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**DEMOGRAPHIC CHANGE
IN GERMANY AND REVERSAL
OF SPATIAL AGEING
PATTERNS¹**

The paper presents the result of a spatial analysis considering the effect of demographic ageing and ageing-in-place processes in Germany according to spatially differentiated ageing patterns among urban, sub-urban and rural counties up to 2025. As to the latest official population forecast counties of urban core regions will undergo a slower ageing process than other types of counties, resulting in a reversal of ageing patterns. Urban core areas in this analysis will gain demographically from their net migration surplus while suburban housing locations of the past will be no longer able to attract enough young migrants to compensate for their now rapidly ageing baby boomer generation. The process presented is typical for the fate of (suburban) housing areas with homogenous populations under conditions of ageing and shrinking if spatial mobility in ageing population groups is declining.

Key words: Demographic Change, Population Ageing, Population Shrinking, Ageing in Place, Spatial Patterns of Population Change, Re-urbanisation, Germany.

Introduction

Germany is currently on the way to becoming a society with an ageing and declining population. This is due to the fact that the country has had extremely low fertility for more than 30 years. With an ageing population, and their preference for ageing in place, the strong impact of internal migration on the spatial differentiation of population structures is declining, and international migration gains in the urban cores will become more influential in the future. Thus, city core regions may gain in demographic terms from young migrants, while suburban areas may no longer be able to compensate for their rapid ageing by a continuous stream of resettling families, and rural areas may face increasing migration losses besides their rapid ageing. The article analyses the spatial differentiation of ageing patterns based on the latest official forecast for counties up to 2025 and presents a first sketch of a reversal in the aging process of urban cores, suburban and rural counties.

The common understanding that urban cores are demographically older than their surrounding regions has to be reconsidered in the light of the insight on ageing-in-place effects of ageing populations and of the reversal of

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ageing patterns which are shown in this paper. Beside this a statistical proof of a new steady trend of re-urbanisation measured in terms of population growth by migration gains is not (yet) possible [cf 3, 4]. Even if populations in city cores have grown slightly in recent years as a result of internal migration, suburbanisation is still the dominant trend. However, if positive internal migration balances of city cores and reduced suburbanisation prevail, the reversal in the ageing process will gain additional momentum.

Current Demographic Change in Germany

Since the onset of the second demographic transition in the 1960s, Germany has belonged to a group of industrialized countries with extremely low fertility (for literature on demographic change in Germany see [7]). In 2006, the Total Fertility Rate (TFR) of the unified country was as low as 1.34. Compared to the Eastern European countries in transition with even lower fertility rates in recent years, the TFR in Western Germany has now been continually below a threshold of 1.5 for more than three decades. The TFR in Eastern Germany was down to an all time lowest low of 0.77 in 1994, and is currently still slightly below the fertility level of the western part of the country.

As a result of this extended process of fertility decline, the balance between births and deaths in Germany has been negative since 1972; the number of deaths in 2006 exceeded the number of births by approximately 150,000. According to the official population forecasts [8, 9], the gap between births and deaths of Germany's ageing population will grow to roughly 600,000 per year in 2050. On the other hand, the net migration balance was about 7.6 million between 1972 and 2006, or an average of 210,000 per year, and thus initially compensated for the negative rate of natural growth. However, the net migration balance has melted down in recent years to reach only 22,000 in 2006. The population of Germany has been shrinking in absolute numbers since 2003; the decrease reached already a level of 126,000 in 2006.

It is projected that the population of Germany will shrink by 13.5 million between 2006 and 2050, assuming an average annual net immigration of 100,000 for this period. The extended period of low fertility induced a process of considerable demographic ageing, further fostered by continually increasing life expectancy. According to the official medium variant forecast, the dependency ratio per 100 persons between 20 and 64 years will decline for those younger than 20 from 33 in 2005 to 29 in 2050, but for those aged 65 and older it will double from 32 in 2005 to 64 in 2050 [2; 8; 9].

The ongoing demographic change in Germany described so far tends to increase spatial disparities among regions, challenge economic growth, social wellbeing and societal cohesion, and thus impose the need to adapt economic and social security systems, as well as other societal institutions and spatial and urban planning in line with the changing demographic conditions.

Increasing Spatial Disparities

If one takes a closer look, the impacts of demographic change will differ considerably among German regions [5]. The internal and international migration balances are particularly prone to spatial differentiations. Internal migration shows a general east-west divide with losses in most eastern counties, except for the hinterland of Berlin and some of the large cities with immigration as a result of regained urban functions and of urban revitalisation efforts (Fig. 1 A). The cluster of internal migration losses stretches far into the western part of the country, counties with internal migration losses are located in rural and peripheral regions, and several large and medium-sized cities are also affected due to the ongoing suburbanisation process. Internal migration gains are concentrated in suburban and to a lesser degree in rural regions in the western part of the country and in cities with strong economies and labour markets or with large universities.

The international migration balance pattern shows a less distinct east-west divide than internal migration (Fig. 1 B). The spatial patterns do not show a pronounced differentiation according to the level of urbanisation. A large number of counties are currently recording losses on their international migration balance. In contrast to internal migration, where city-core counties are below average, international migration still prefers the cores of agglomerations and urbanized regions as destinations, in part due to chain migration processes.

The result of the internal and international migration balance is shown in Figure 1 C and contrasted with the natural balance of births and deaths in Figure 1 D. The natural balance is negative in most counties; exceptions are some young suburban regions in the south and some rural regions which still have an exceptionally high level of fertility.

The resulting ageing of the population is depicted in Figures 2 A and B according to the forecasts of the Federal Office for Building and Regional Planning up to 2025. The dependency ratio of the 65-plus population will increase especially in the East and to a lesser extent in the peripheral and old industrialized regions of the West, corresponding with the patterns of migration and natural balance presented in Figure 1. Coincidentally, the ageing-related disparities are growing; the variation coefficient of the dependency ratio was 0.119 in 2005, and will increase up to 0.224 in 2025. The maps show that a relatively high dependency ratio — beside large parts of the eastern federal States — in 2005 is localized in several western counties, especially in agglomerated and urbanized city cores. The dependency ratio has increased considerably in all counties in 2025, and the distribution of counties with the highest dependency ratio is almost completely concentrated in the eastern federal States.

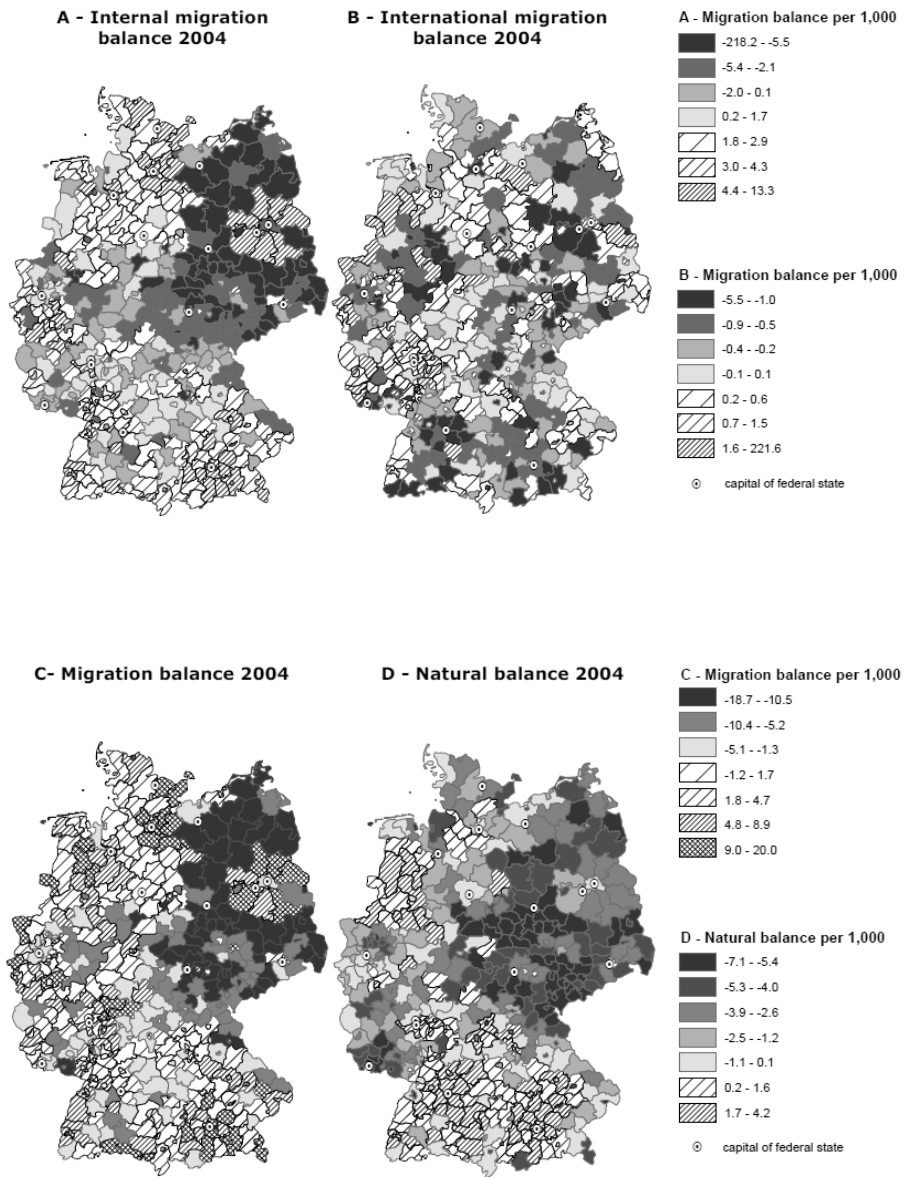


Fig. 1. Components of demographic change by county 2004 (natural and migration balances per 1,000 population, percentile classification)

Source: Federal Office for Building and Regional Planning.

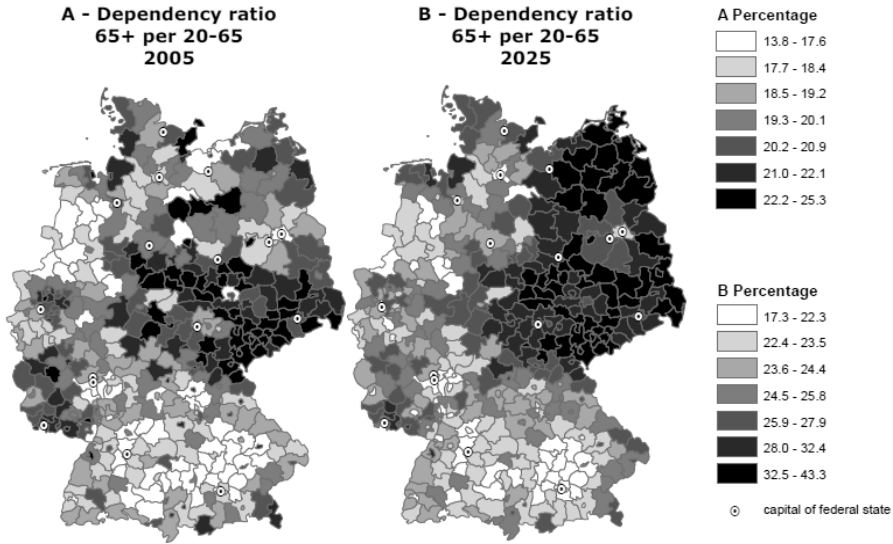


Fig. 2: Increasing disparities in ageing patterns by county 2005—2025 (dependency ratio of 65+ per 20—65 in percentage, percentile classification)

Source: Federal Office for Building and Regional Planning.

Reversal in Ageing Patterns

With a population that is prone to ageing and shrinking, the demographic change of a region depends mainly on the age structure in situ and on the effect of age- and sex-selective migration. The spatial forecasts [1] used for the analysis in this paper anticipate that a continually ageing population will trigger an inherent decline in the level of interregional migration. Currently with general east-to-west and north-to-south patterns, and a well-documented long during history of migration losses of eastern Germany before and after unification [5], as well as intraregional migration within the large agglomerations and urbanized regions and with their rural hinterland. This assumption applied to the population forecast of the Federal Office for Building and Regional Planning reflects the low spatial mobility of the age cohorts as they age, and the shrinking number of the mobile younger age groups. The forecast models international migration and internal migration independently. For international migration, the assumptions are based more on the long-term mean of the migration balance than on figures of recent years. The forecast assumes a net migration gain of about 190,000 people per annum, which is close to the high variant of the forecast of the Federal Statistical Office. Considering internal migration, largely unchanged age-specific mobility rates are applied. Due to the aging of the population, this leads to a decline in total mobility from approximately 2.7 million in 2000 to approximately 2.4 million movers in 2025 crossing a county boundary.

Ageing-in-place processes will thus become most important in demographic terms for those counties with a small number of international migrants and a negative migration balance of the shrinking younger age groups.



Most affected are suburban areas in the western and remote rural areas in the eastern part of the country. On the other hand, there are the city core counties of agglomerations and urbanized areas. They can be expected to benefit in demographic terms from the continuing settlement of young international migrants beside the positive internal migration balance among the smaller young cohorts (Fig. 3). The city cores are currently older in demographic terms than the suburban regions, to which they lose large numbers of inhabitants when they reach the state of family formation in their life cycle. The ageing of the city cores will be reduced in future by an ongoing net migration surplus of young migrants, both internal and international, which will gain importance compared to the internal migration losses of the other age groups. The level of internal migration declined considerably between 1999 and 2004. This general trend is contrasted by a reversal of internal migration patterns of the city core counties. Their migration balance was negative in 1999; it was slightly positive in 2004. The level of the migration balance of the different suburban settlement categories changed for the worse between 1999 and 2004. Some suburban settlement categories reduced their migration surplus; others increased their negative migration balance. The international migration balance was lower on average in 2004 than in 1999, but it is currently not evident whether this trend will persist in the future and have to be reflected in future forecasts. In this case, the ageing-in-place effect will be even more pronounced than is inherent in the data of the forecast available for this paper.

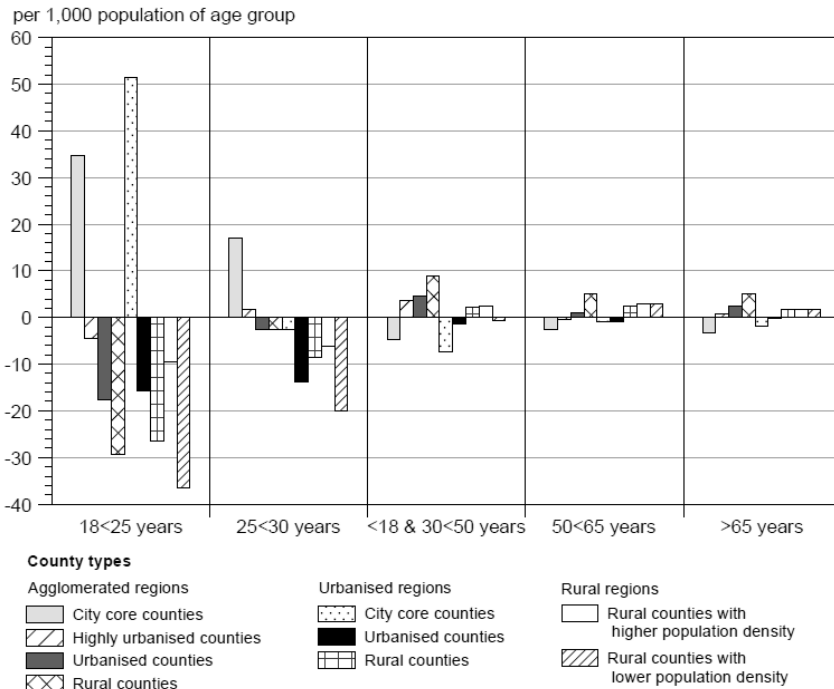


Fig. 3. Migration balance by settlement structure 1999 and 2004 (net migration balance per 1,000 population)

Source: Federal Office for Building and Regional Planning, Federal Institute for Population Research.

Figure 4 shows the change in the population (A), the number of people 65 plus (B) and the dependency ratio between 65 plus and working-age population (C) between 2005 and 2025. The development of the population size of counties up to 2025 shows a similar spatial pattern as the internal migration balance in Figure 1 A. Internal migration is, beside the effect of ageing in place based on the current age structure reflecting previous migration, an important moderator of the spatial differentiation of demographic change because of the only slight spatial differences in fertility and mortality patterns. The greatest losses are concentrated in the eastern part of the country, with the exception of Berlin and its hinterland, and a corridor stretching through the central part of the western federal States to the Ruhr region. But most counties will ultimately experience at least small reductions in population size in 2025. A slightly positive population development will only take place in the few counties of the agglomerations of the Rhine-Main area and the southern federal States. Complementary to the development of population size is the development of the 65 plus population. This is mostly due to the fact that those counties with the most positive population development until 2025 are currently younger than average, but large cohorts will grow into the 65 plus category until 2025. Among areas with the lowest increase in the 65 plus population are many city-core counties, with an above average median age today. The spatial pattern of the old age dependency ratio shows a clear east-west divide. That the dependency ratio of the western part of the country is better than the average for almost all counties is a result of the compensating effect of migration on ageing. Clearly distinguishable are furthermore the city-core counties in Figure 4 C, with the lowest increase in dependency ratio until 2025, surrounded by a suburban hinterland with a faster ageing population.

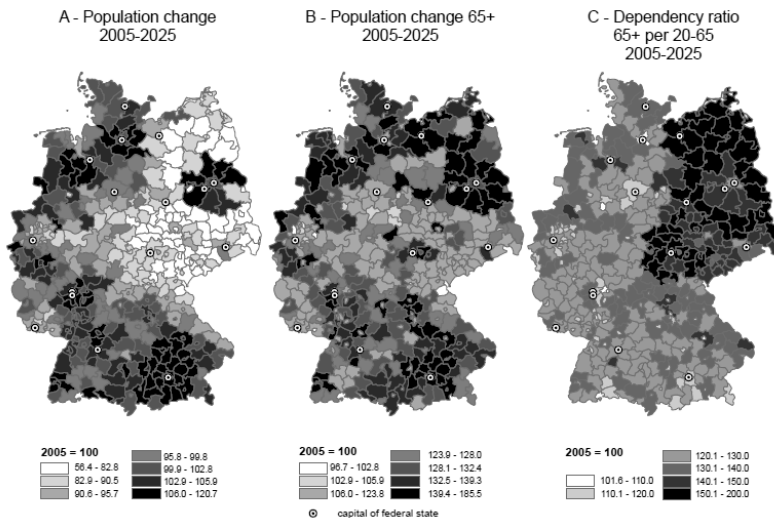


Fig. 4: Reversal of shrinking and ageing patterns 2005—2025 (population change, change of population 65+, change of dependency ratio of 65+ per 100 20—65, 2005 = 100)

Source: Federal Office for Building and Regional Planning.

Table 1 analyses demographic change between 1990 and 2025 by county type according to the settlement structure of the Federal Office for Building and Regional Planning. According to this differentiation, the city core counties of agglomerated and urbanized regions will face the most severe population decrease of all types of counties by settlement structures. They will lose roughly 1 million people between 1990 and 2025, while suburban settlement types will show population growth of more than 2.5 million in this period. The period investigated here is thus one of a continuing suburbanisation process, with exceptionally high rates of suburbanisation in the 1990s. The latest change in internal migration rates presented in Fig. 3 does not affect this overall balance for 1990 to 2025 because the forecast assumes for the long run a moderate continuation of the suburbanisation patterns of the past and reflects the decline of potential movers already mentioned. The population development of the most rural counties of categories 8 and 9 is also negative by more than 500,000. As mentioned before, the city cores of agglomerations and urban areas had the highest old age dependency ratio in 1990, but the increase until 2025 is below the average of all categories, and finally the old age dependency ratio of category 1 (city-core counties in agglomerated regions) is the lowest of all categories, that of category 5 (city-core counties in urbanized regions) being the third lowest. Figures 5 shows the impact of different age groups contributing to the described process. For the city-core counties, the relative change in the increase in the 65 plus population, and the loss of young population, are both below average.

A forecast by Spangenberg and Kawka based on the municipality instead of the county level allows a better spatial resolution of analysis and shows additional details [6]. For the differentiation on the municipality level a combination of structural types (urban, between urban and rural, rural) and centrality of location (strongly peripheral, peripheral, central, strongly central) is applied to classify 4,698 municipalities into 10 categories. From 2005 to 2025 a population decline of 1% applies to urban municipalities, 1.8% to mixed urban and rural municipalities and 4.6% to rural municipalities. The gradient of population change is even more pronounced if one looks only at the centrality of a location. The strongly central municipalities will grow by 0.6% between 2005 and 2025 according to the forecast. With increasing distance from the strongly central locations, the population decline increases. In centrally located municipalities the population will decline by 0.5%, in peripheral municipalities by 8.5% and in strongly peripheral municipalities by 16.2%.

Table 1

Indicators of ageing and population growth/shrinking by settlement structure 1990—2025

Indicator	County types according to settlement structure								
	Agglomerated regions			Urbanized regions			Rural regions		
	1. City-core counties	2. Highly urbanised counties	3. Urbanised counties	4. Rural counties	5. City-core counties	6. Urbanised counties	7. Rural counties	8. Rural counties with higher population density	9. Rural counties with lower population density
Population change 1990—2025 in 1,000	-485,741	1,143,458	468,529	423,707	-528,031	575,806	-74,859	82,579	-604,614
Population change 1990—2025 in % (1990 = 100)	-2.45	9.29	7.30	13.44	-10.68	3.91	-0.95	1.32	-14.21
Arithmetic population growth rate per annum 1990—2025 in %	-0.070	0.265	0.209	0.384	-0.305	0.112	-0.027	0.038	-0.406
Dependency ratio 65 + 1990 (65 + per 100 20—65)	24.56	21.50	23.69	21.80	23.99	23.68	24.08	24.69	22.73
Dependency ratio 65 + 2025 (65 + per 100 20—65)	35.87	40.09	43.14	45.39	41.19	42.63	45.93	44.28	51.80
Change of dependency ratio 1990—2025	11.31	18.59	19.46	23.59	17.19	18.95	21.86	19.59	29.07

Source: Federal Office for Building and Regional Planning.

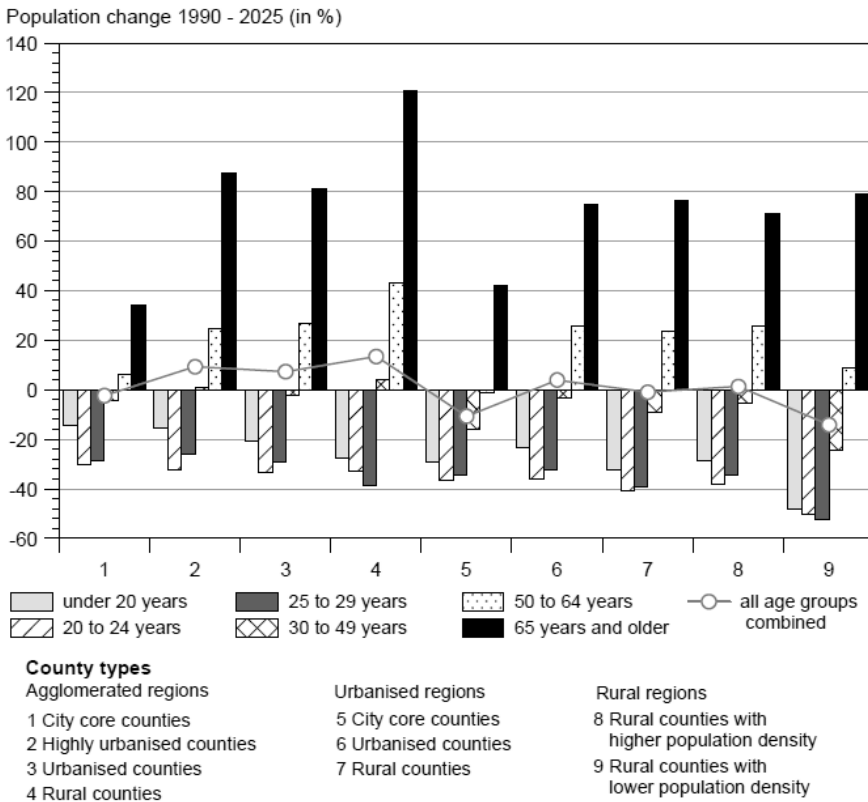


Fig. 5. Population change by settlement structure and age groups 1990—2025 (1990 = 100)

Source: Federal Office for Building and Regional Planning.

Reconsidering Urban Population Processes

The processes shown above imply special and completely unprecedented problems for spatial planning and urban revitalization in Germany, and a major concern of this paper is to discuss the projected future demographic trends among the large agglomerations in Germany where — because of different net migration rates — a reversal in ageing is likely to take place between the aged urban cores, the still younger suburban periphery, and the remote rural areas with considerable shrinking besides rapid demographic ageing. The conclusion drawn from the empirical evidence presented in this paper is that, as the impact of international migration patterns on the spatial distribution of ageing processes increases, urban cores are likely to catch up with the suburban areas in terms of ageing. Both future internal migration, and ageing-in-place processes, tend to favour the city core areas, and will contribute most to ageing in suburban areas in the western part and remote rural areas in the eastern part of Germany. For the suburban areas in the

West, still younger than the urban cores today, ageing will become a prominent issue for spatial planning and urban revitalisation in the future because ageing will affect the demographically homogenous housing areas of the suburbanisation periods of the 1960s to the 1980s within the next decades. Nevertheless, statistical proof of a steady new trend of re-urbanisation measured in terms of population growth by migration gains cannot yet be provided.

To conclude, the common understanding that urban cores are demographically older than their surrounding regions has to be reconsidered in the light of the insight on the ageing-in-place effects of ageing populations and the reversal of the ageing pattern shown in this paper. The assumption that suburbanisation will continue as the general trend has currently not to be questioned in general terms. However, if positive internal migration balances of city cores and reduced suburbanisation prevail — as has been recorded in recent years — the reversal process will gain additional momentum.

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