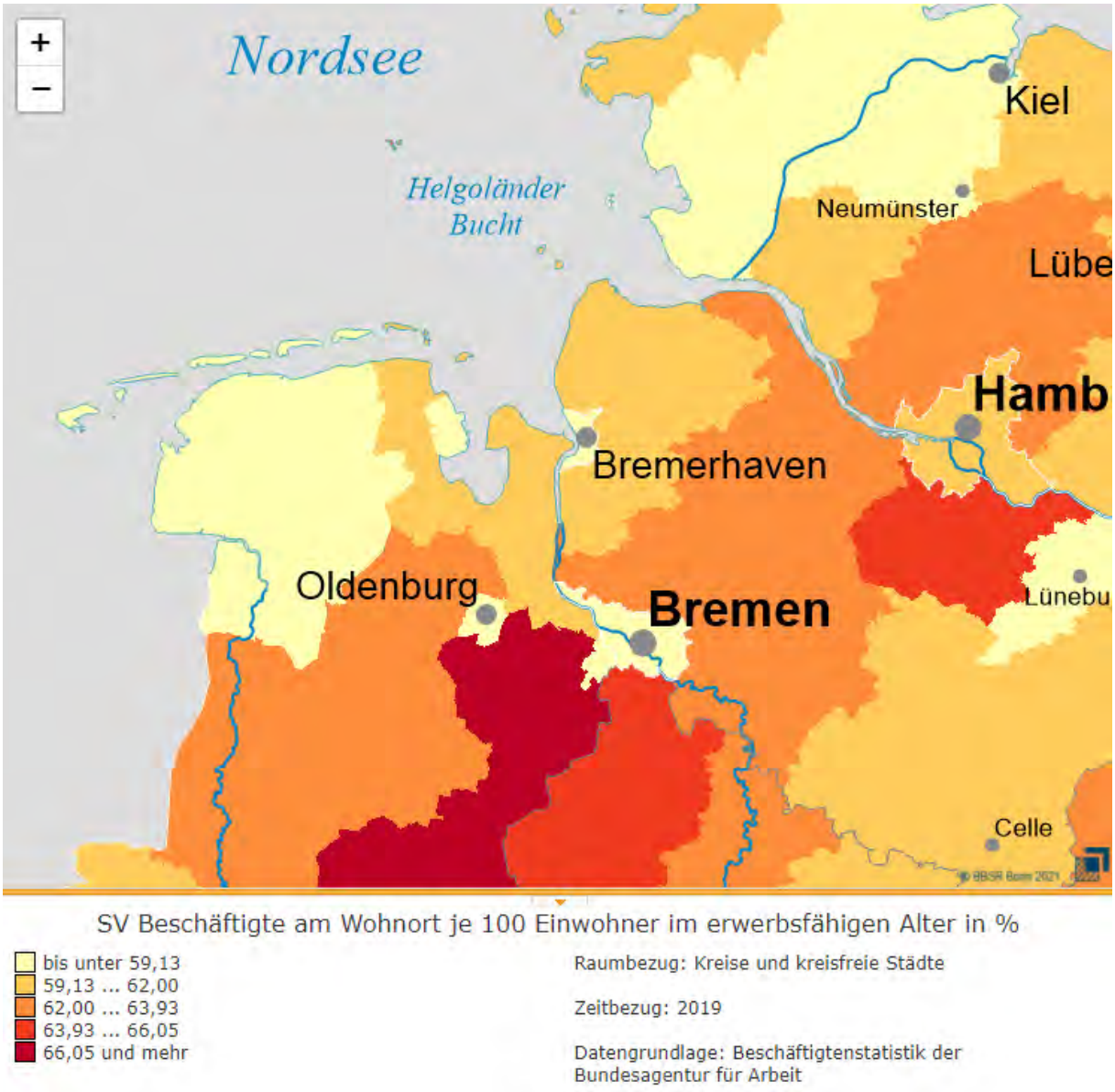



Average Building land prices in €/m² (2019)
Source: INKAR



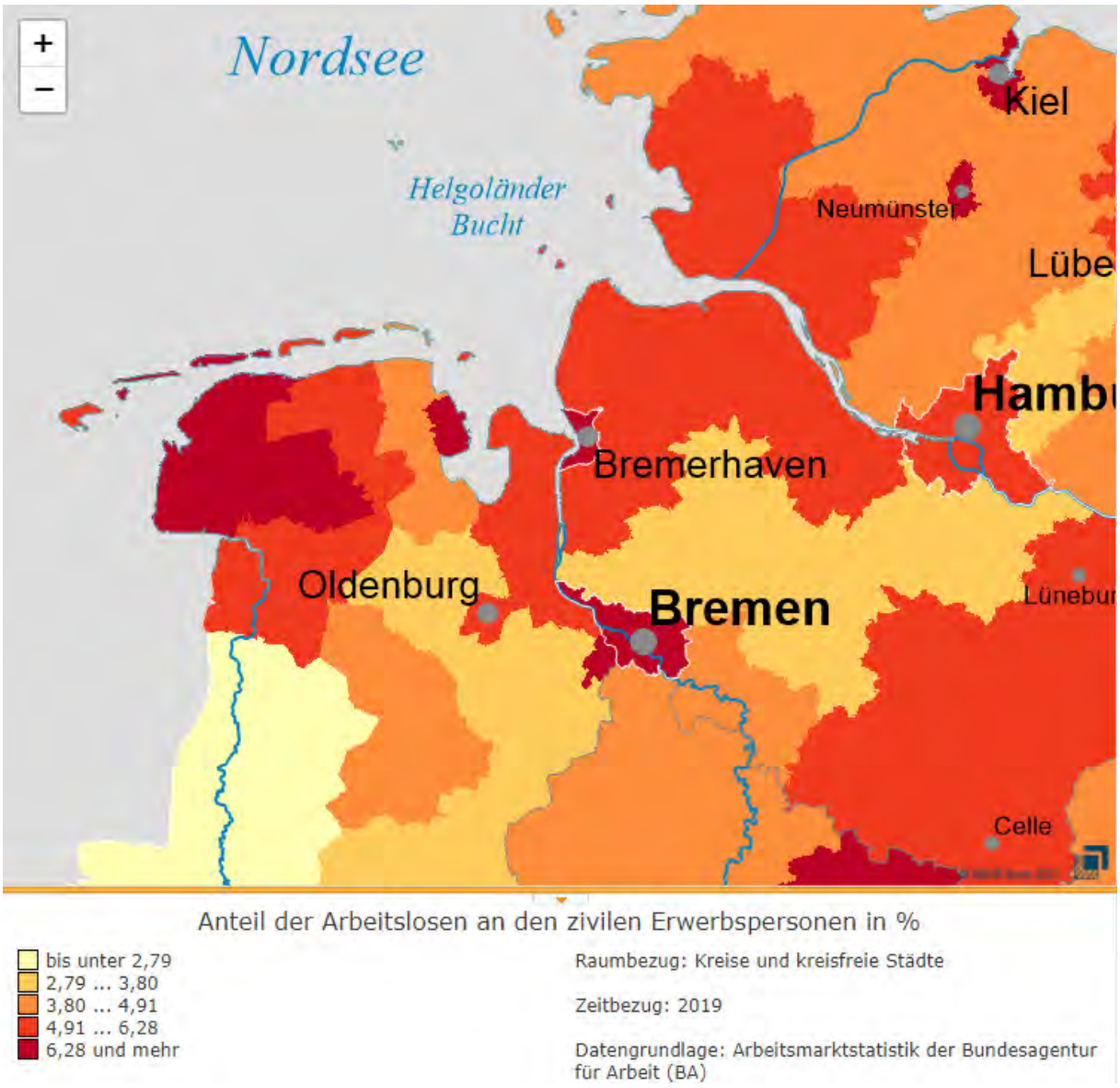

Proportion of foreigners an all residents in % (2019)
Source: INKAR

# Labour Market related indicators

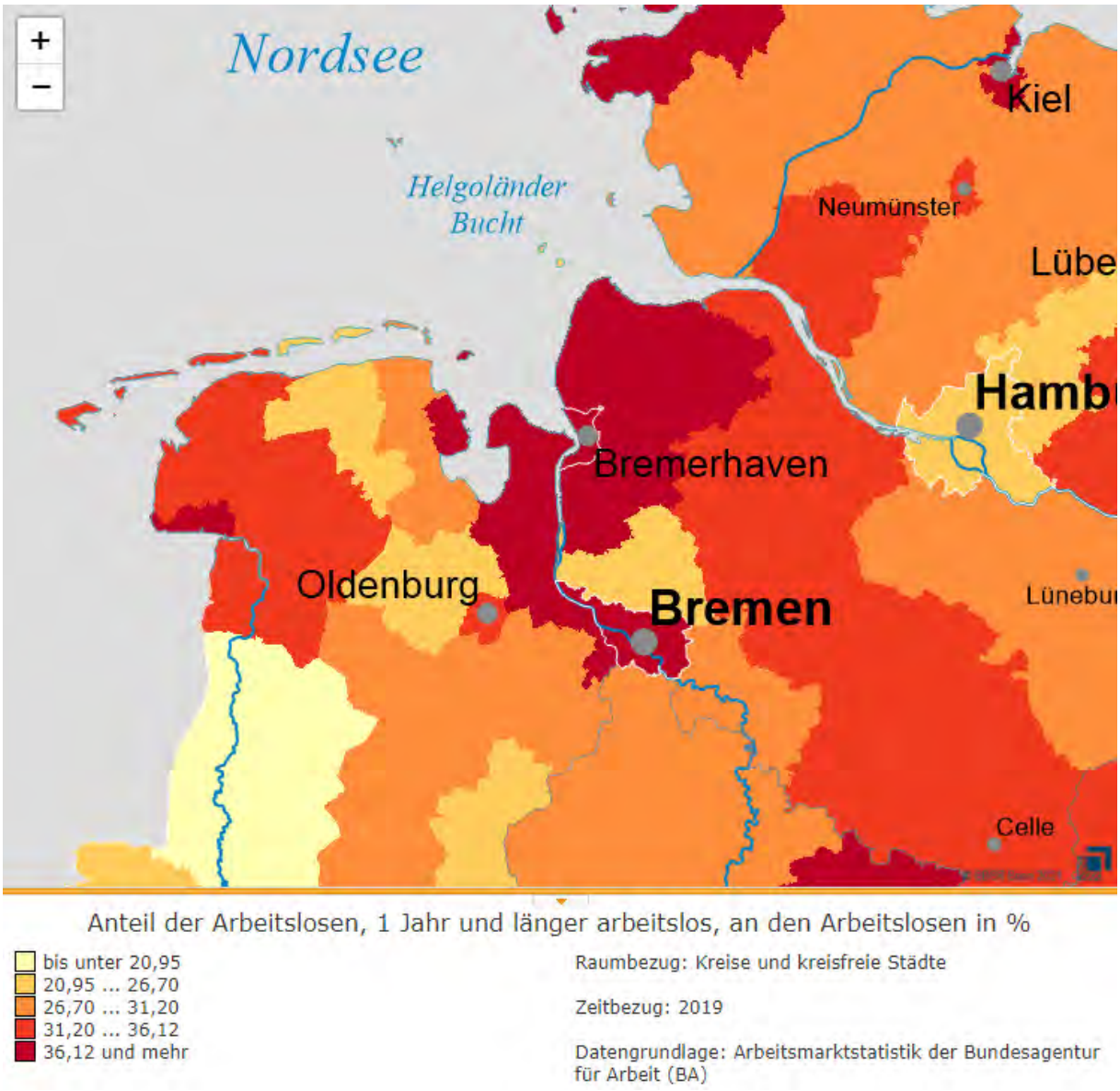



Proportion of employees working subject social security contributions on labour force

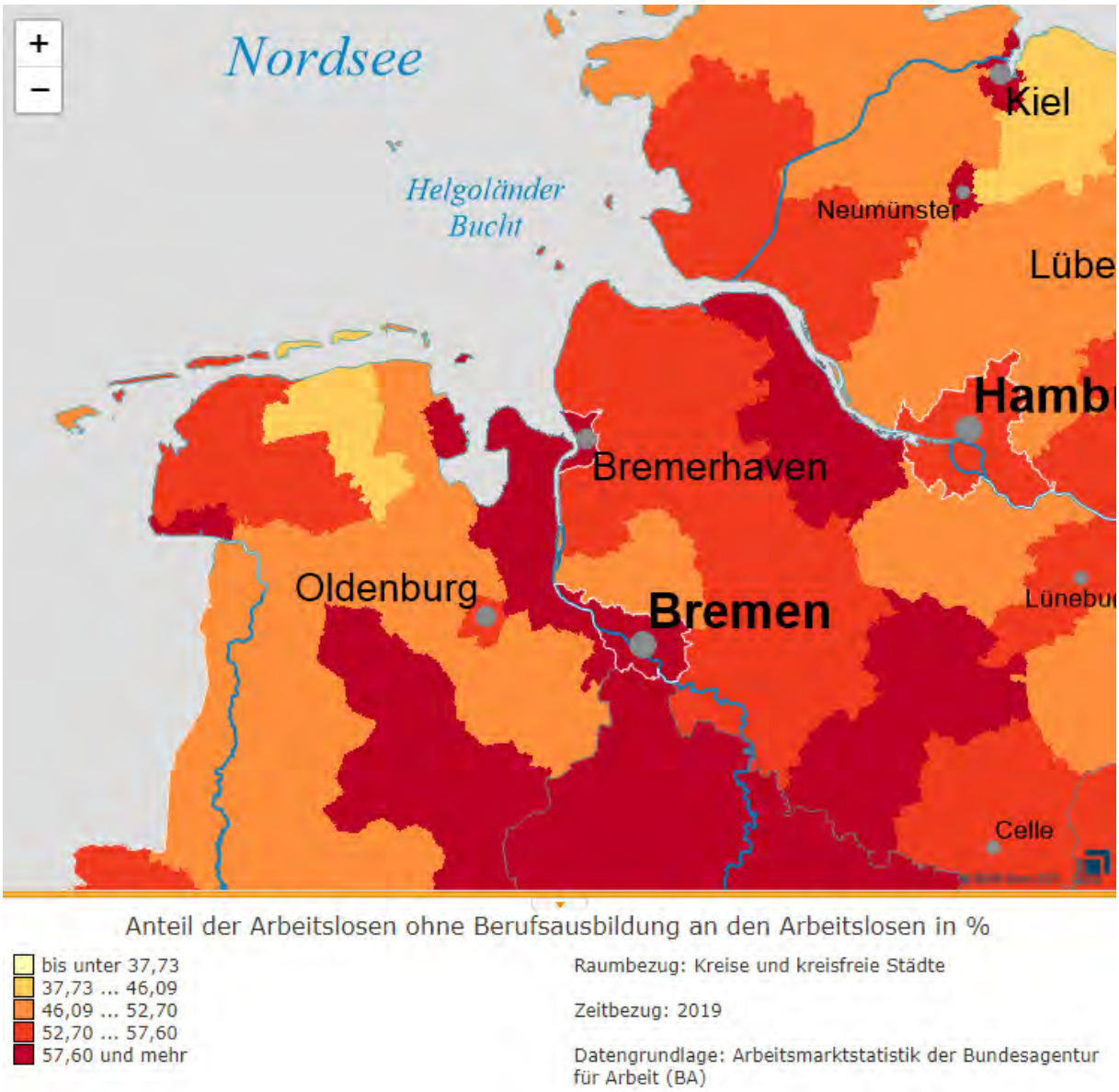
Source: INKAR




Proportion of unemployed to active labour force
Source: INKAR

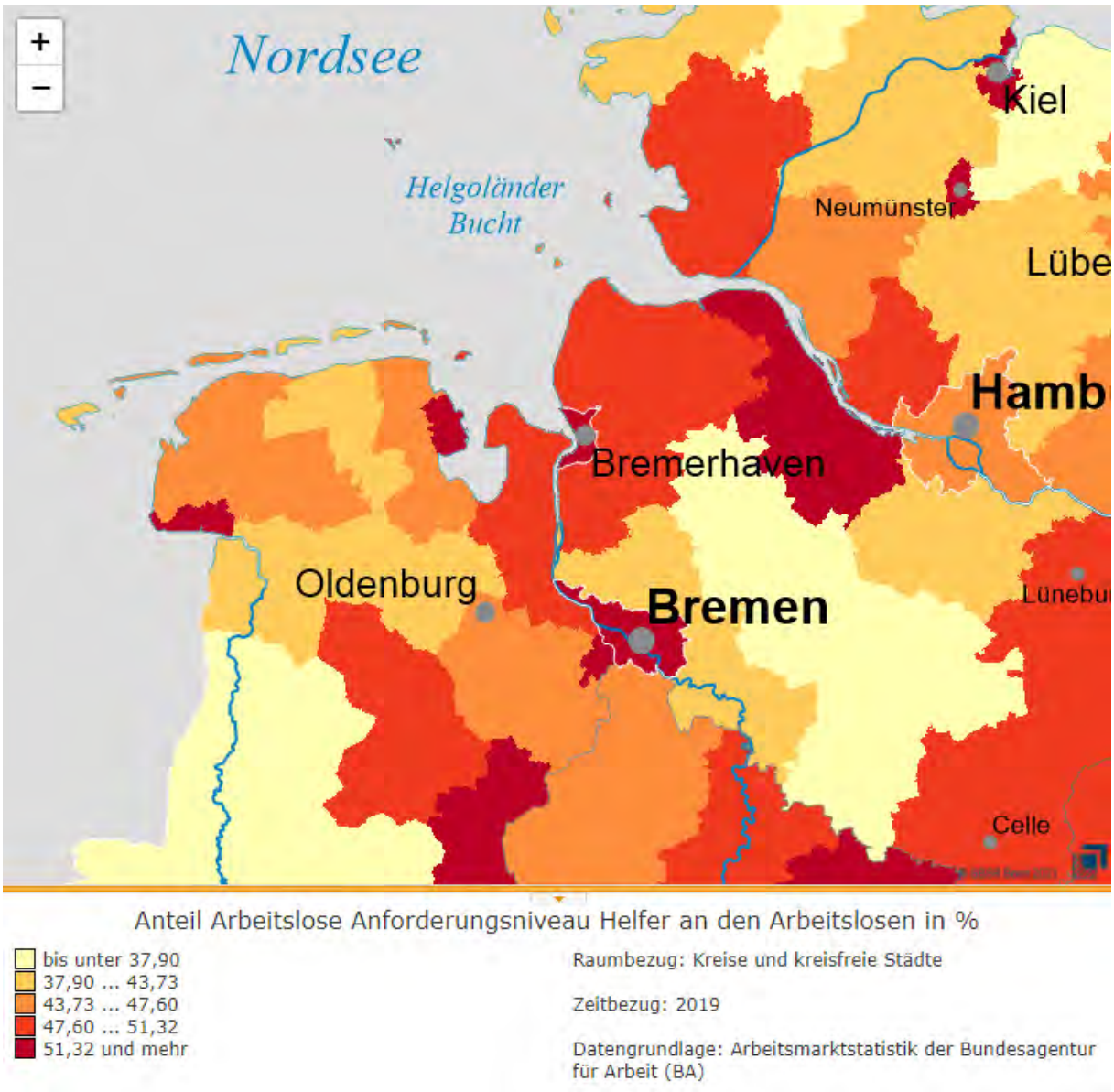



Long-term unemployed (>1 year) on all unemployed (2019)
Source: INKAR



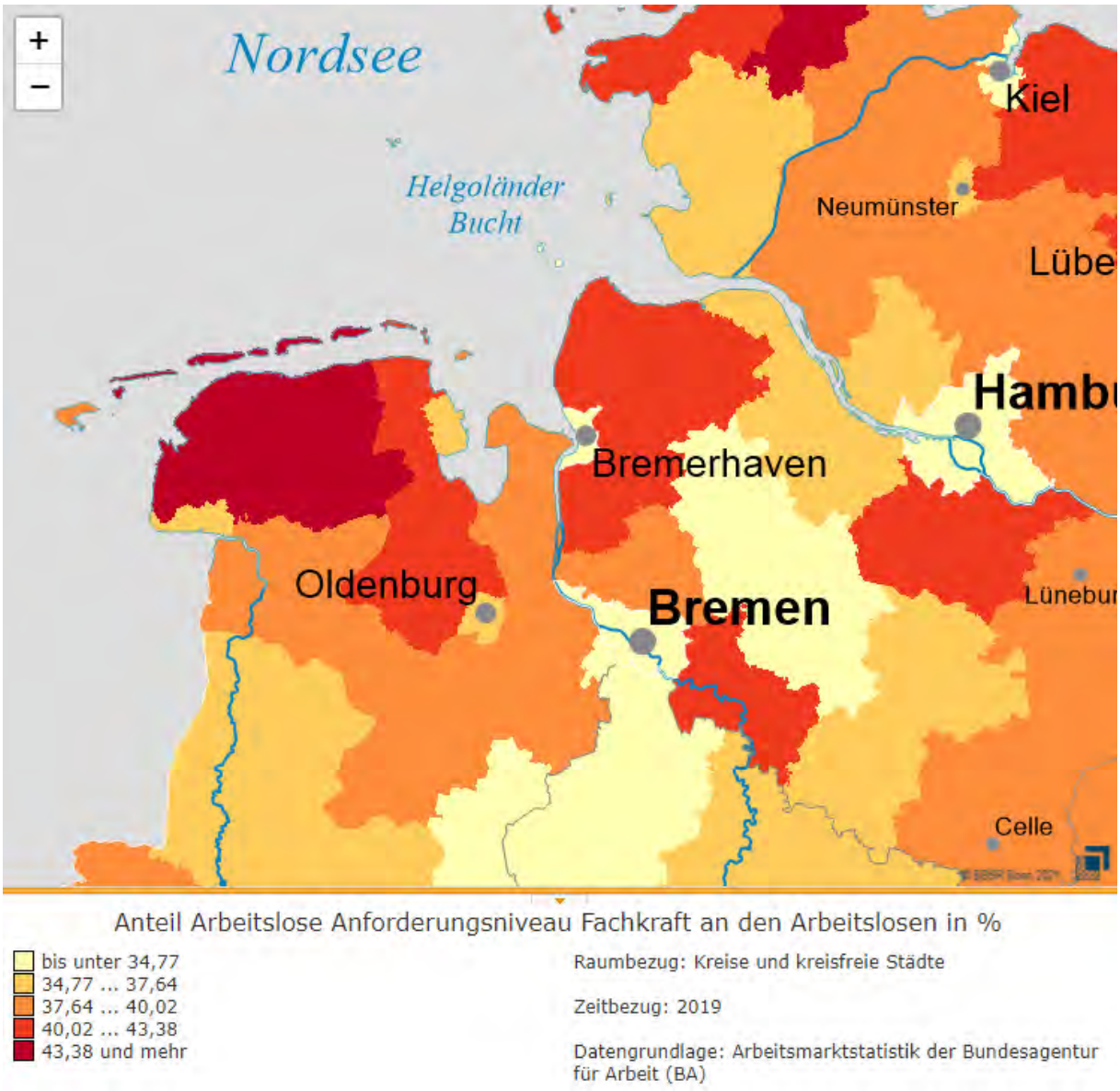

Proportion of unemployed without occupational training

Source: INKAR

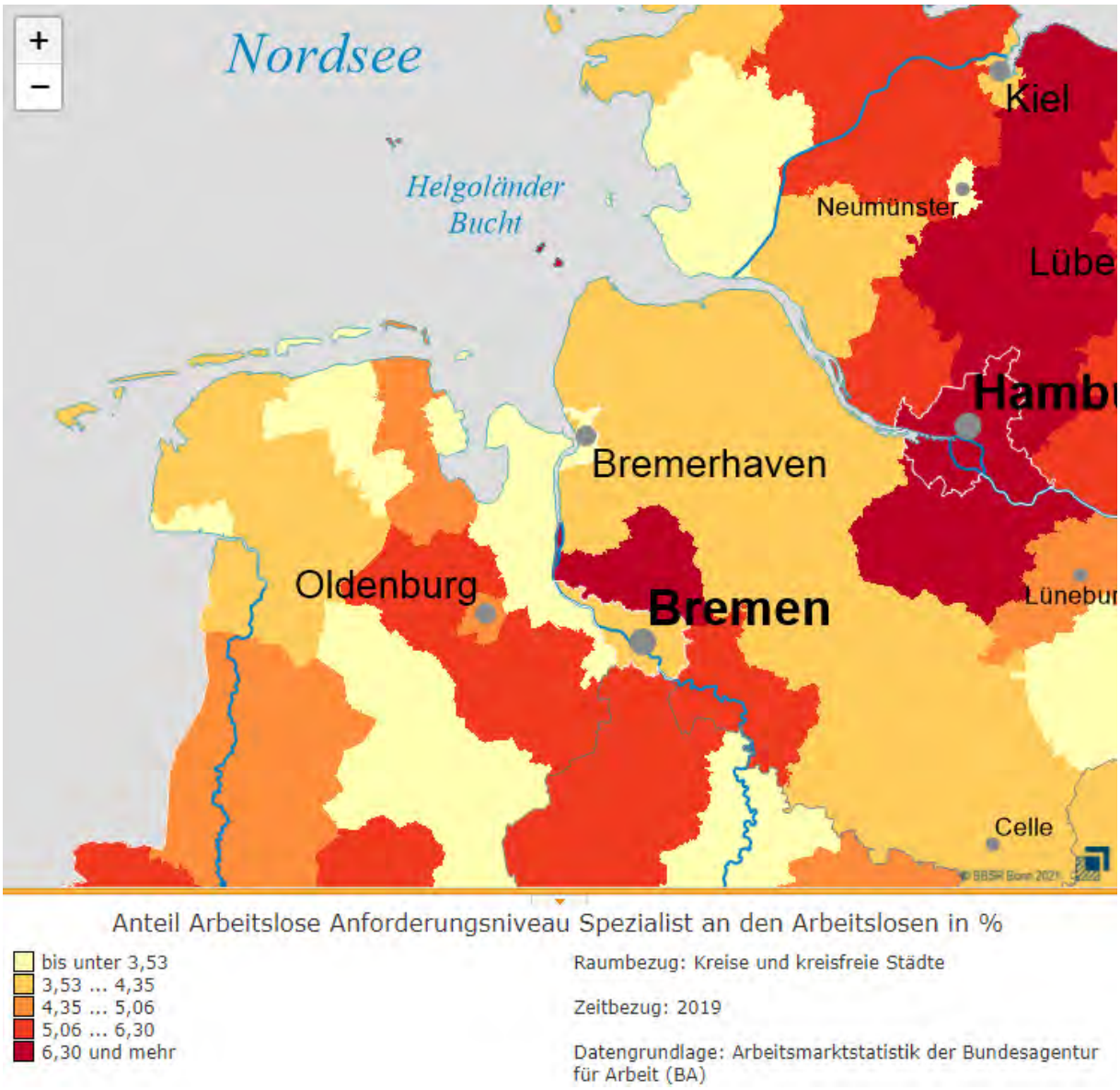



Proportion of unemployed looking for a job as unskilled worker (2019)

Source: INKAR

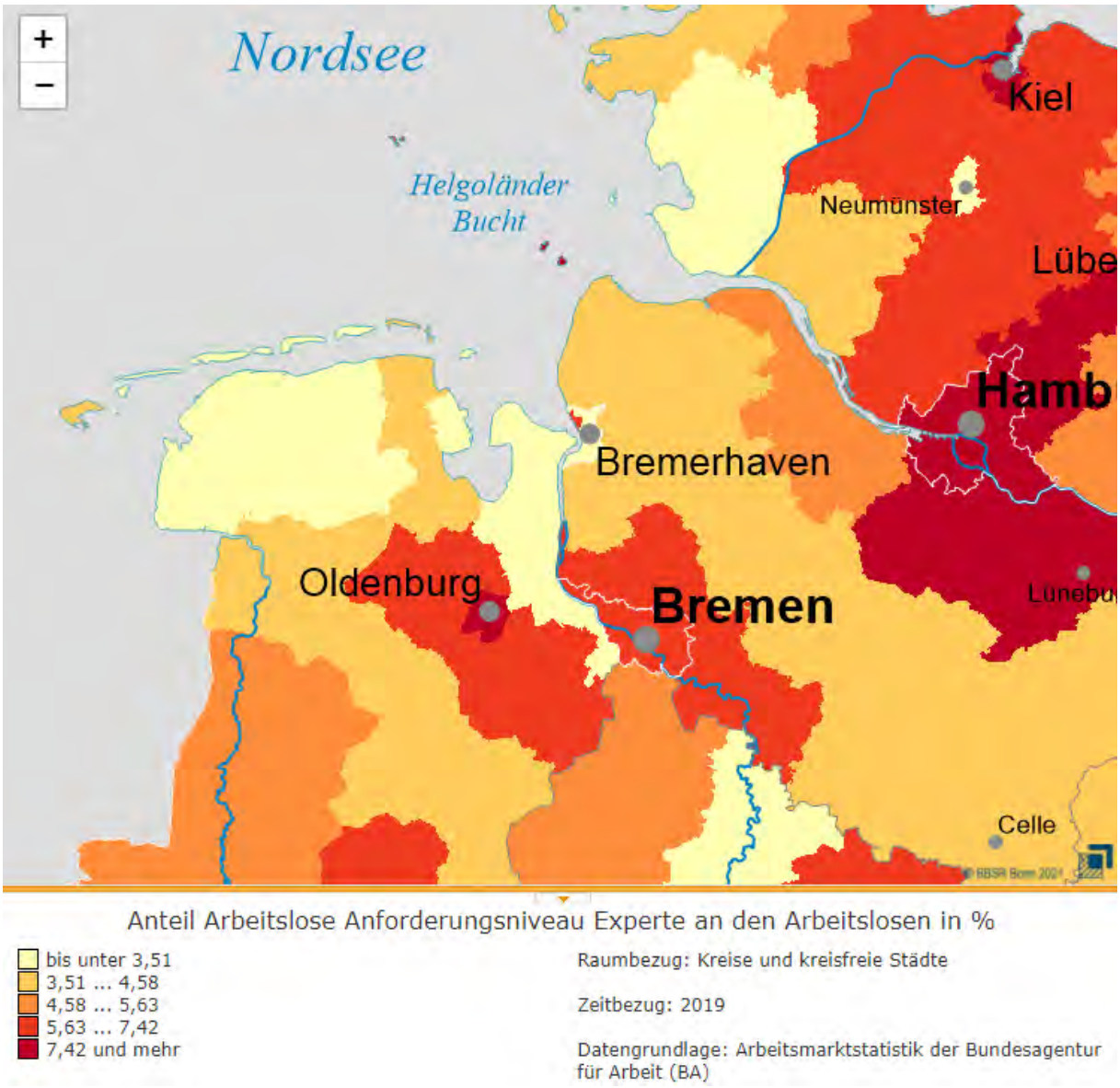



Proportion of unemployed skilled labour on all unemployed in % (2019)
Source: INKAR



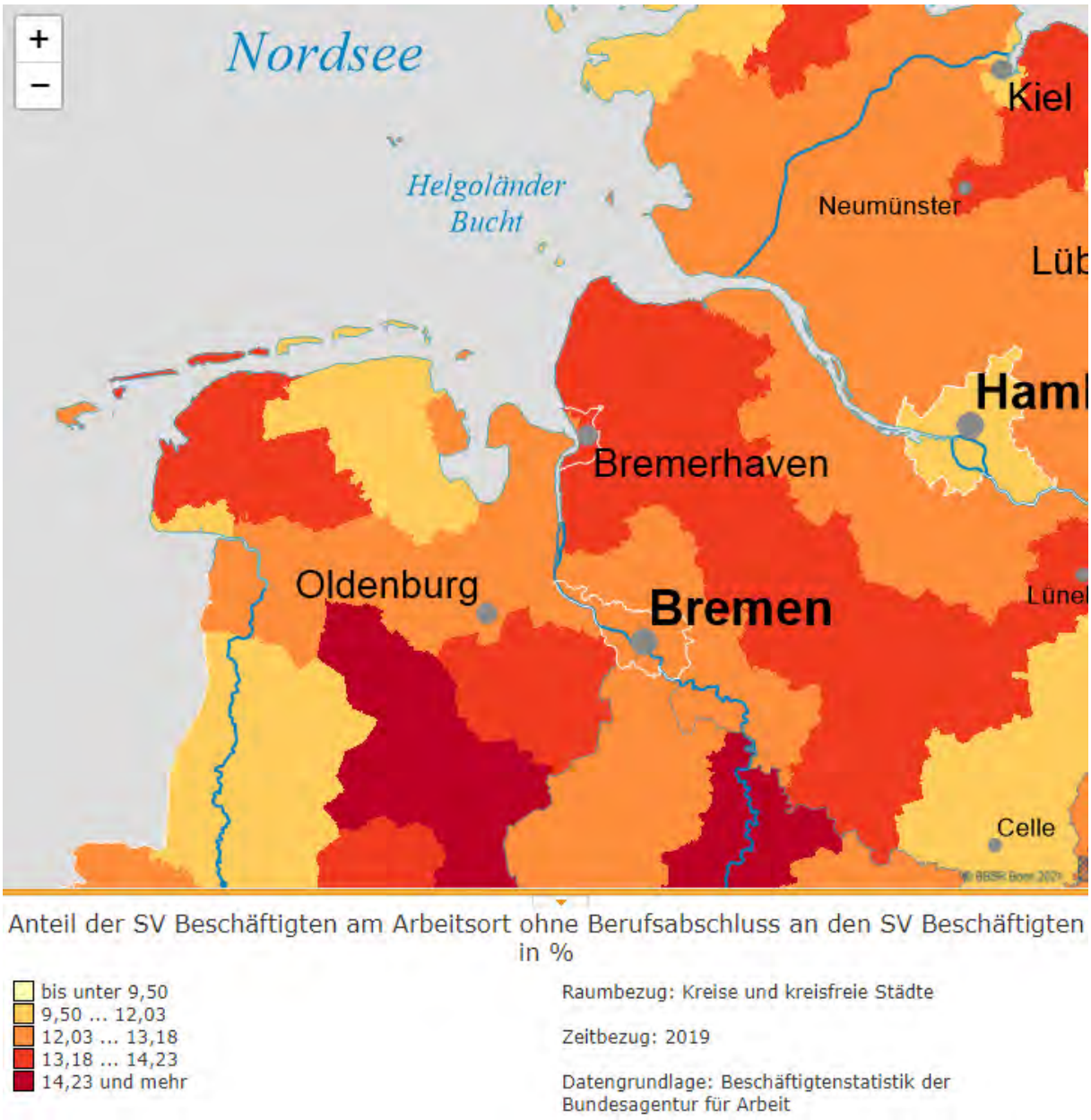

Proportion of unemployed specialists on all unemployed (2019) in %

Source: INKAR



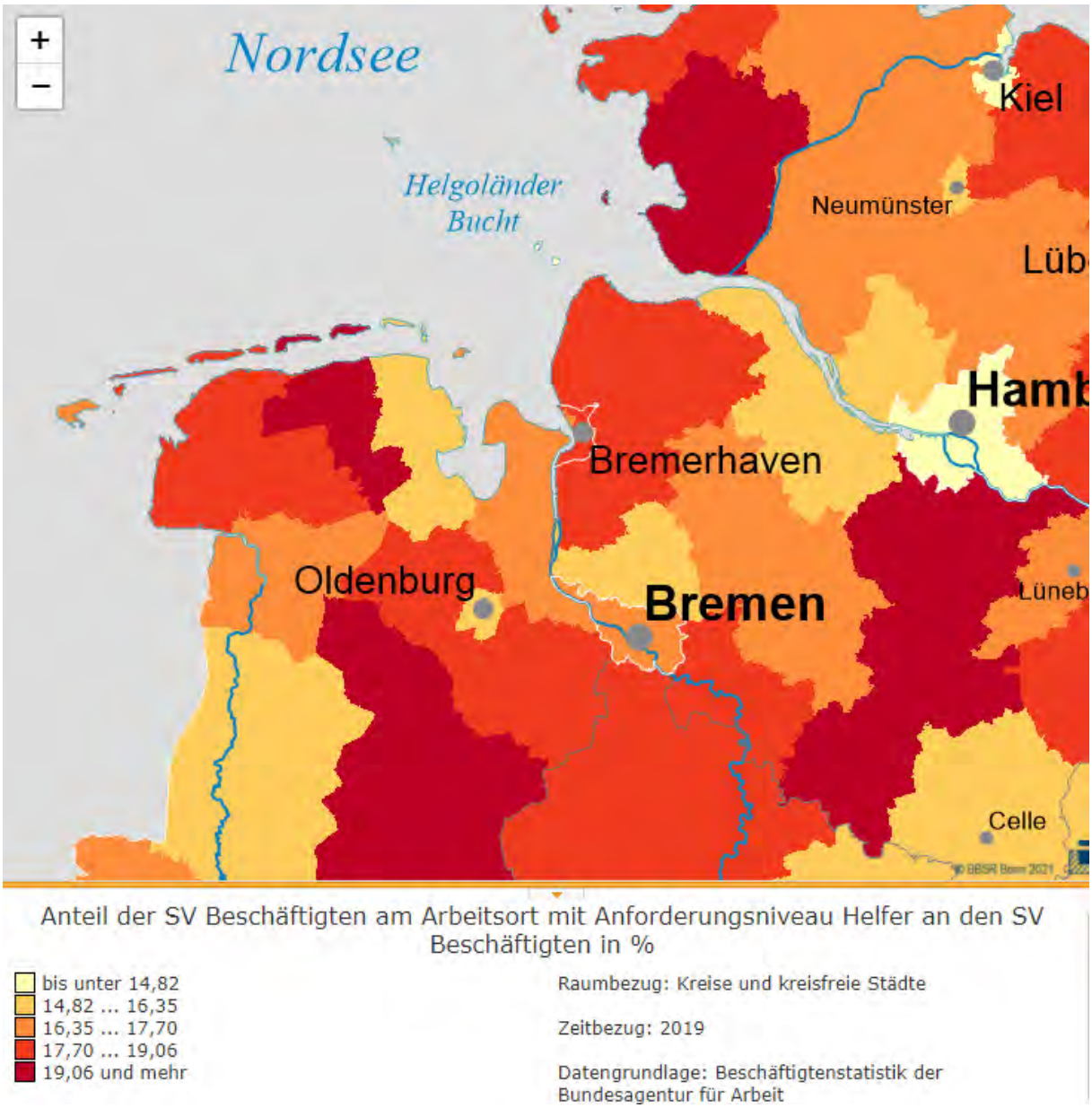

Share of unemployed experts on all unemployed in % (2019)

Source: INKAR



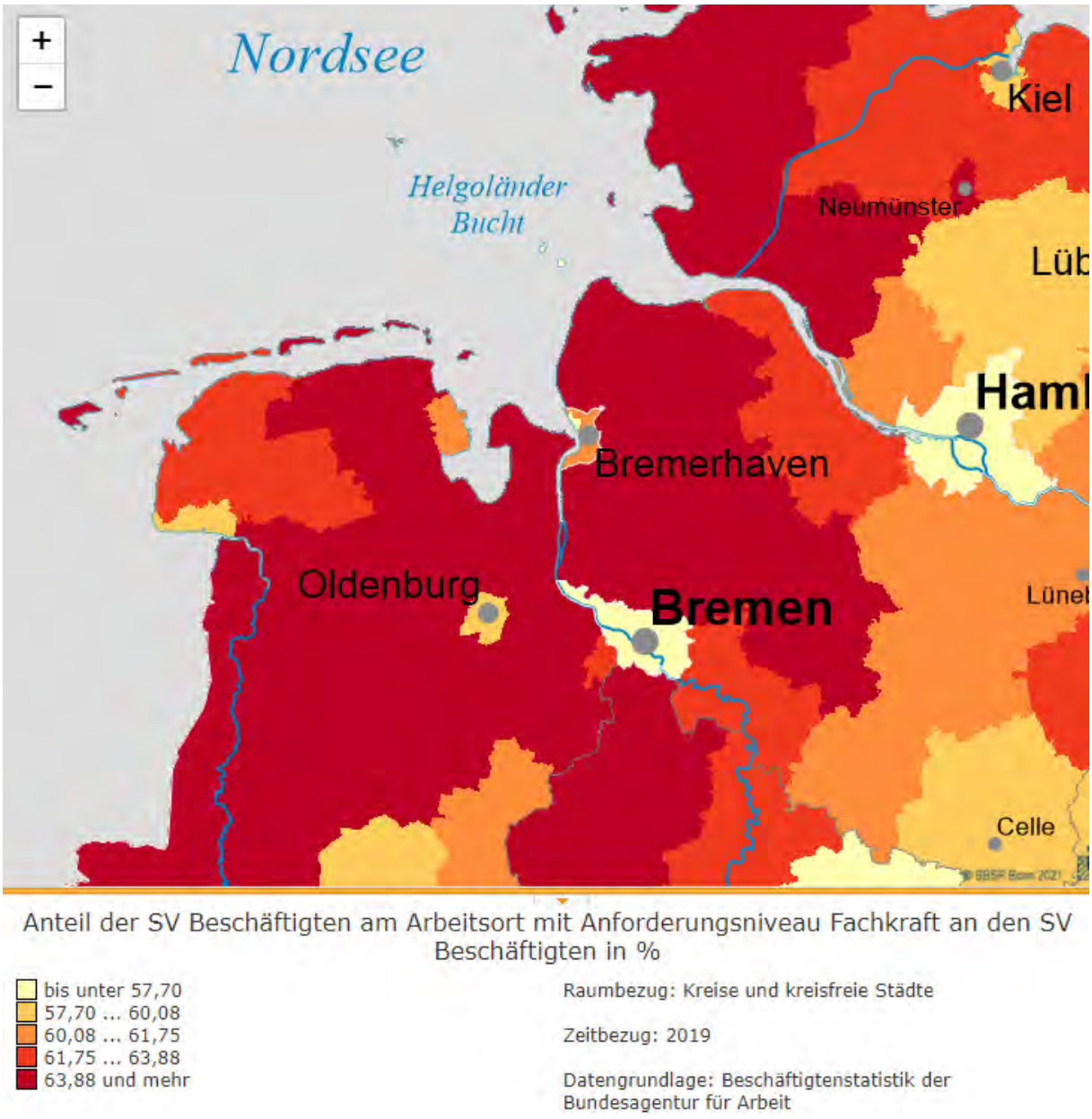

Share of employees working subject social security contributions without occupational training on all employees (2019)

Source: INKAR



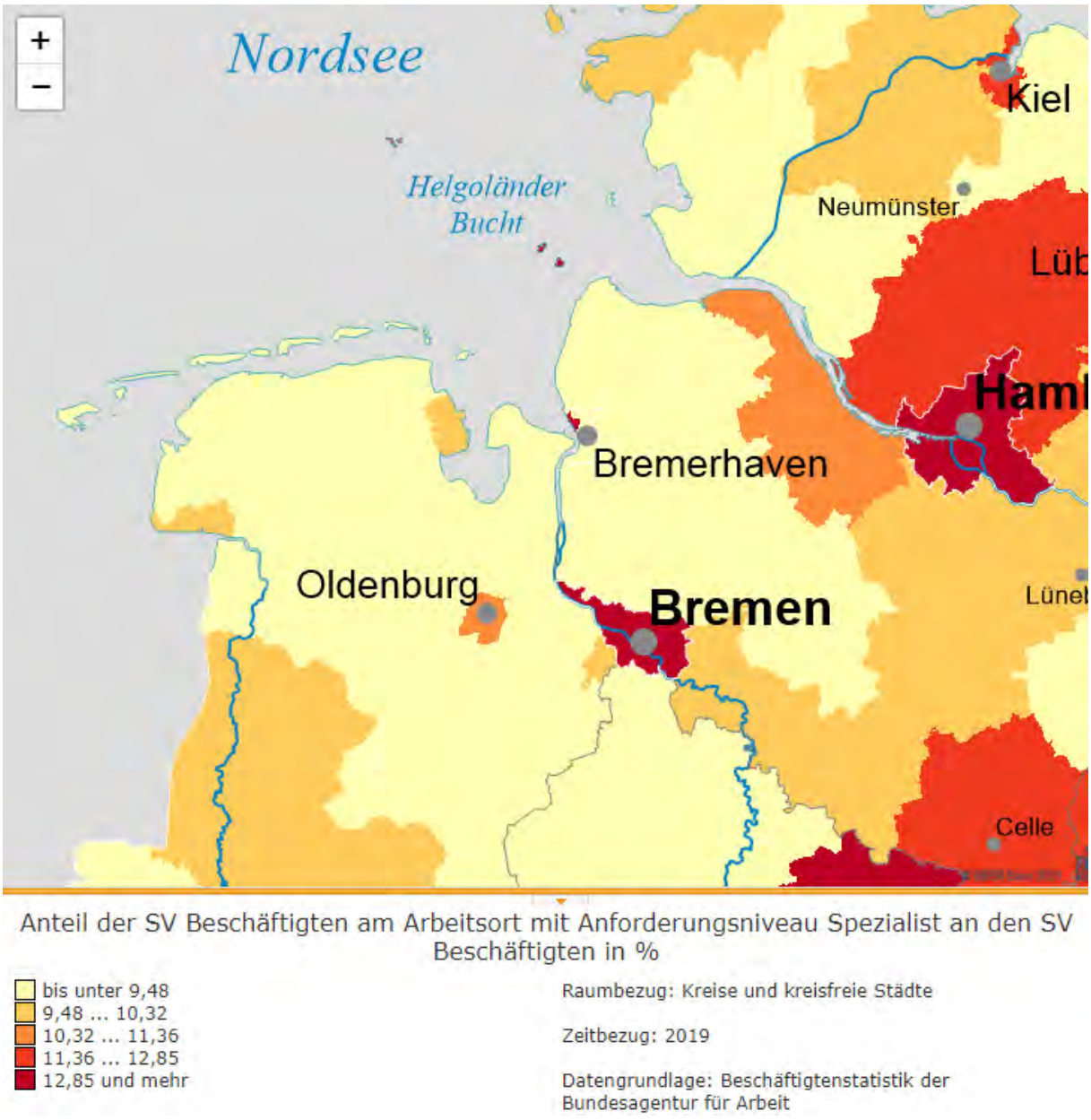

Share of unskilled employees working subject social security contributions on all employees (2019)

Source: INKAR



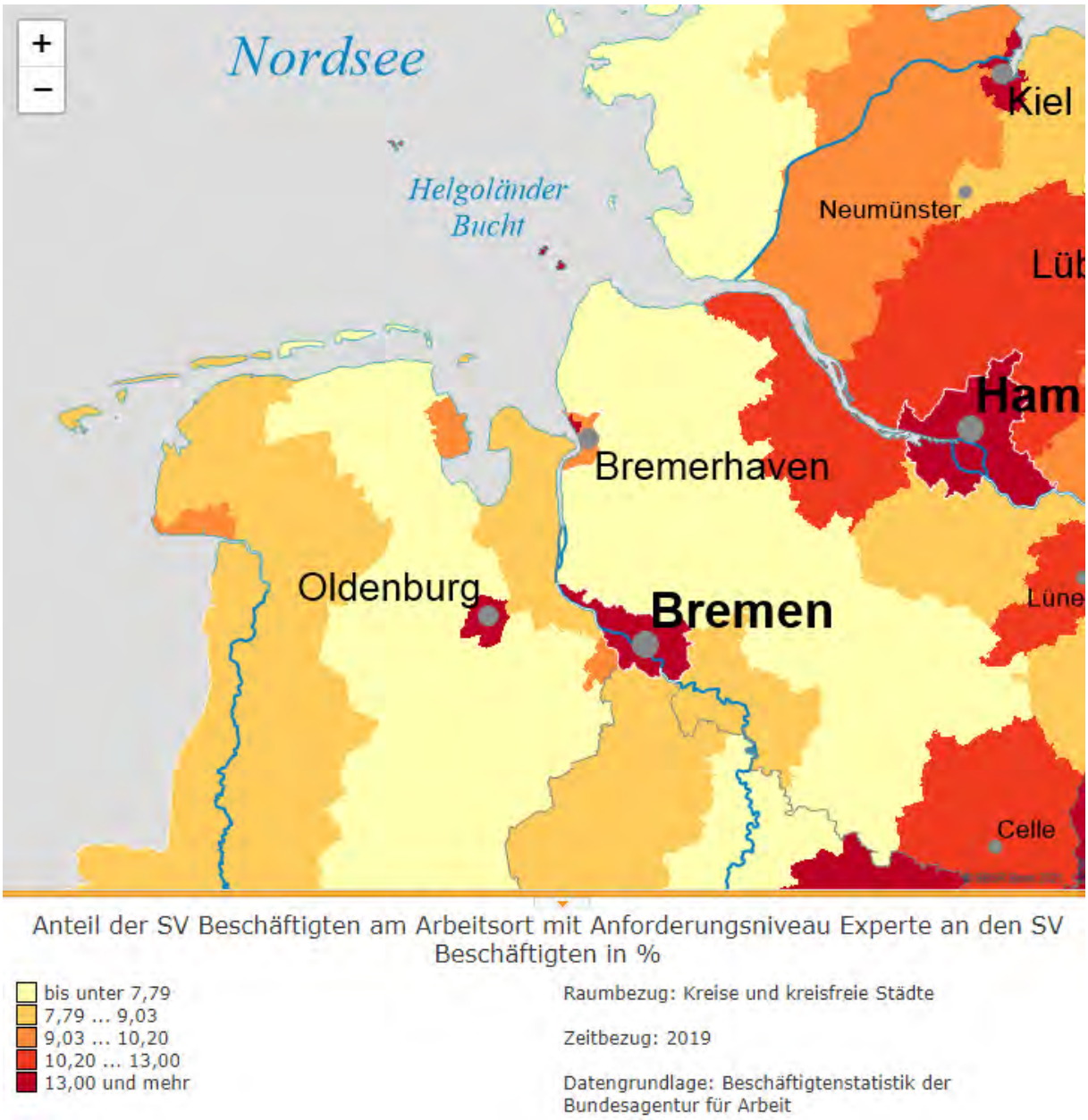

Share of skilled employees working subject social security contributions on all employees (2019)

Source: INKAR



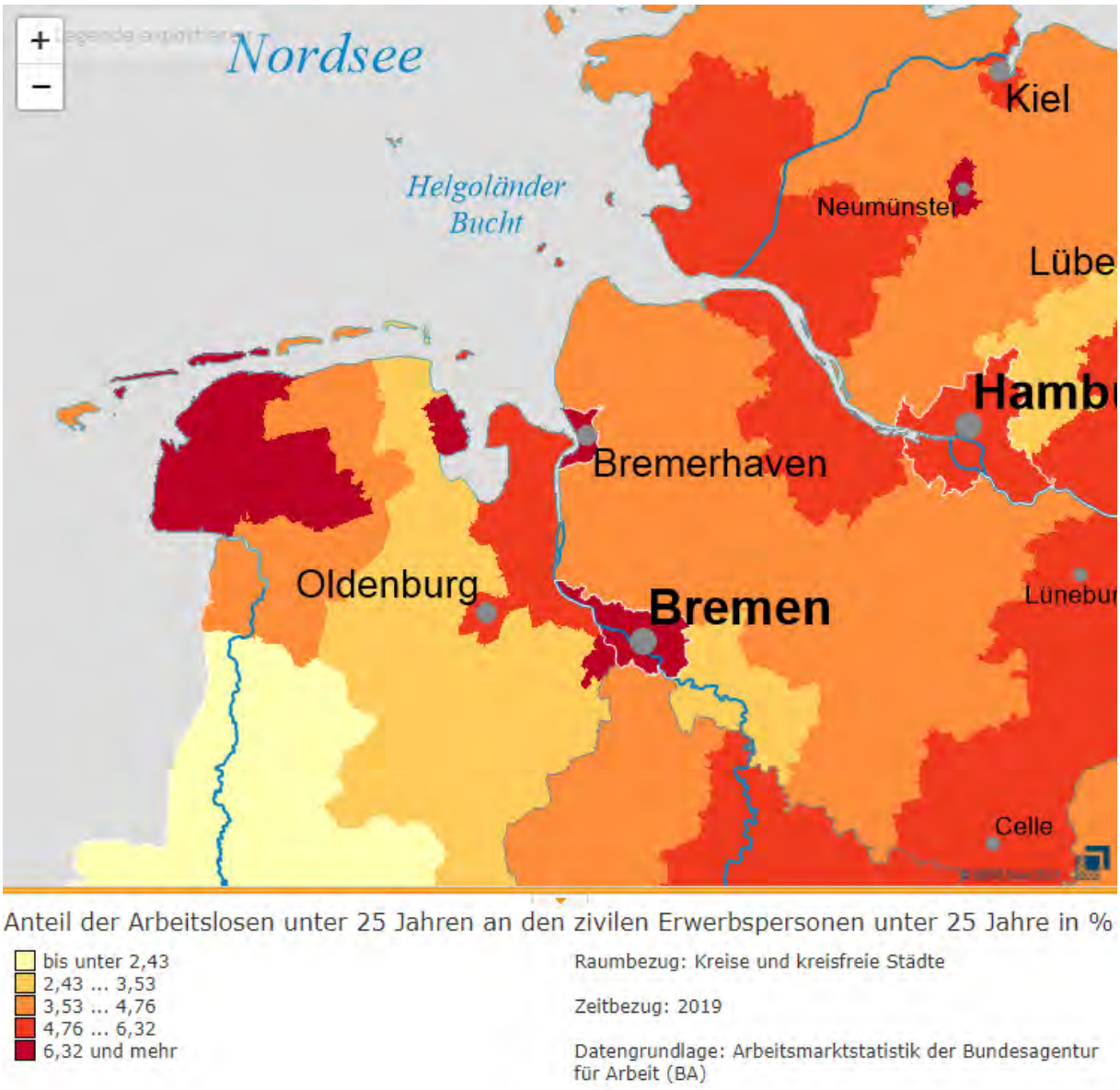

Share of specialist employees working subject social security contributions on all employees (2019)

Source: INKAR

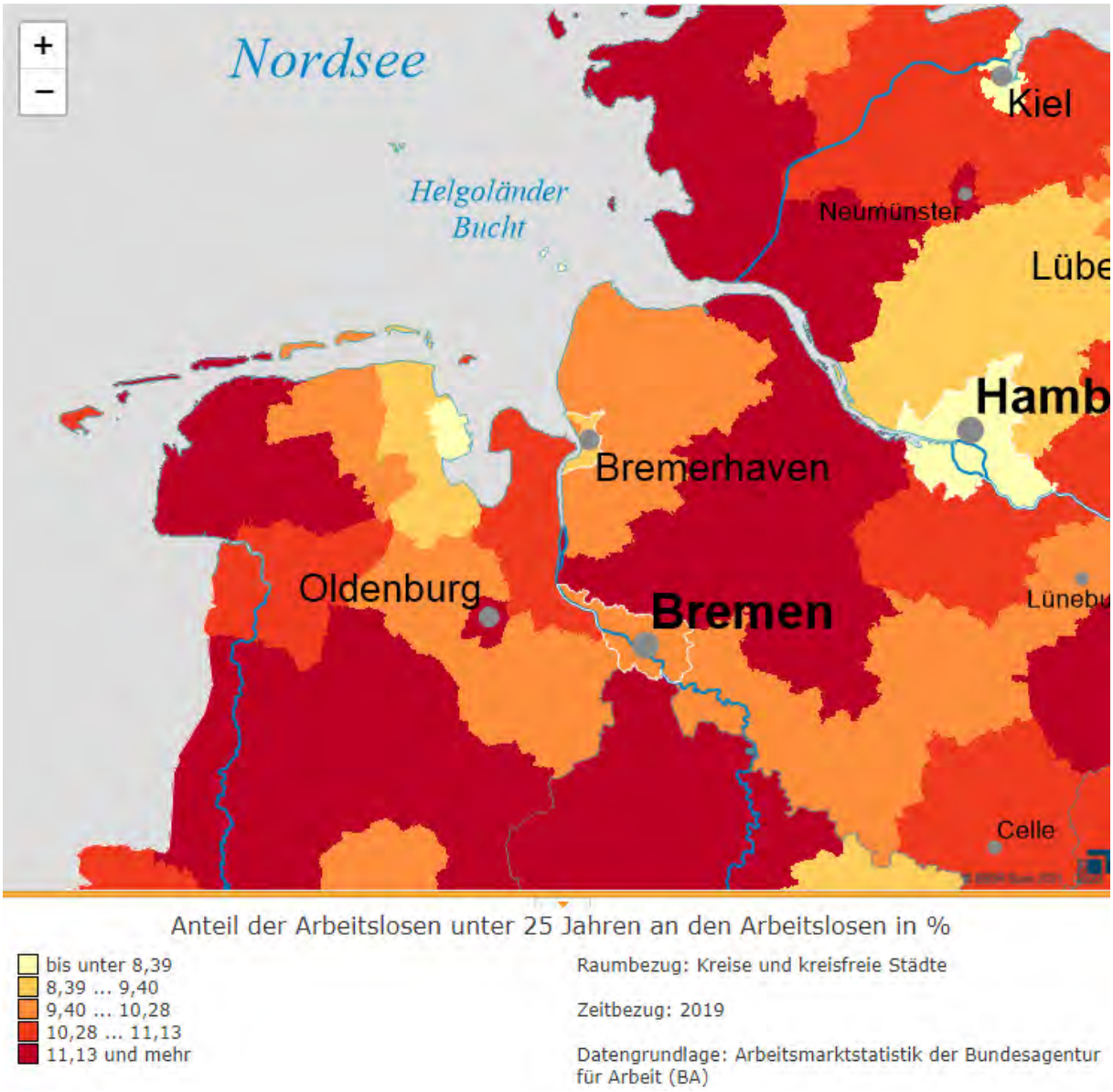



Share of expert employees working subject social security contributions on all employees (2019)

Source: INKAR

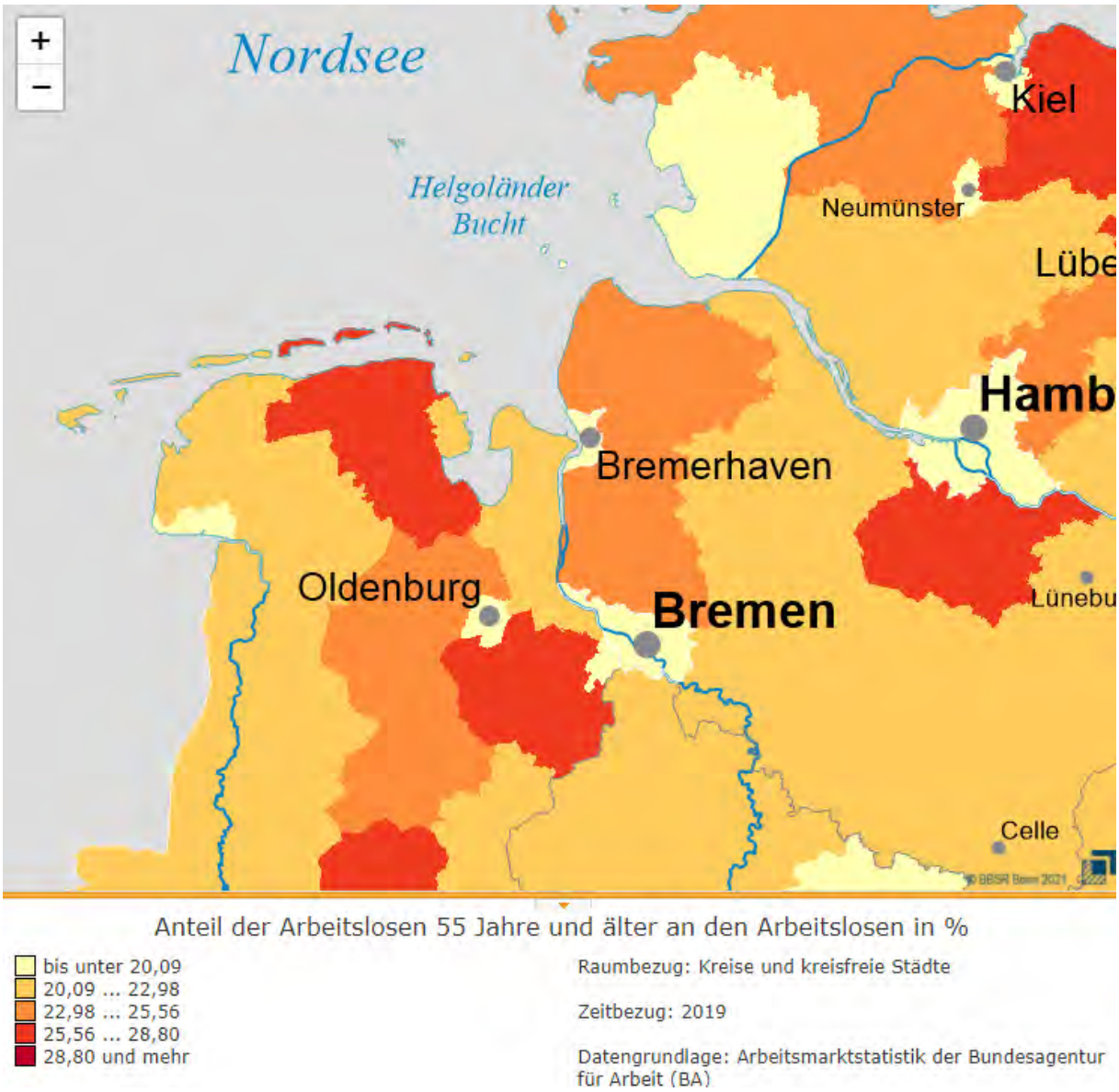



Share of unemployed individuals on labour force up to an age of 25 years
Source: INKAR



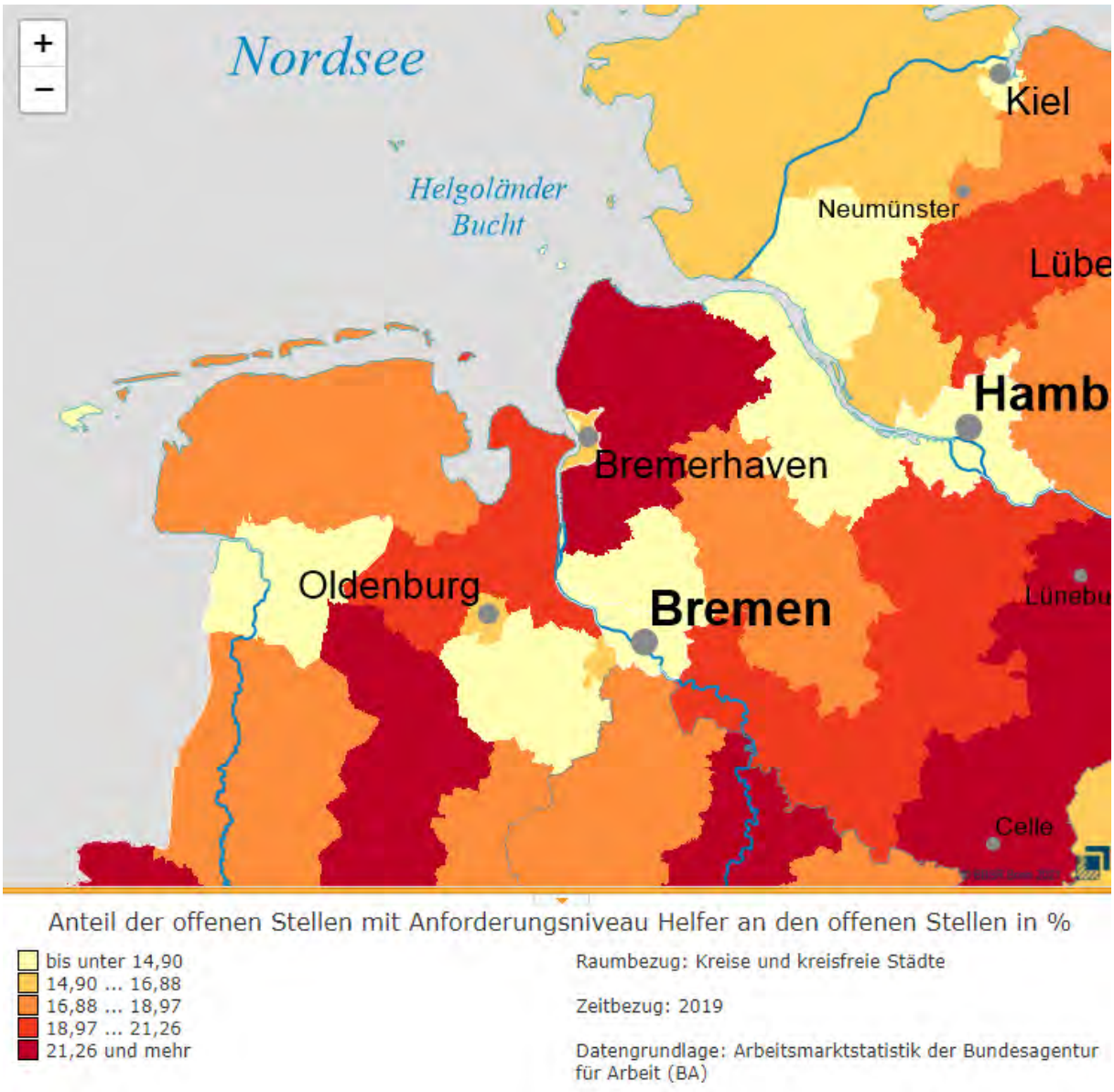

Share of unemployed individuals up to 25 years on all unemployed individuals

Source: INKAR



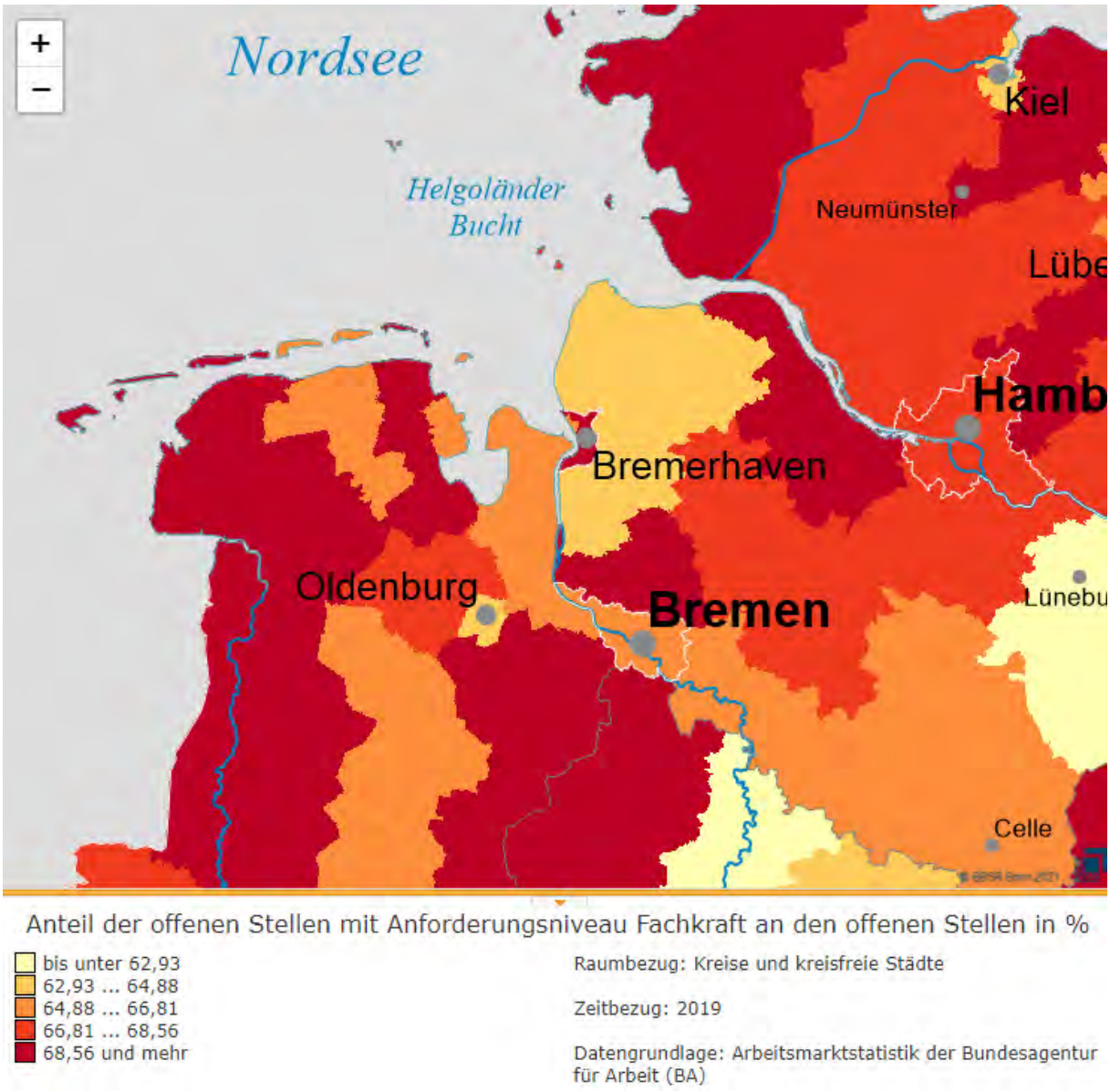

Share of unemployed individuals 55 years and older on all unemployed individuals

Source: INKAR



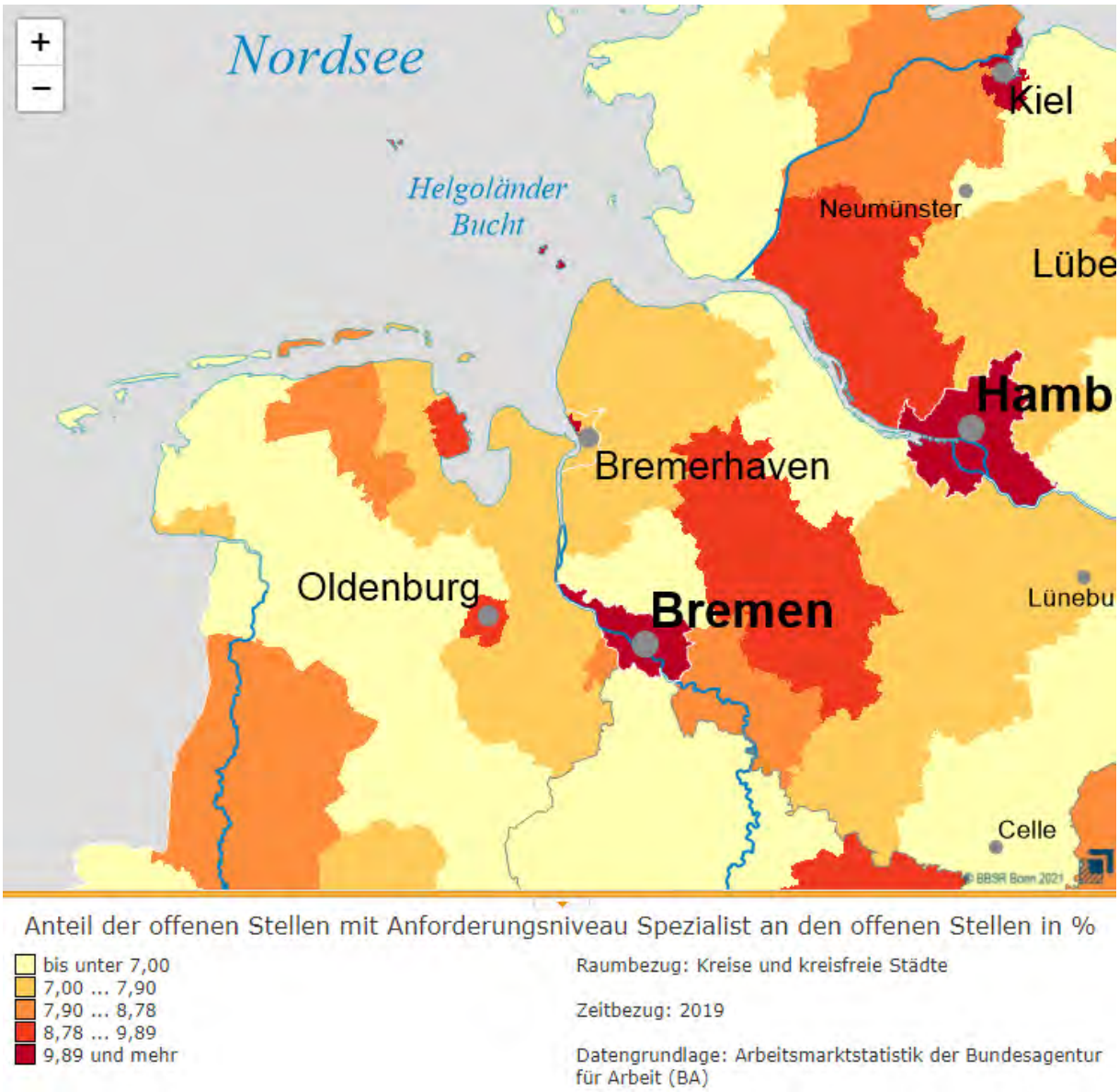

Share of open vacancies for unskilled labour

Source: INKAR



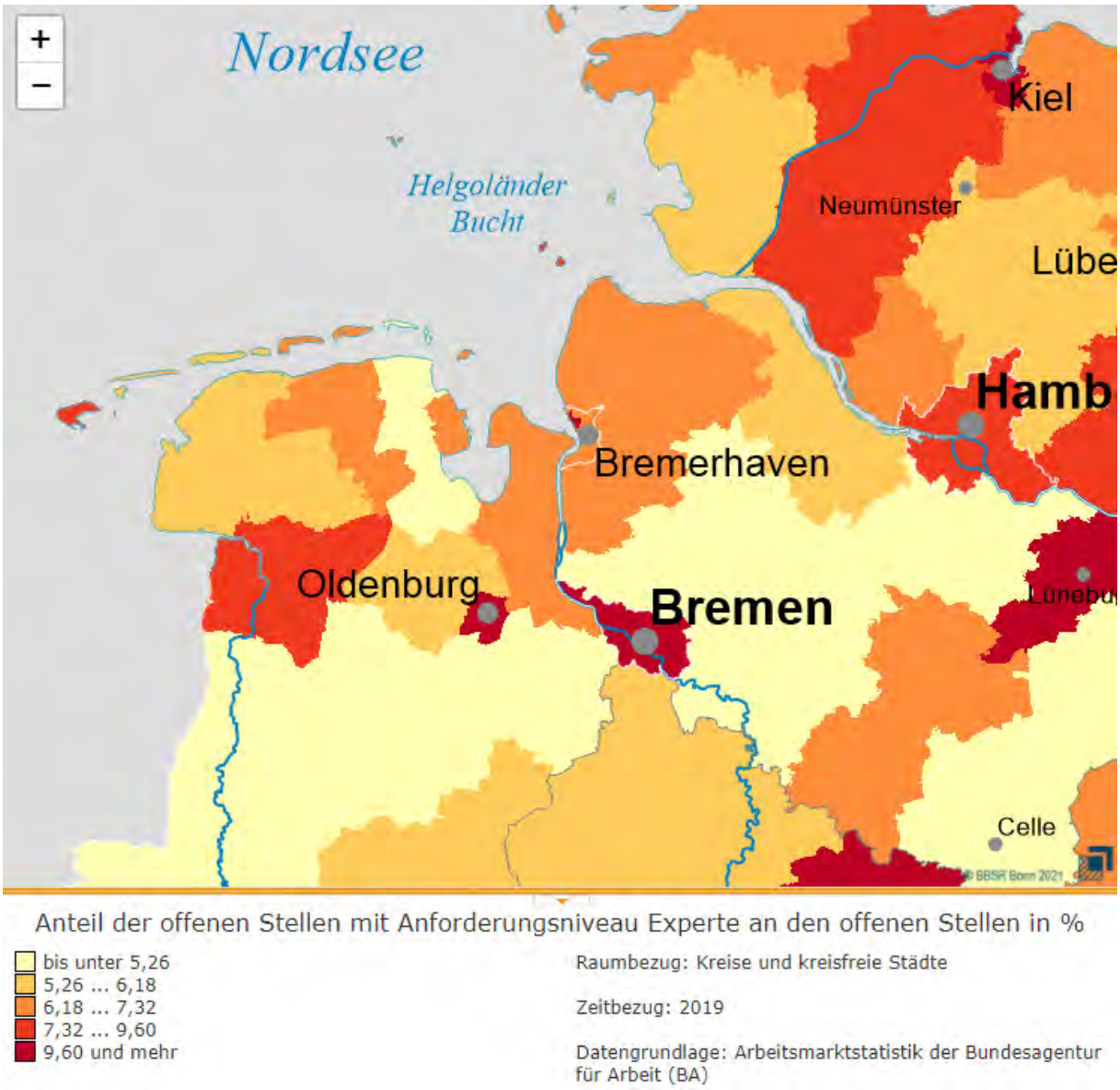

Share of open vacancies for skilled labour

Source: INKAR



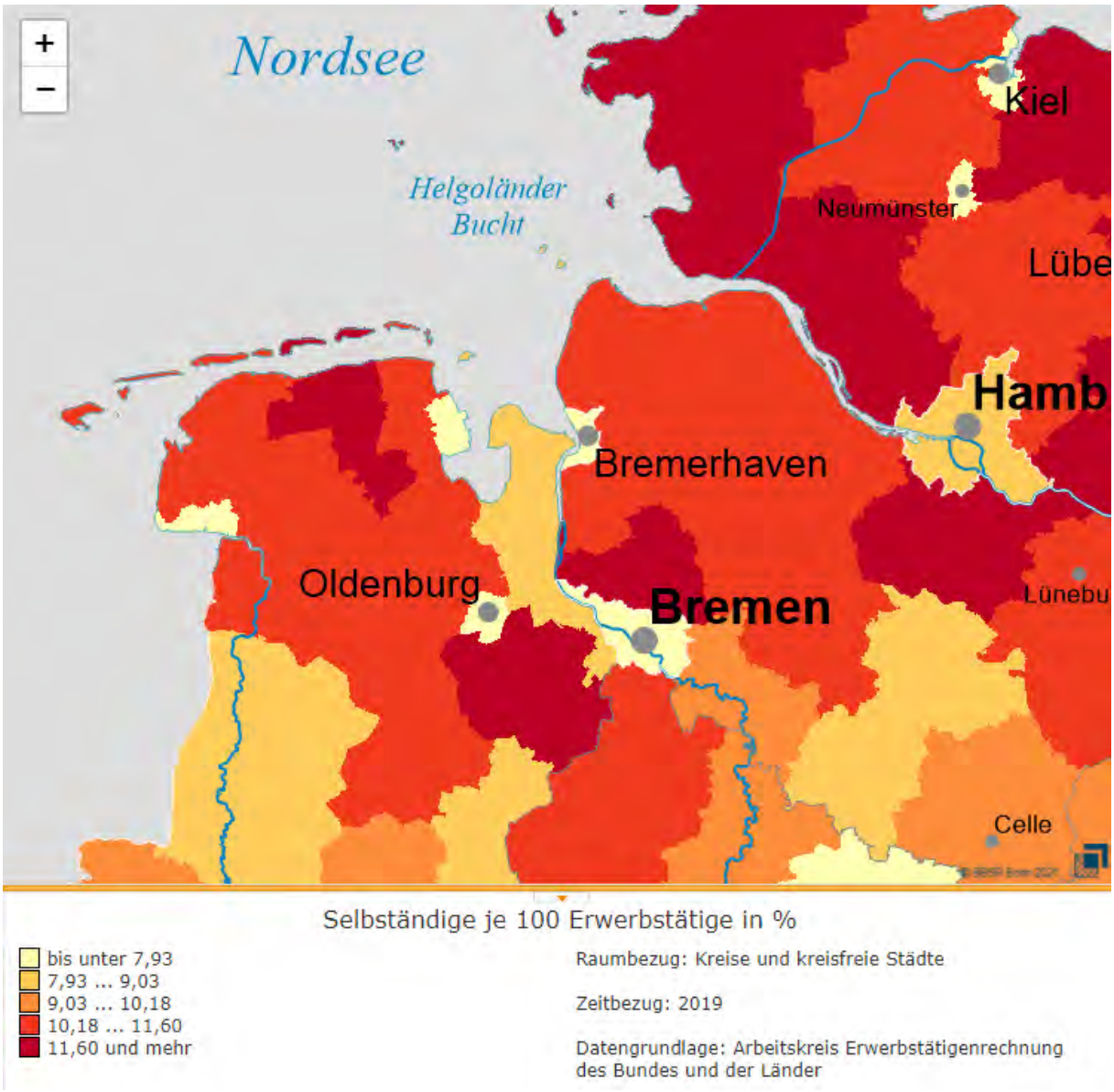

Share of open vacancies for specialist labour

Source: INKAR



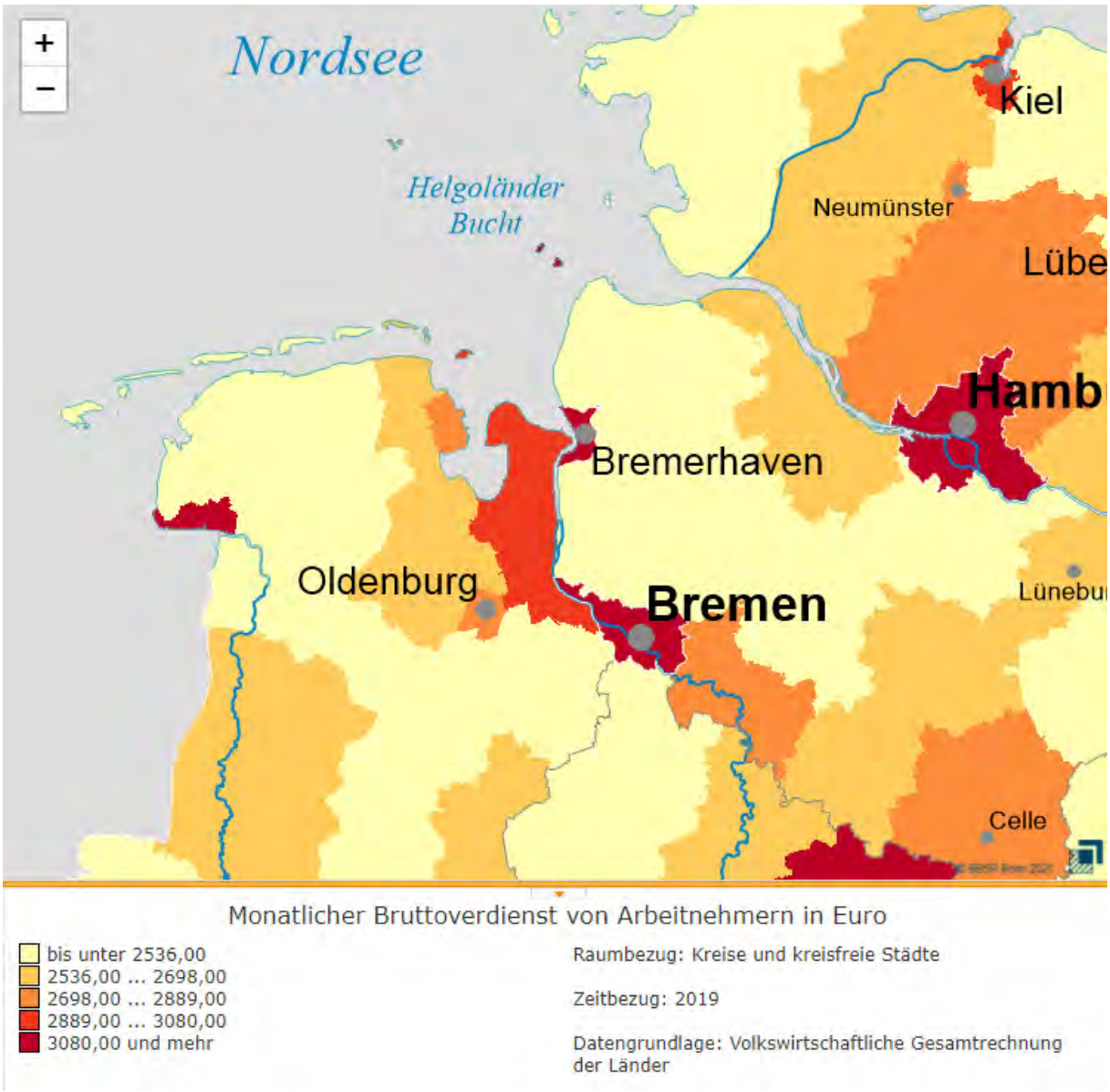

Share of open vacancies for expert labour

Source: INKAR



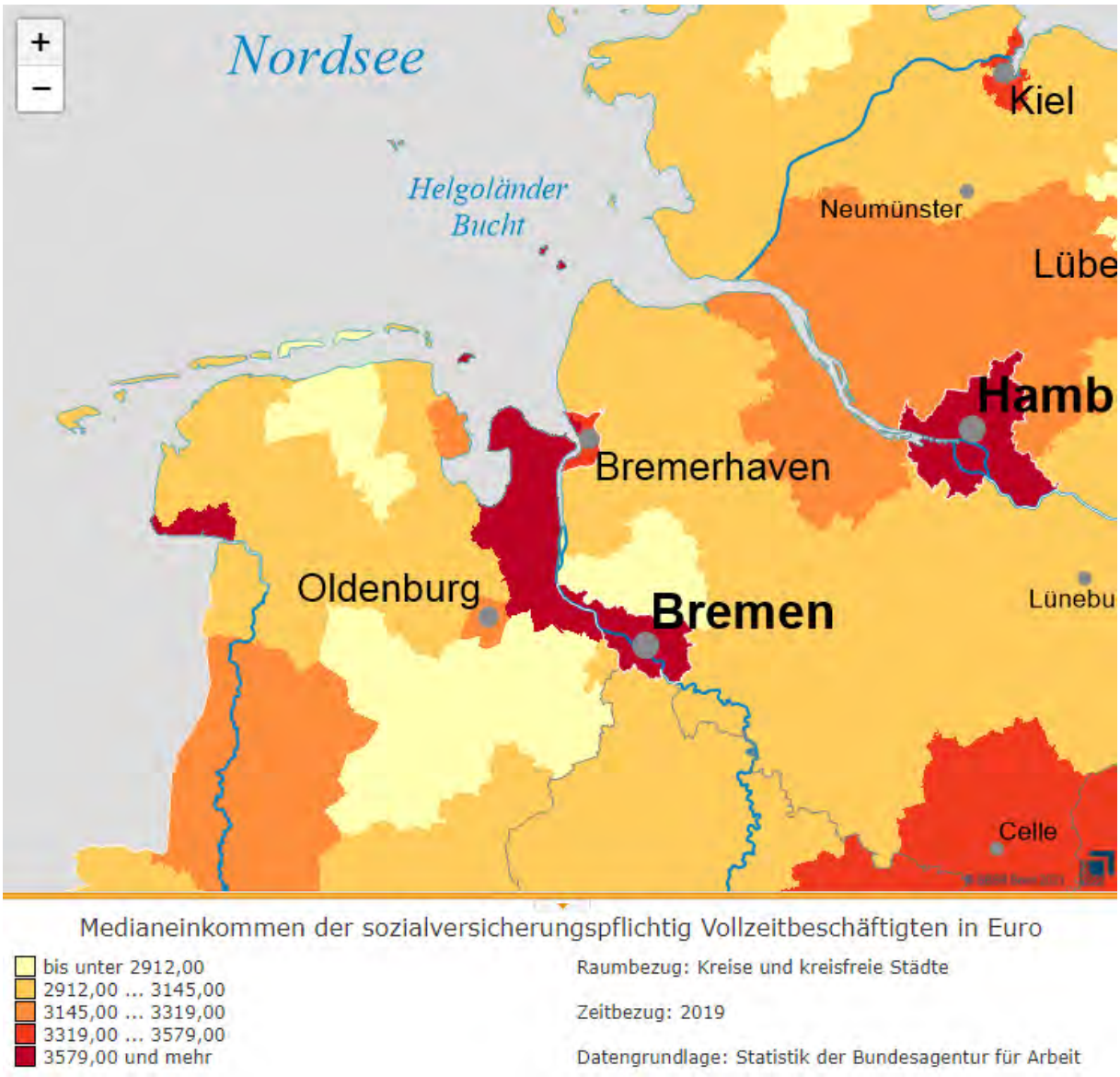

Self-Employment per 100 employees in %

Source: INKAR



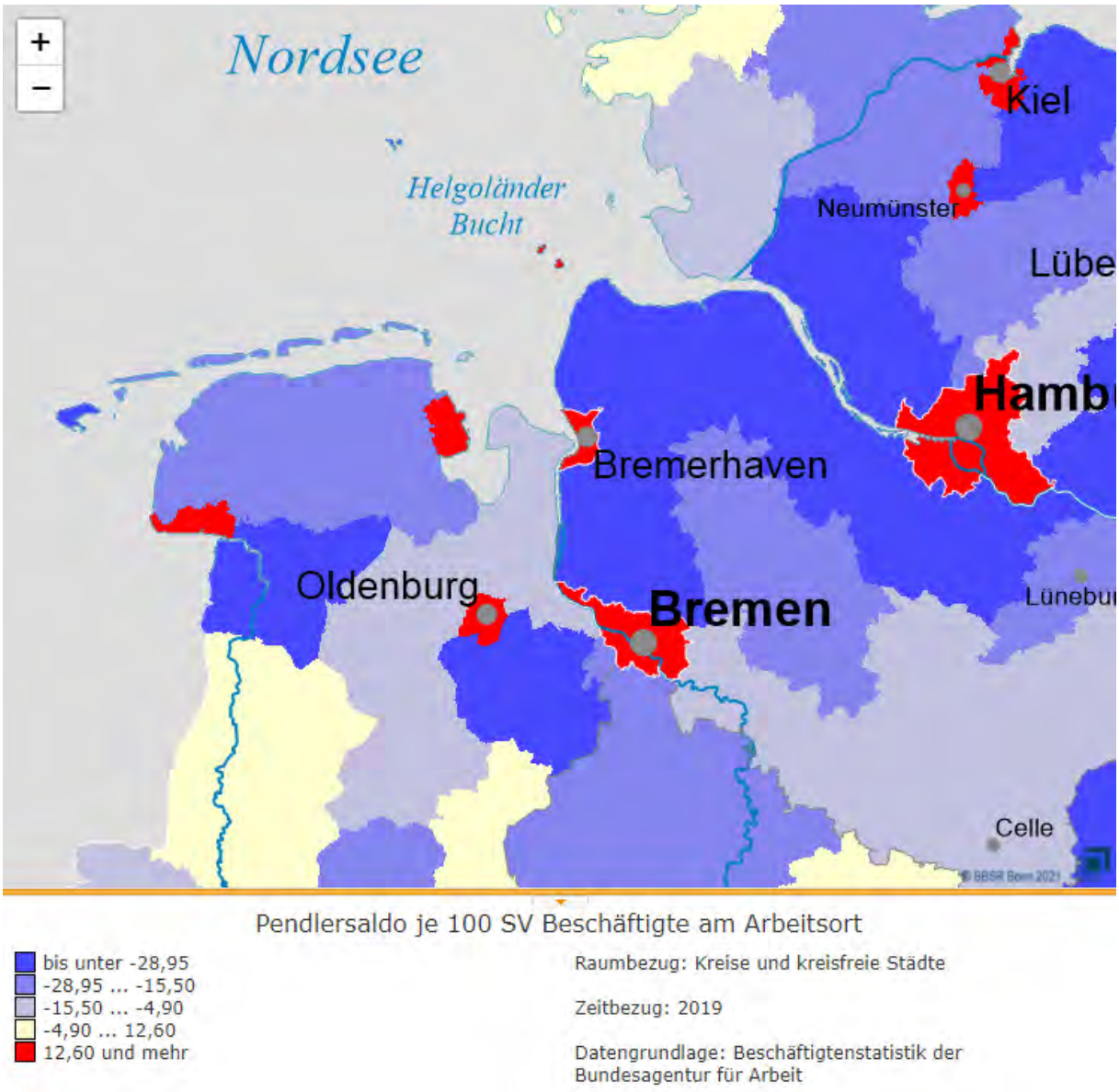

Average monthly gross income for employees in Euro

Source: INKAR



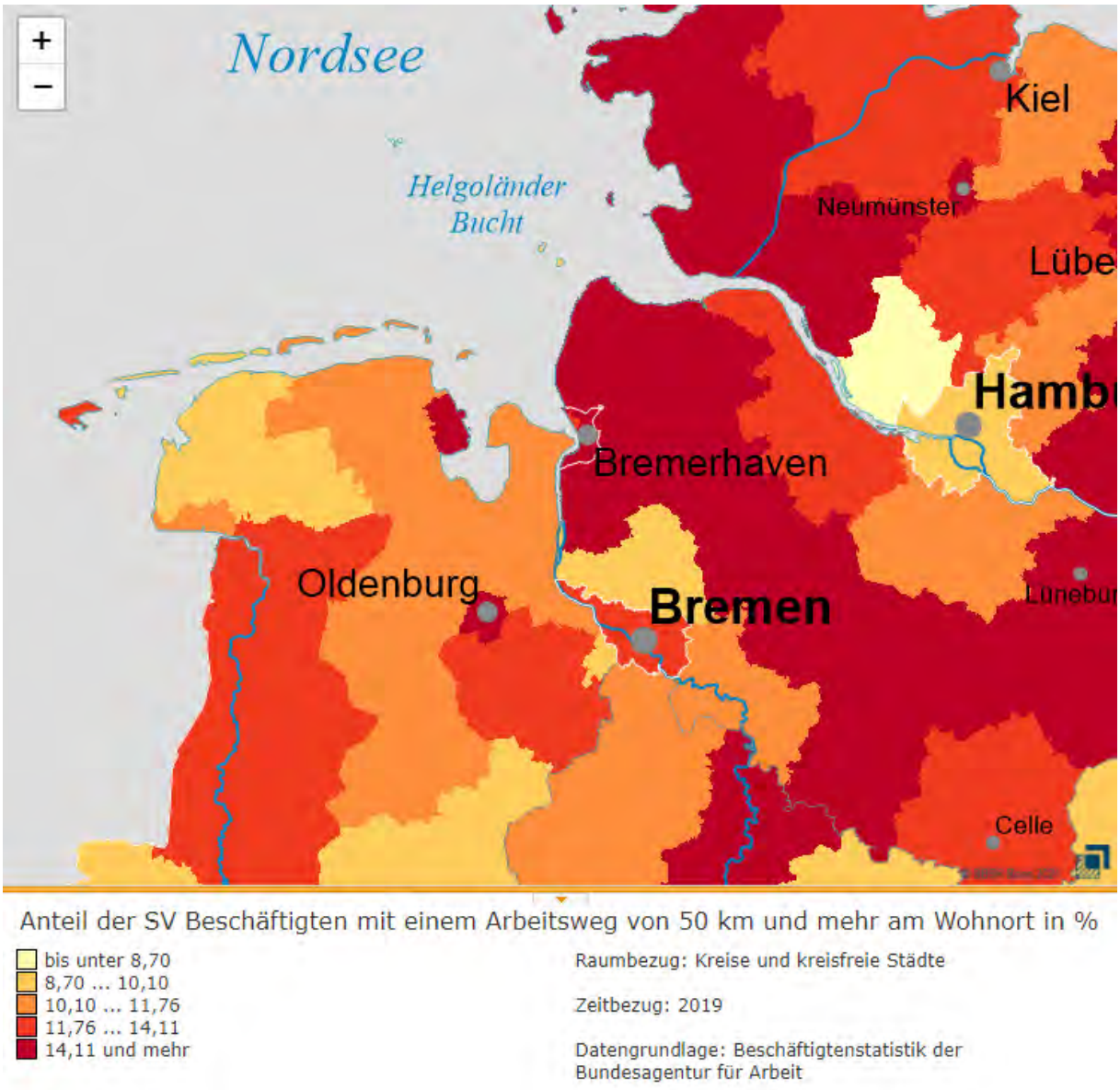

Median income of employees working subject to social security contributions in Euro

Source: INKAR



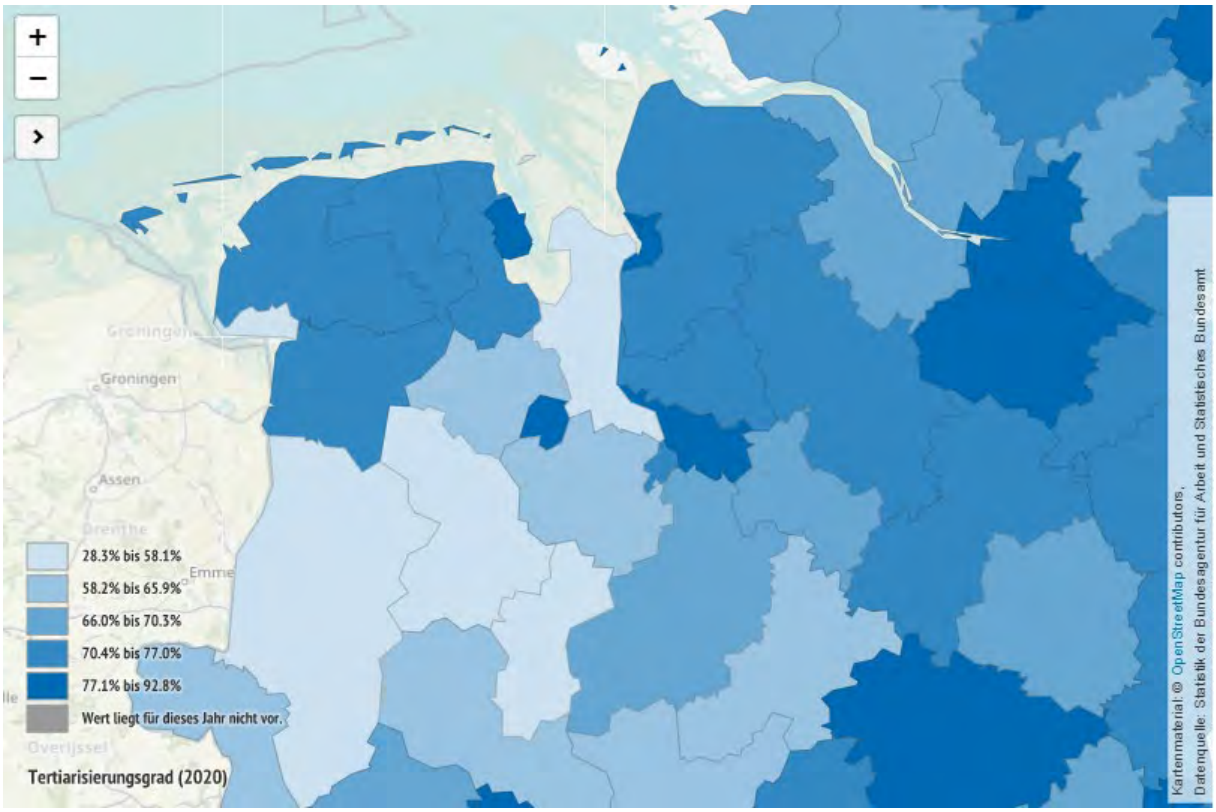

Net commuters per 100 employees working subject social security contributions (measured at workplace)

Source: INKAR

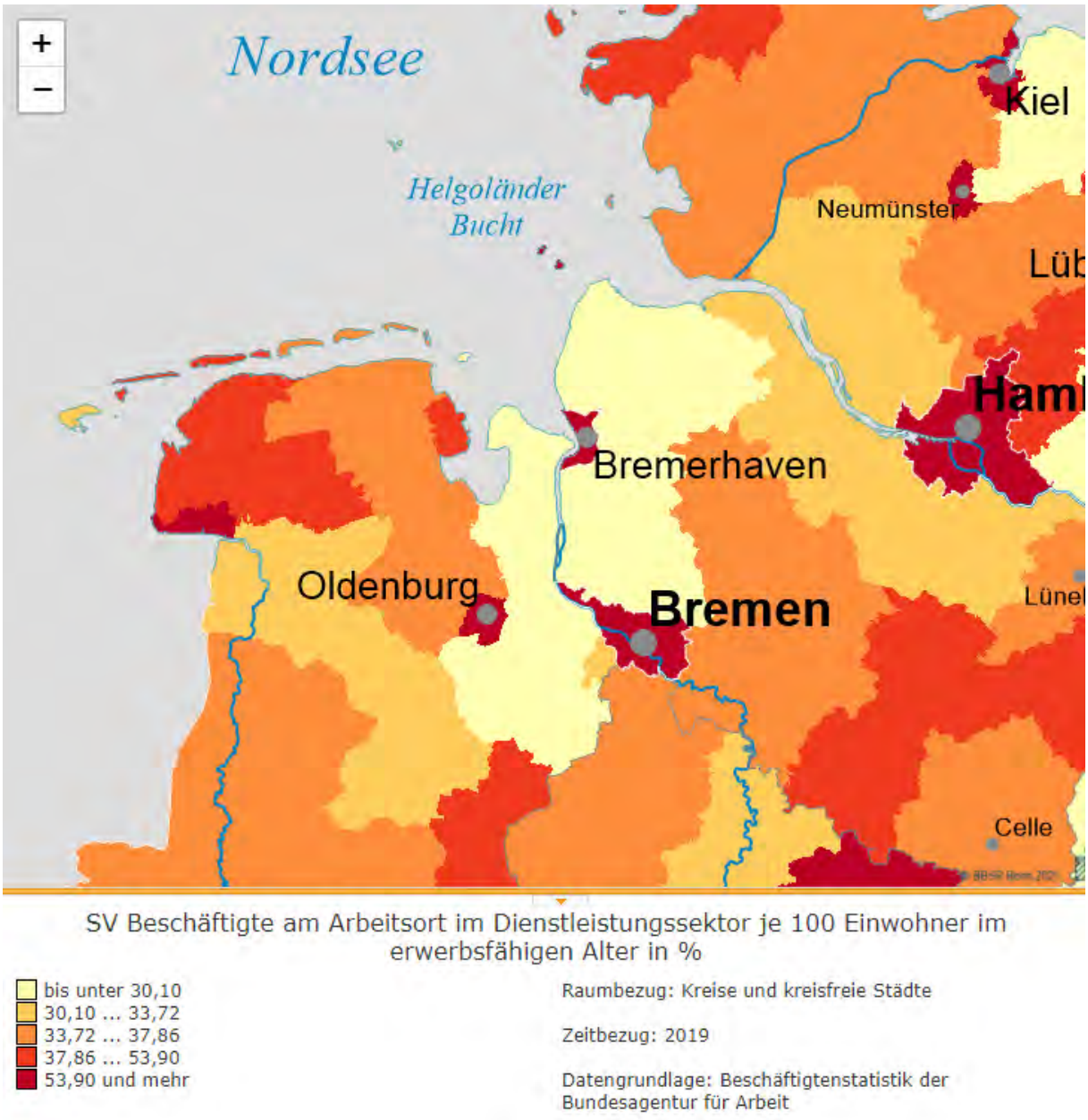



Proportion of employees working subject to social security contributions with commuting distance above >50km (measured at place of residence)

Source: INKAR

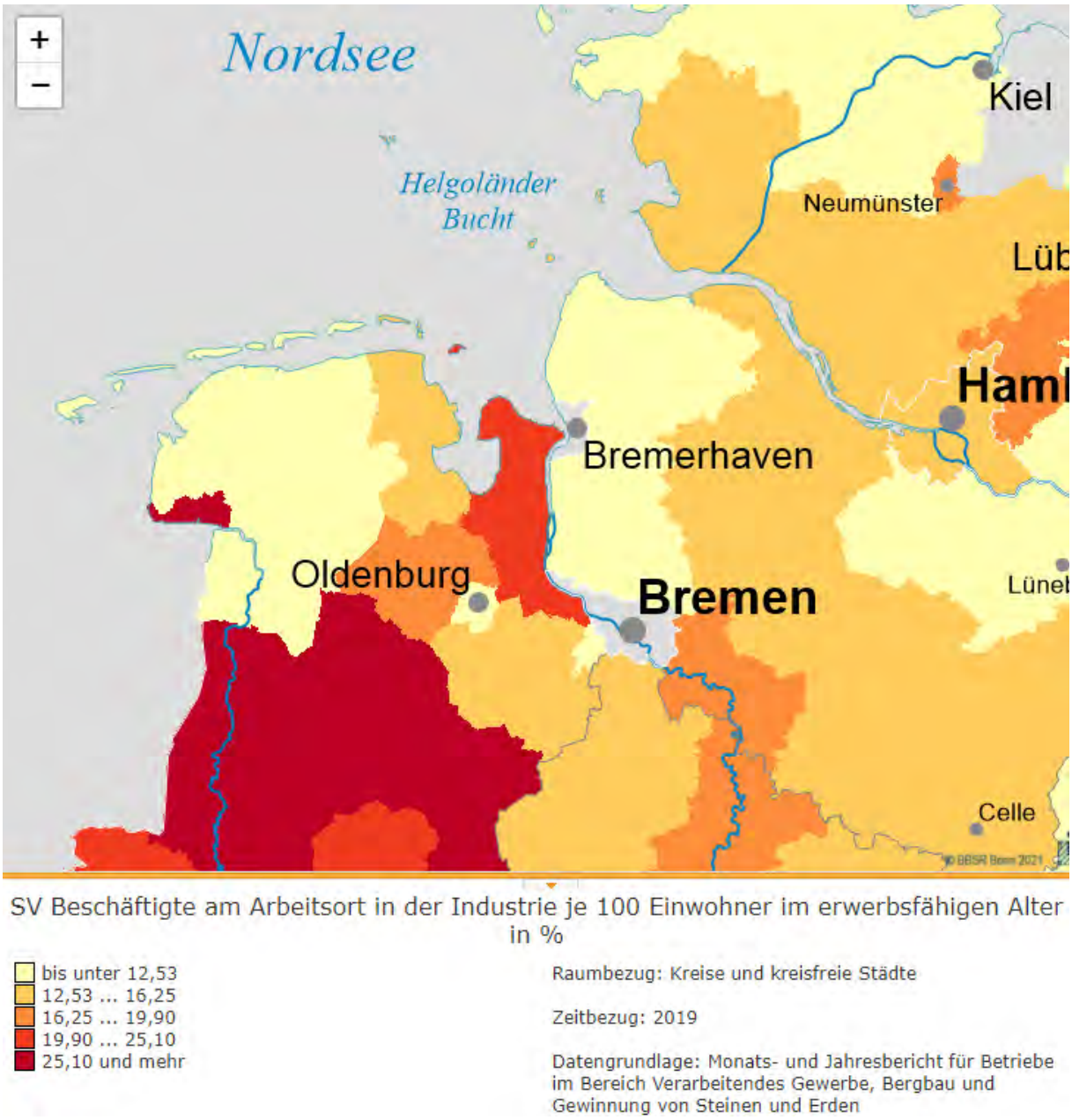



Proportion of the service sector (2020)
Source: Arbeitsmarktmonitor der BA



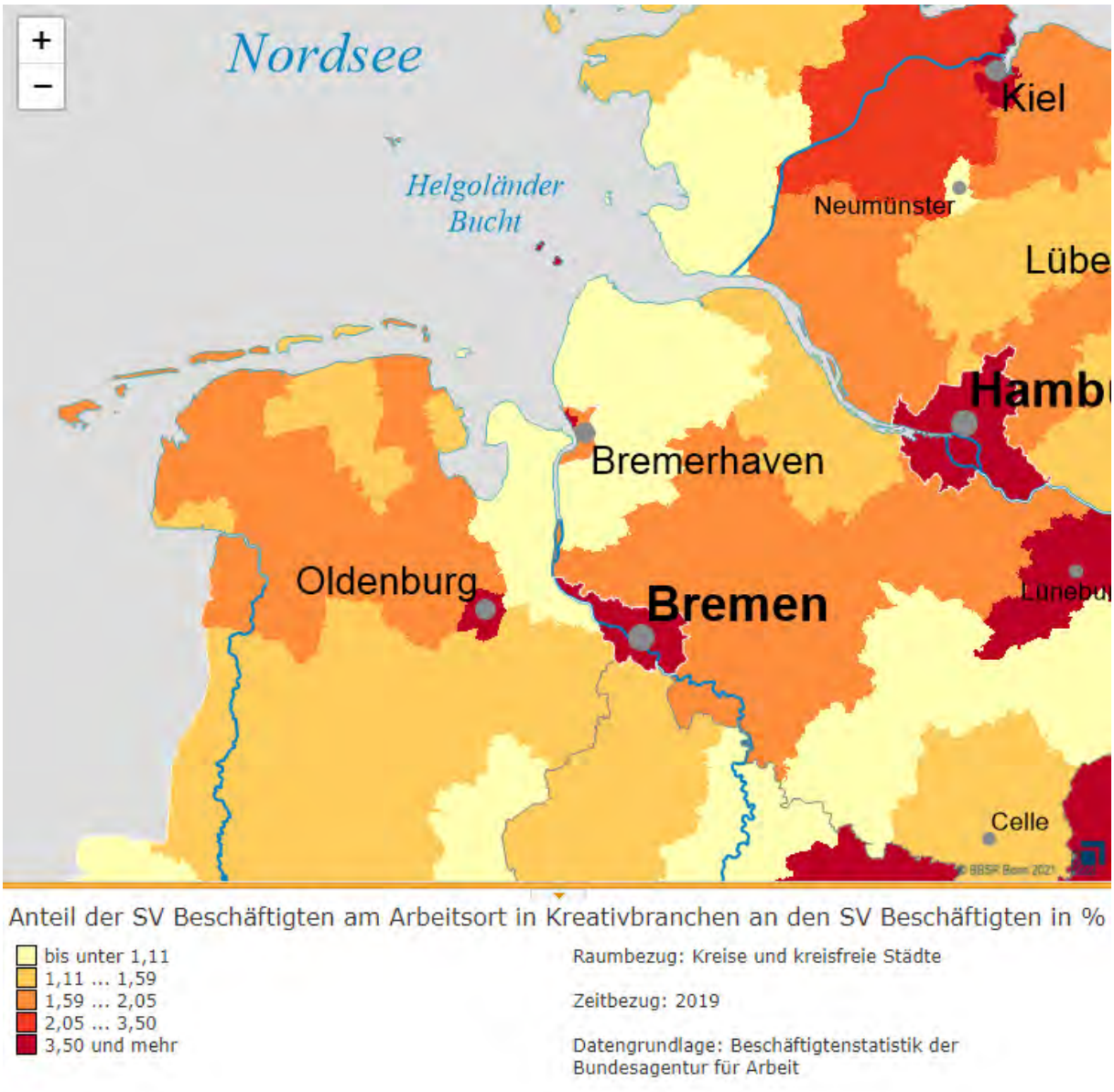

Proportion of employees working subject to social security contributions in the service sector

Source. INKAR



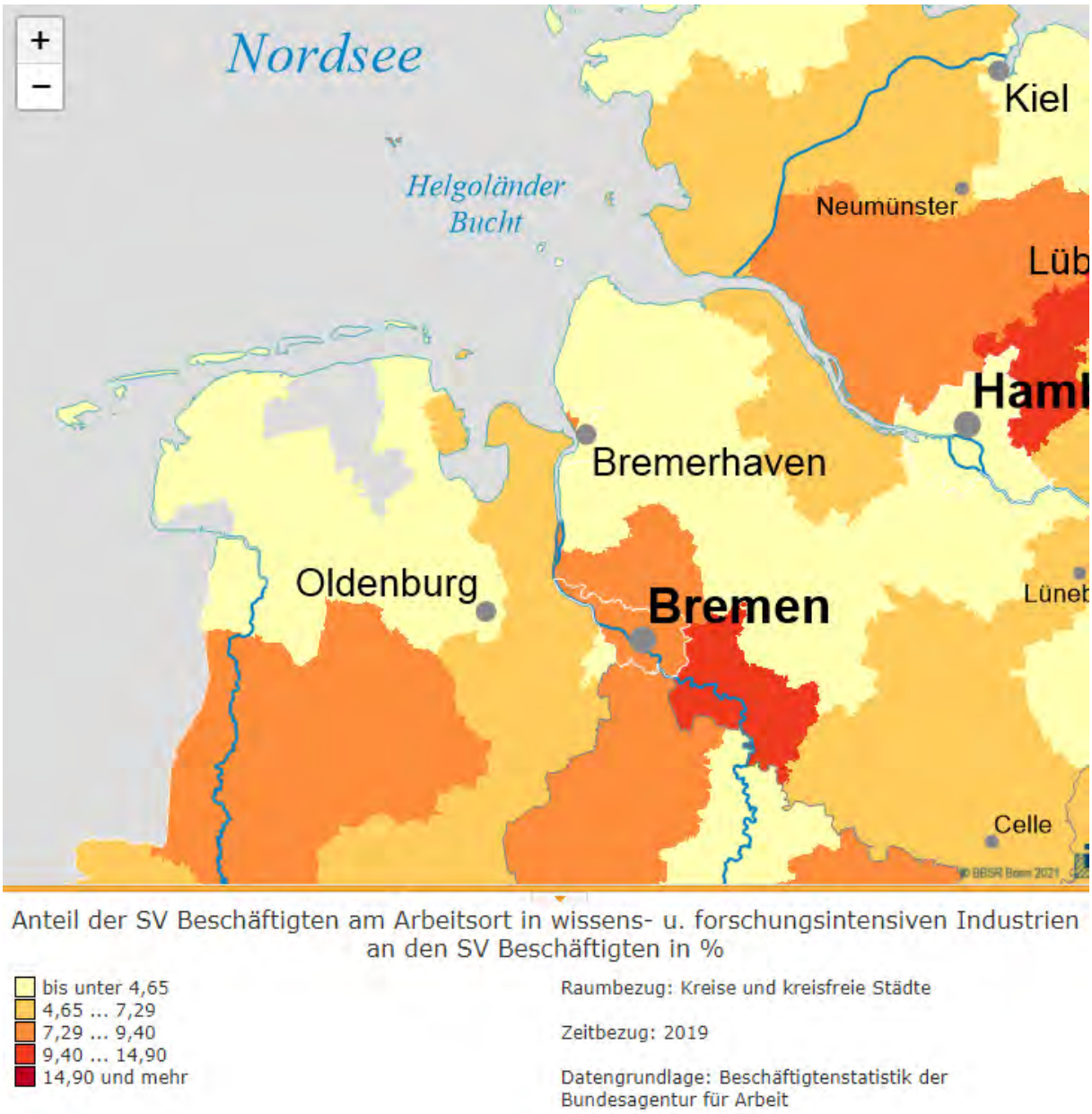

Proportion of employees working subject to social security contributions in the industry

Source. INKAR



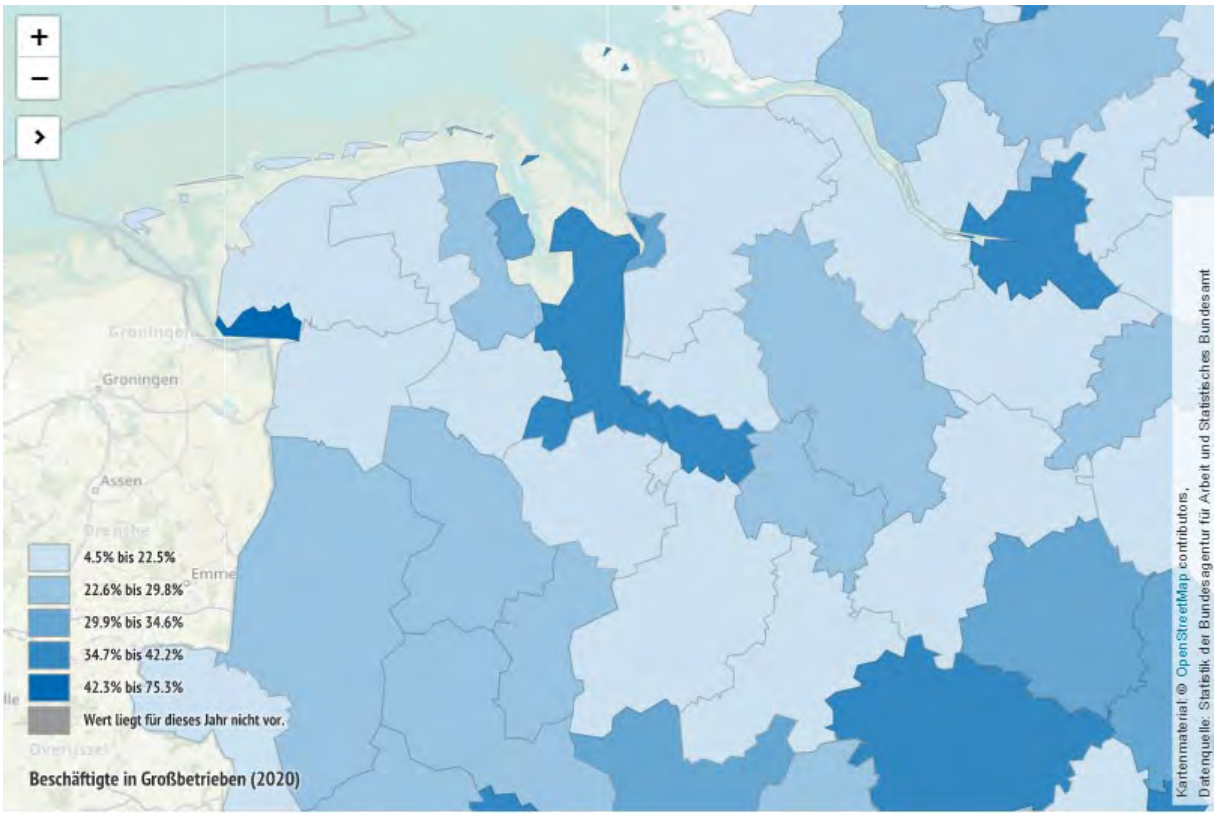

Proportion of employees working subject to social security contributions in creative industries

Source. INKAR

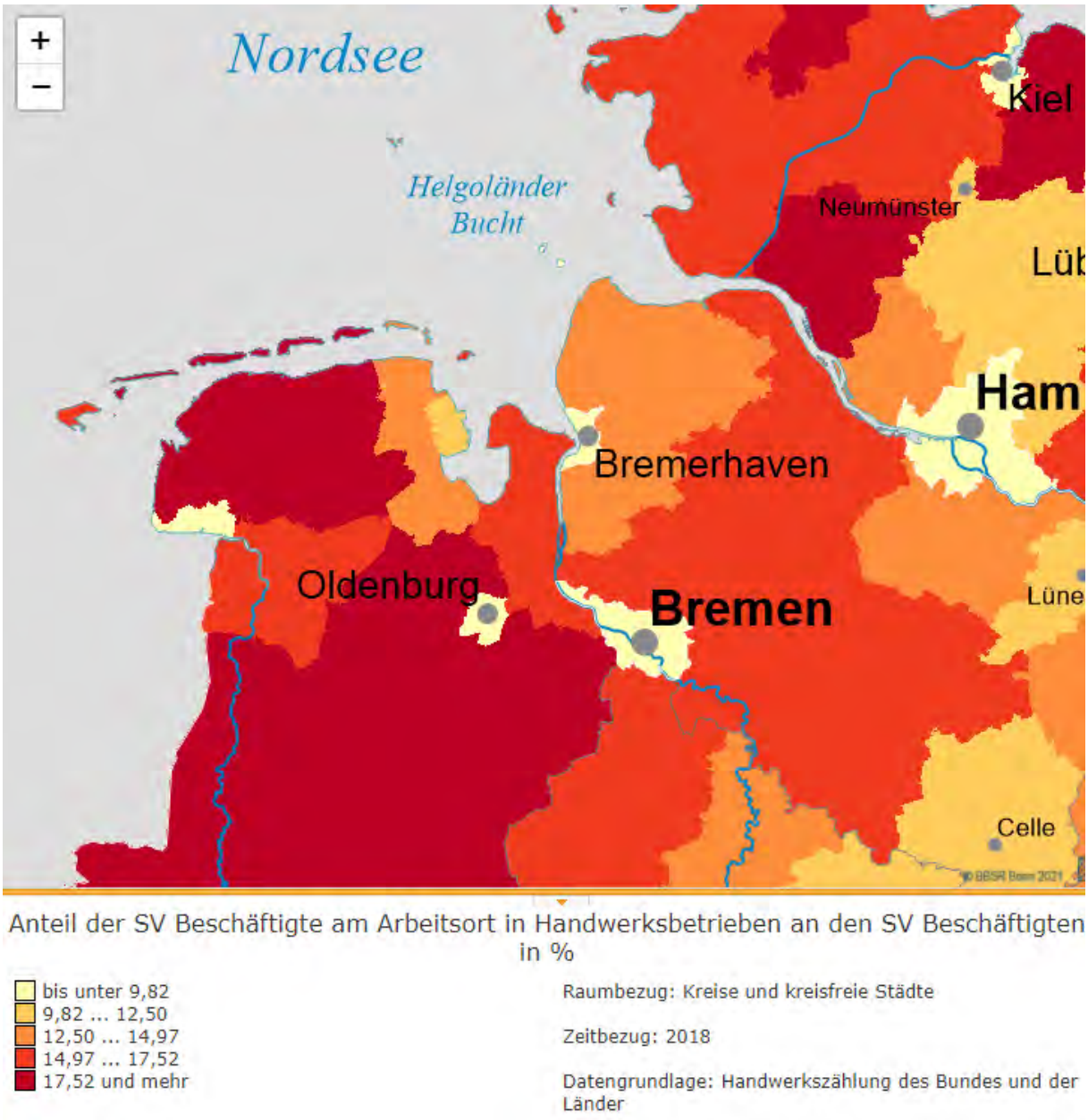



Proportion of employees working subject to social security contributions in knowledge-intensive industries

Source. INKAR

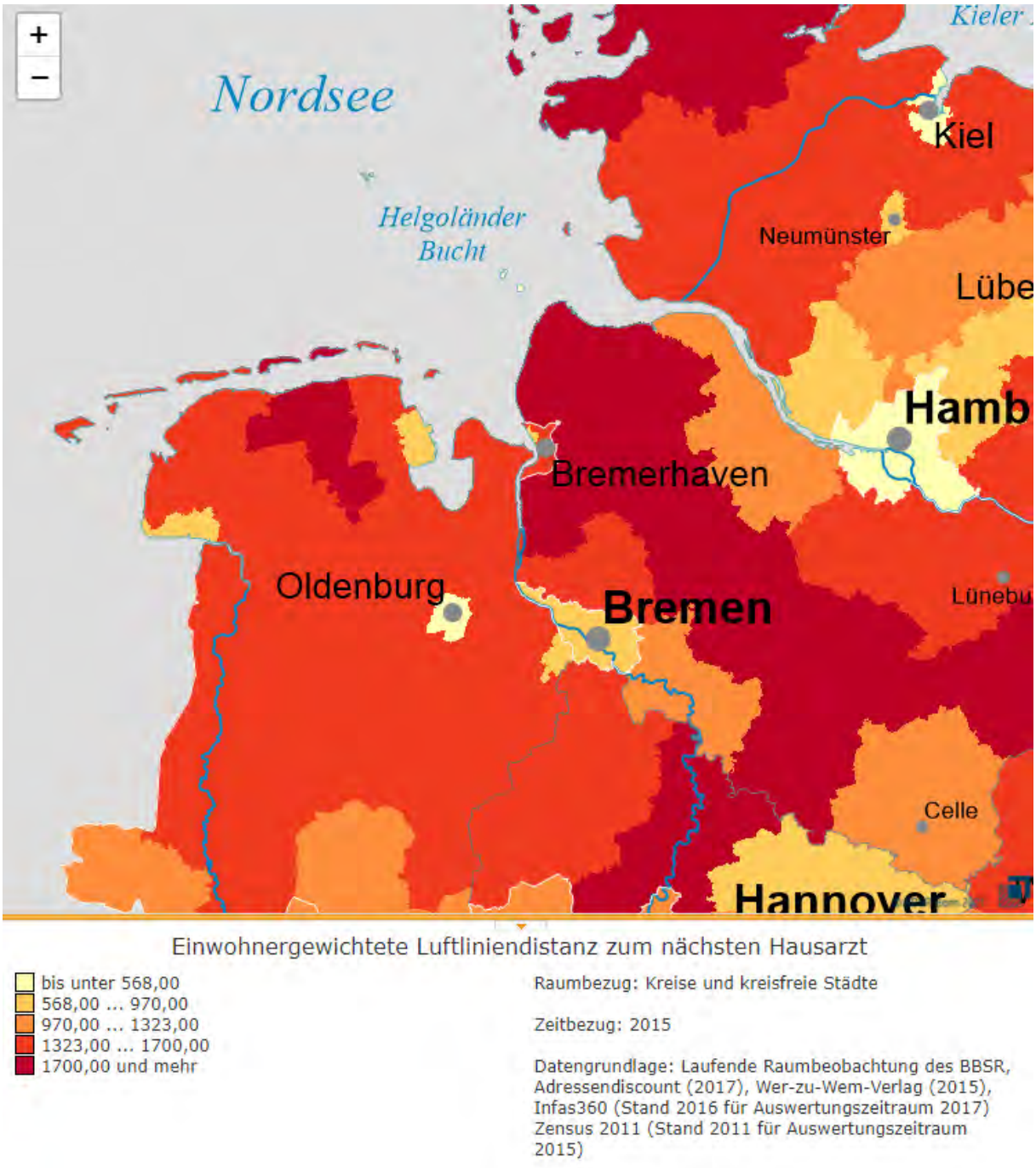



Proportion of employees in large scaled firms (2020)
Source: Arbeitsmarktmonitor der BA

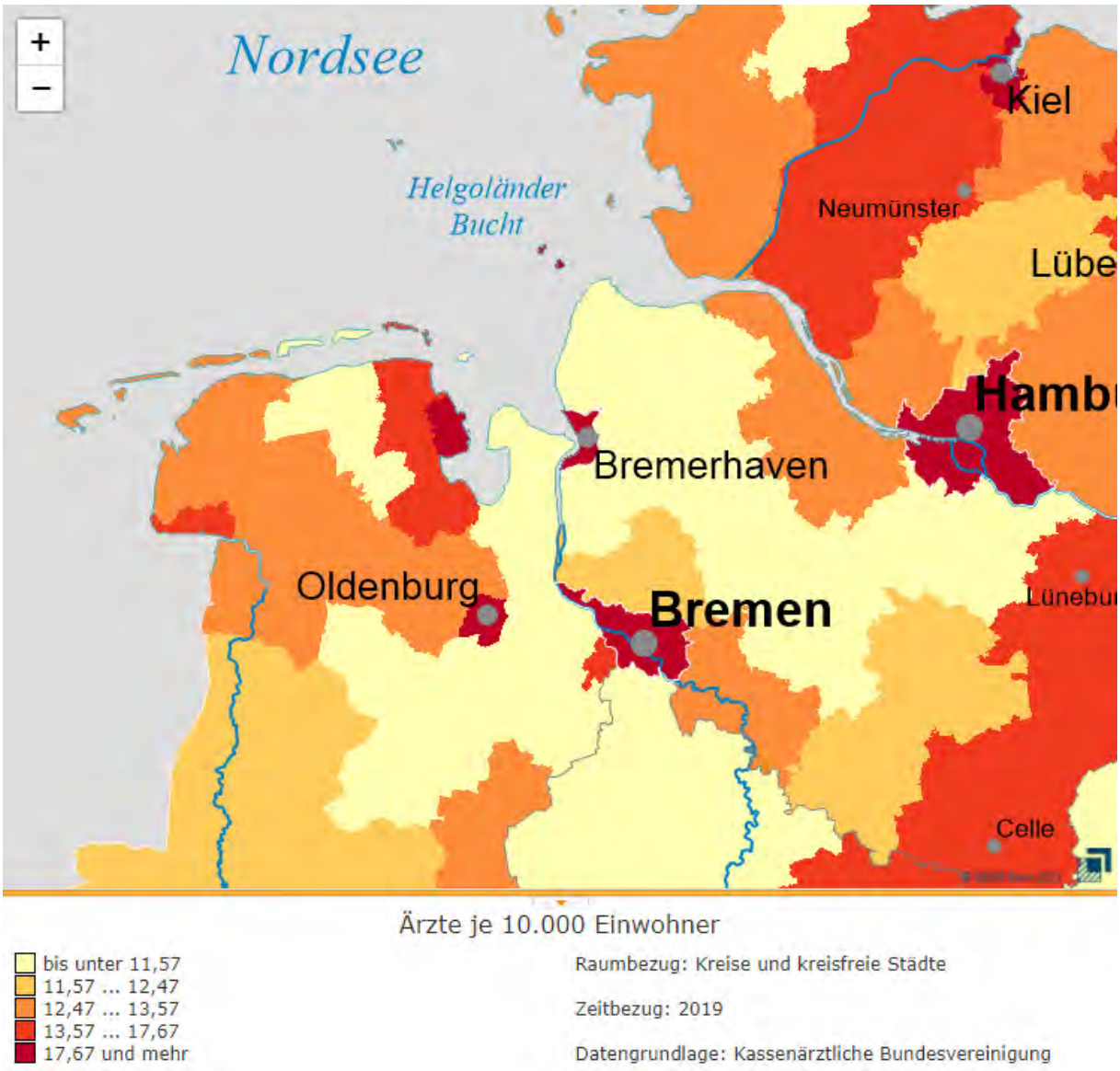



Proportion of employees working subject to social security contributions in crafts occupations

Source: INKAR

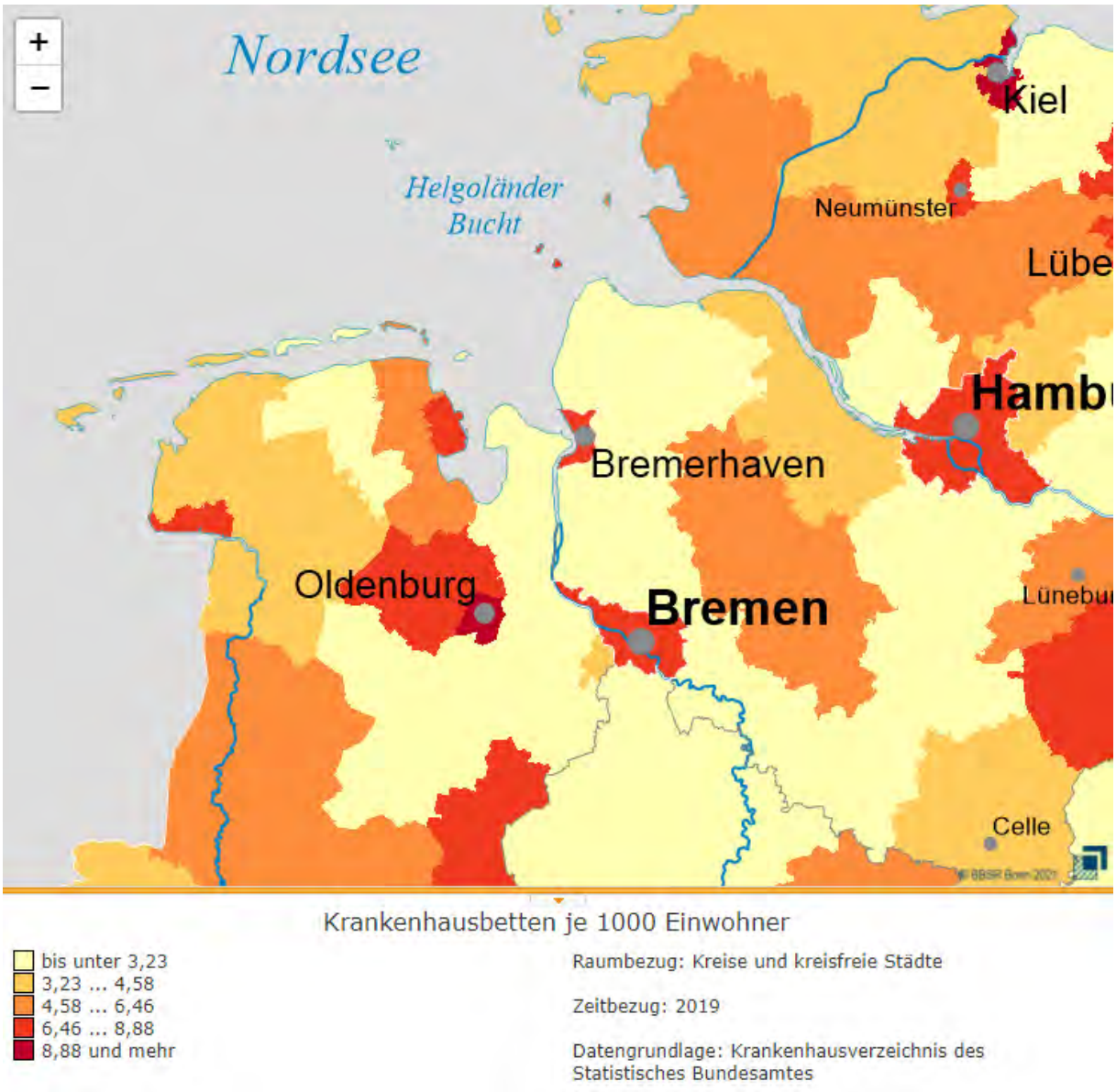



Population weighted distance to closest medical doctor (2015)
Source: INKAR



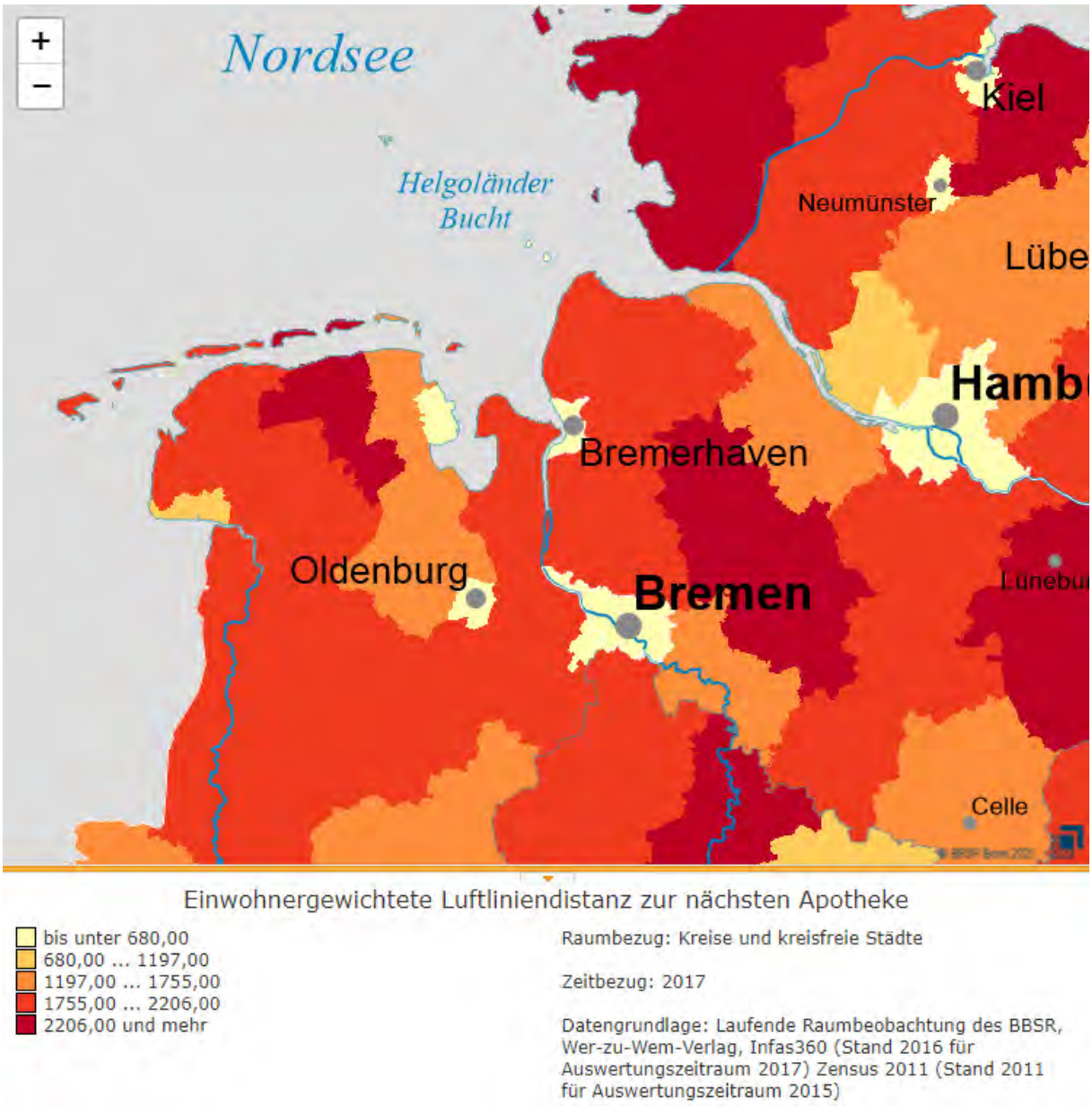

Number of medical doctors per 10.000 residents

Source: INKAR

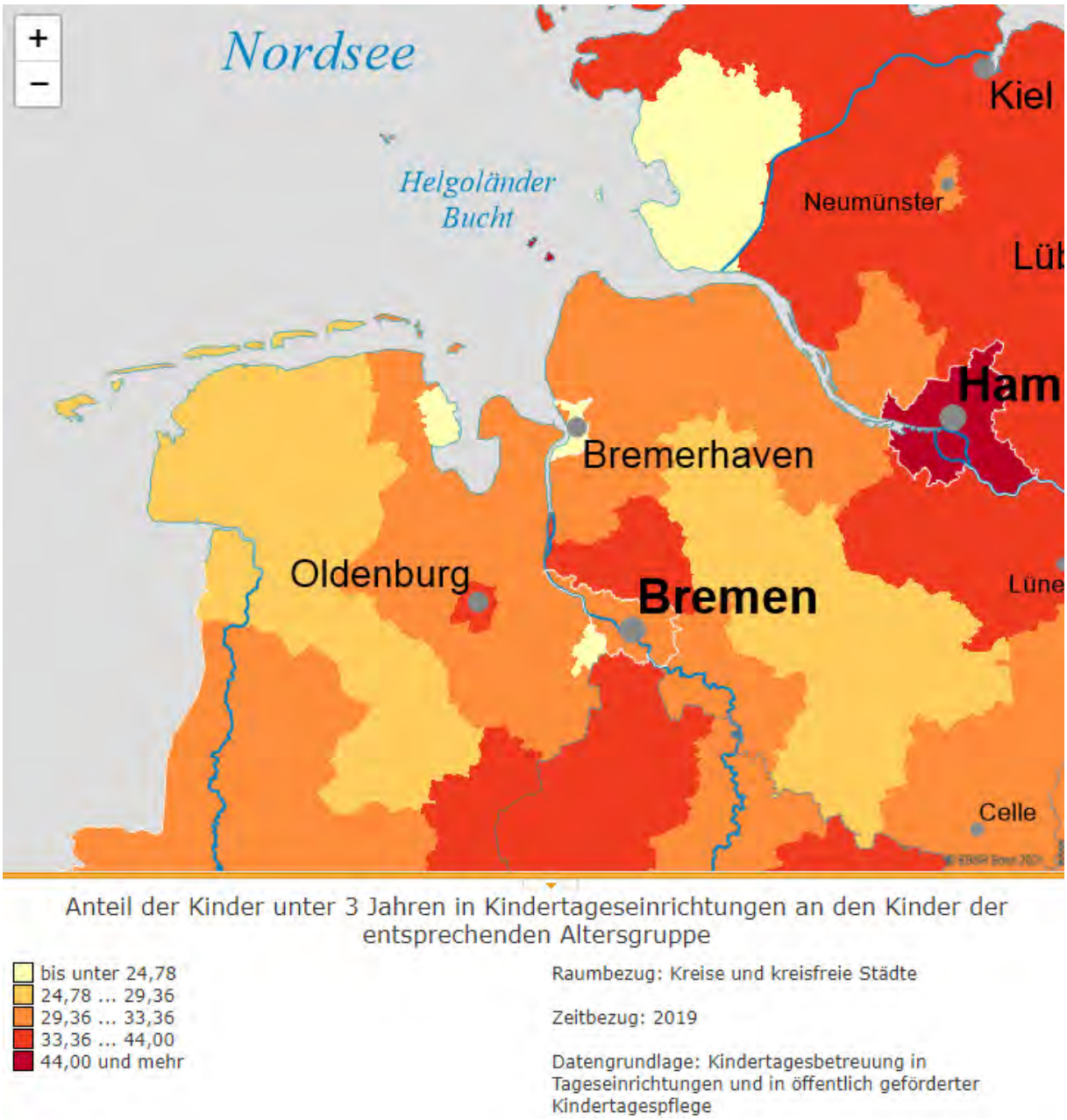



Number of hospital beds per 1000 residents

Source: INKAR




Population weighted distance to closest pharmacy (2015)
Source: INKAR




Proportion of children in kindergarten relative to all children of age <3 years
Source: INKAR