STAREBEI: DEMOGRAPHIC CHANGE AND LOCAL FISCAL STRESS

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Introduction

The baby-boom generation born between 1946 and 1964 has been a major ‘demographic market force’ for decades. This group has delivered the largest age cohorts, and created a surge in labour supply and in demand for goods and services as it passed through the stages of the life cycle. This demographically driven continuous increase in consumption and production resulted in a popular assumption about constant, everlasting economic growth. Now the baby-boomers are about to retire. Their withdrawal from the labour market constitutes a historic tipping point for the communities of the European Union. This is due to the fact that baby-boomers are not succeeded by any generation of a similar size. Persistent fertility rates below the replacement level coupled with an increase in life expectancy in Europe result in an unprecedented ageing and effectively also shrinking of the societies, which will potentially deeply affect future economic growth in Europe and the welfare of European citizens.

As the majority\(^1\) of Europeans live currently in urban areas, and these in turn are the engines of economic growth, the question of how the demographic change will affect the cities becomes important in the context of future socio-economic development in Europe. With this in mind this study surveys literature on selected aspects of the impact of population ageing and decline on urban areas as well as the influence that demographic change exerts on the financial position of municipalities through changes in municipal revenues and expenditures.

The study is divided into two main parts. Part one approaches the issue from the macro perspective and focuses on the expected impact of demographic change on future economic growth. It puts in focus demographically driven determinants of growth – labour utilisation and labour productivity. It addresses also the impact of the demographic change at the local level by analysing the issues around urban labour markets; demand for and provision of urban technical infrastructure; and the main trends and shifts in the demand for and pricing of urban housing in the context of a shrinking and ageing population.

Part two of the study aims to provide a comprehensive literature review on the influence that demographic change exerts on the financial position of sub-national governments through changes in their revenues and expenditures. Special attention is given to the impact of different institutional frameworks on the expected results. This section discusses also demographic indicators signalling potential negative fiscal development. It investigates possible local government reaction strategies for dealing with demographic change and its fiscal consequences. Finally, it presents a case study of the impact of demographic changes on municipal budgets in Saxony, Germany.

The study has been conducted under the auspices of the STAREBEI Programme\(^2\) of the EIB Institute\(^3\) and in co-operation with the OECD\(^4\) in order to promote sustainable development of urban areas and enhance aid effectiveness by supporting evidence-based policy making.

\(^1\) 70\% (United Nations, 2010, p.9).

\(^2\) STAREBEI is the EIB Institute’s programme for financing young researchers working on joint EIB-University projects. The STAREBEI Programme supports the joint interests of University Centres and EIB staff through the sponsorship of junior researchers interested in carrying out research projects proposed by the Bank under the joint supervision of a University tutor and an EIB tutor (http://institute.eib.org/programmes/knowledge/starebei-2/).
Summary

This literature review presents a state of knowledge on selected dimensions of the impact of population ageing and decline on urban municipalities. The summary covers the three parts of the study followed by the lists of key findings, policy relevant issues, and information about knowledge gaps and further investigation needs.

A challenge

The defining characteristic of the ongoing ageing and shrinking of the European population is that it is unprecedented. Researchers who analyse its consequences for the economy face two challenges. First, there is no hard historical evidence available and researchers need to base their work on theory-based predictions and projections. Second, the existing research methods and patterns of thinking stem from the ‘growing population times’, which might lead to ‘thinking inside the box’, an inability to see beyond the known. The same problem is faced by institutions which will have to deal with the consequences of demographic change, which again themselves have been constructed with ‘growing populations with a relatively stable age composition’ in mind.

This is the reason why the questions asked in this review often could not be answered in an unambiguous way. Additionally, demographic change affects the socio-economic system in so many ways that it is highly likely that in its predictions the academic community may fail to capture the numerous channels through which the effects of demographic change will eventually unfold.

PART I: Impact of population ageing and decline on urban areas

1. Ageing and economic growth – a macro perspective

This section of the study analyses how the ageing and shrinking of population might affect the future potential economic growth. It approaches the problem by asking how this change is likely to affect the GDP per capita. It goes by forecasting the changes in the demography-driven labour supply and demand-driven labour demand. First, it breaks down the measure of mean income into its constituent elements - utilisation and productivity of labour. It then analyses how demographic change is thought to affect those. In consequence, it focuses on the amount and quality of work that can be delivered in the context of the changes within the working-age population and the impact that ageing may have on capital intensity and multi-factor productivity.

In terms of future developments in labour utilisation, the section looks at its two demography-driven constituent elements - demographic projections regarding size and age structure of

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3 A part of the European Investment Bank Group, the EIB Institute is a catalyst for social, cultural, educational and research activities that are directed towards economic and social development in EU Member States, Candidate and Potential Candidate Countries, and EEA Countries (http://institute.eib.org/).

4 The European Investment Bank and the Organisation for Economic Co-operation and Development, based on the co-operation agreement of 26th November 2009, co-operate on challenges such as aid effectiveness, corporate governance and sustainable development (Press release – http://www.oecd.org/document/34/0,3746,en_21571361_44315115_44141602_1_1_1_1,00.html).
working-age population, and assumptions about the labour force participation rates. In terms of labour productivity, the section examines concepts and evidence relating to the impact of ageing on individual productivity, as well as to the capital accumulation process and technological innovation. Finally, the section looks at how labour markets in specific sectors are likely to be affected by the changes in product demand related to changes in population size and age-structure.

**Key findings**

- In the coming decades most European countries will face a shrinking of the working-age population accompanied by an increase in the number of elderly and a decrease in the number of children. Effectively, there will be a significant and continuous increase in dependency ratios, e.g. for the EU as a whole the old-age dependency ratio (the population aged 65 years and older divided by the population aged 15 to 64) will increase from 31.3% in 2010 to 59.9% in 2060, which will significantly increase the dependency burden of the elderly on the working-age cohort.

- The working-age population and effectively also the workforce will be ageing - the average age of a working person will increase. Will that negatively affect individual and general productivity? There are conflicting opinions on how individual productivity evolves with age. Some claim that, due to the fall in cognitive capabilities, individual productivity follows an inverted U-shape age profile, which suggests a rapid fall of individual productivity at an older age and thus threatening the decline of the economies with ageing workforces. Some other voices however point to the importance of experience on the job and suggest that individual productivity increases into a worker’s forties and remains constant thereafter.

- There are different opinions on whether in the future the potential decrease in human capital will be compensated through an increase in capital intensity (substitution of one production factor with another). The latest research suggests that moving away from pay-as-you-go pension systems towards pension systems with ‘private saving accounts’ would revive the amount of savings in the economy and facilitate this process.

- Similarly, in the case of multi-factor productivity (driven mainly by innovation) there is no single voice on expectations about future developments. On the one hand, as labour becomes scarce, there could be increased pressure for more labour-saving innovation, which could raise technological progress and multi-factor productivity. Innovation could also potentially be imported from abroad. On the other hand, a decrease in supply of prime-age workers to innovate may negatively impact the rate of innovation.

- Finally, changes in population size and age-structure are expected to result in changes in product demand and effectively have an impact on labour markets in specific sectors. The type and extent of these changes will depend on whether age-related consumption patterns will remain the same over time or whether baby boomers with wealth and education levels not experienced by previous generations of senior citizens will bring the ‘silver economy’ to its bloom.

**Policy-relevant issues**

Factors increasing employment rates:
• processes determining speed, quality and stability of labour market entry through the specific features of education systems and employment protection legislation;
• processes determining labour market exit through statutory retirement age and incentives to either stay in employment or to retire;
• labour market policies determining part- and full-time working hours;
• flexible working time arrangements;
• general population health level, which impacts on labour supply, as health status (‘healthy/unhealthy ageing’) increases/decreases the time available for both work and leisure;
• life-long learning and training programmes and initiatives.

**Knowledge gaps and further investigation needs**

• Strategies for adapting the economy to the new demographic shape of the European population.

2. Impact of ageing on urban areas

This section of the study analyses what kind of impact demographic change is expected to have on urban areas. The section concentrates on the following areas: urban labour markets, technical infrastructure, and urban housing.

**Urban labour markets**

This subsection takes the analysis of labour supply and demand from the macro to the micro level. It addresses issues of local workforce shortage, work-related migration, and integration of work migrants into the local communities. It discusses labour force productivity at the local level and the locational decisions of the elderly. Finally, it asks the question of how depopulation and the resulting local depletion of skills may affect new job creation.

**Key findings**

• General conclusions on the future potential growth patterns at the macro level are not sufficient to make generalisations about the impact of demographic change on the local level. Firstly, population changes in small sub-areas occur much faster and are more pronounced that at the country level. At the local level both population ageing and shrinking are more likely to be influenced by the migration rate than by the natural population growth. Secondly, urban areas and hence urban labour markets differ considerably in terms of size, economic structure and economic performance.

• In most of the shrinking cities population decline is a symptom of the structural crisis of the local economy. However, once in full swing depopulation blocks the process of socio-economic recovery.

**Policy-relevant issues**

• Integration of work-migrants into local communities.

• ‘Smart shrinking’ models for local labour markets in structural crisis.
Knowledge gaps and further investigation needs

- Compilation and systematic analysis and comparison of experiences of local/urban labour markets which undergo severe demographic change.

Urban technical infrastructure

This subsection of the study examines the problem of underutilisation in urban infrastructure. It starts with the definition and characteristics of urban infrastructure. It then analyses the impact of population shrinkage and ageing through the decline in demand for infrastructure services and associated revenues. In the last step it analyses the economic repercussions of infrastructure underutilisation and finally the future of urban infrastructure provision.

Key findings

- Two main characteristics of urban technical infrastructure in the context of urban shrinking are their very high fixed costs (up to 80%) and an obligation to provide a minimum level of services, which in the case of considerable population decline and consequent decreasing population densities in residential areas lead to a lowering of system utilization, which in turn increases the per capita costs of operating and maintaining roads, sewer or drinking water networks. Effectively, fewer residents have to pay more for oversized/underused infrastructure facilities.

- Moreover, additional costs can arise from a change in the infrastructure consumption patterns, or from modernisation investments to maintain system efficiency or to demolish and downsize inefficient facilities. These developments pose a question about infrastructure efficiency and sustainability.

Policy-relevant issues

- Infrastructure planning and provision in the context of projected demographic development.

Knowledge gaps and further investigation needs

- Future models of infrastructure provision in shrinking cities.

Urban housing

This subsection of the study analyses the impact of demographic change on urban housing. It begins with considerations about the role of households in the housing market and the prognosis about the future development of the number and structure of households. It then moves on to analysing locational decisions of the elderly. Finally, it describes academic discussions about the demography-driven shifts in housing prices and issues raised by vacant housing in the shrinking urban areas.

Key evidence
There is a decrease in an average household size, which means that even though in many EU countries there will be a decline in population, the number of dwellings needed is likely to remain largely unchanged in the coming decades.

Senior citizens are likely to age in place as the propensity to migrate declines with age.

Locational decisions of seniors who move are strongly influenced by prior family connections – the majority of those who migrate to live near relatives and compatriots, therefore the geographical distribution of destinations favoured by pensioners follows the transition in labour migration patterns.

There are conflicting opinions about the possibility of a dramatic reduction in house prices due to baby-boomers' withdrawal from the housing market, with some authors considering it unlikely and others highly likely.

Experiences of shrinking cities reveal a very negative impact of the increase in vacancies on real estate prices, as well as the image and attractiveness of the affected urban areas.

**Policy-relevant issues**

- Adjustment of housing supply to the needs of an ageing society with an increased number of single-person households.
- Provision of utilities and services (e.g. long term healthcare, in the case of an increase in the number of elderly living alone).
- Regulations on drawing pensions abroad.
- ‘Smart physical shrinking’ strategies for urban areas.

**Knowledge gaps and further investigation needs**

- Future models of provision of utilities and services.
- Data collection and analysis on elderly migrants.

**PART II: Demographic change and local government finance: Case study – Saxony, Germany**

1. **Demographic change and local government finance**

Local fiscal stress is a financial condition where a local government is having difficulty financing its operations with the available revenue. There are many determinants of this situation like the structure of fiscal system, general economic situation, efficiency of local financial management etc. Demography is one of them as well.

This part of the study aims to provide a comprehensive literature review on the influence that demographic change exerts on the financial position of sub-national governments through changes in their revenues and expenditures. Special attention is given to the impact of different institutional frameworks on the expected results. In this section we also discuss demographic indicators signalling potential negative fiscal development. Finally, we investigate how demographic change affects local government finance in municipalities of
Saxony, Germany and what are the possible local government reaction strategies for dealing with demographic change and its fiscal consequences.

**Key findings**

A decline in a local population would, at first glance, appear to relieve the pressure for expenditures, because the population requiring services is smaller. However, in practice, a declining community faces escalating fiscal pressures due to declining tax base and reduced resource capacity on the one hand and the increasing per capita costs of social and technical infrastructure on the other, as it is rarely possible to make reductions in expenditures proportional to the population loss. Similarly, an increase in amount of elderly in the community can further reduce existing tax base and put a strain on senior-oriented services (Havesi, 2006).
PART I: Impact of population ageing and decline on urban areas
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1. Ageing and shrinking of population and economic growth – a macro perspective

1.1. Demographic change and determinants of economic growth

There is an ongoing discussion about how the ageing and shrinking of the population might affect future potential growth. One of the possible ways of addressing this question is through analysing how demographic change will affect the determinants of economic growth.

At the country level, income per capita depends on the extent of labour utilisation\(^1\), measured as the number of hours worked per capita, and the level of labour productivity\(^2\), measured as GDP per hour worked (OECD, 2008a). GDP per capita can be presented through identity \(\frac{Y}{N} = \frac{L}{N} \times \frac{Y}{L}\), depicted in Figure 1.1, where:

- \(Y\) = real output
- \(N\) = total population
- \(L\) = total number of hours worked
- \(\frac{Y}{N}\) = GDP per capita
- \(\frac{L}{N}\) = labour utilisation (hours worked per capita)
- \(\frac{Y}{L}\) = labour productivity (output per hour worked)

Figure 1.1. Determinants of GDP per capita.

Note: * Multi-factor productivity (MFP) is a synonym for Total factor productivity (TFP). The MFP is used in the OECD productivity manual uses to signal a certain modesty with respect to the capacity of capturing all factors’ contribution to output growth (OECD Glossary of Statistical Terms).

Source: Own diagram based on Leibfritz and Roeger, 2008.

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1 “Labour utilisation is defined as total hours worked divided by total population. Growth of labour utilisation can result from an increase in the employment rate, an increase in average hours worked by the employed population and/or an increase in the share of the working age population in the total population” (Bassani and Venn, 2008, p.3).

2 The driving forces behind labour productivity are the accumulation of machinery and equipment, improvements in organisation as well as physical and institutional infrastructures, improved health and skills of workers (‘human capital’) and the generation of new technology (OECD, Labour productivity, Glossary of statistical terms, http://stats.oecd.org/glossary/detail.asp?ID=4819).
The analysis of the impact of demographic change on potential future growth can therefore be divided into two steps. The first is to estimate how demographic change will affect labour utilisation (i.e. labour supply in terms of total hours worked divided by total population), and the second is to find out if and how demographic change transforms labour productivity. This should involve estimating the impact of demographics on factors determining productivity – capital labour ratio (capital deepening), human capital (level of skills of the workforce) and technical progress (multi-factor productivity) (Leibfritz and Roeger, 2008). All of these elements can be found in Figure 1.1, which provides an overview of the elements of GDP per capita and the various factors which affect its long-term growth. In the following section we discuss these elements in turn.

1.1.1. Labour utilisation

Predictions about future labour utilisation have the following components:

- a demographic projection regarding size and age structure of working-age population, and population in general;
- assumptions about labour force participation rates (i.e. ratio between the labour force and the overall size of their cohort) specific to age, sex, and other characteristics (Börsch-Supan, 2008a);
- assumptions about the employment/unemployment rate;
- assumptions about the labour market policies determining the number of working hours in the working week;
- retirement regulations.

For the purposes of this study we will analyse two demography-driven building blocks of future potential labour utilisation - demographic projections and assumptions about the participation rates.

Demographic projections

A population is affected in its size and structure by four components: the current, historically determined age composition; fertility; mortality; and migration. Projections of future demographics are based on assumptions about these components (Höhn et al., 2008) and are typically presented in several possible variants. On the basis of assumptions about the development of the total population (these typically include: total fertility rates, migration balance, and life expectancy) we can draw conclusions about the development of the working-age population.

Size

Population projections clearly indicate that the populations of most OECD countries will be ageing and contracting in the coming decades. This will have a direct effect on the structure of the working population. The OECD's estimates show that if migration trends and retirement policies remain unchanged, the number of workers is likely to deteriorate slightly.
in the OECD at large after 2020 (Figure 1.2). This trend is not uniform across OECD countries. While labour supply is forecasted to decline in Europe and especially in Japan, it would continue to grow in North America during the next half-century (Oliveira Martins et al., 2005).

Figure 1.2. Impact of ageing on labour supply (labour supply, 1970=100).

![Graph showing the impact of ageing on labour supply in OECD countries](image)

Source: Oliveira Martins et al., 2005, p.65.

Shortage of the required workforce in ageing Europe will lead to increased migration flows on the international and inter-regional level. It is commonly believed that a very intense in-migration (so-called replacement migration, i.e. “international migration that would be needed to offset declines in the size of a population, and declines in the population of working age, as well as to offset the overall ageing of a population” (UN, 2000, p.97)) could address the risks raised by the ageing and shrinking of a local population. However, under closer investigation this solution, unfortunately, turns out not to be realistic. For Europe as a whole, 950,000 people would need to immigrate annually to maintain the size of the population, or more than 1.5 million to keep the working-population constant (500,000 would have to immigrate to Germany alone\(^4\)) (UN, 2000). Such magnitude of migration flows would be far beyond Europe’s absorption capacity (Bijak et al., 2008) and would eventually result in the majority of the population being of immigrant origin (Coleman, 2002).

**Age structure**

Not only will the size of the working-age population shrink but the structure of the potential available workforce will also change. Figure 1.3 shows the pattern of the change in age composition of the labour force in Germany over the years 2000-2030. It can be easily

\(^4\) At the same time the German Federal Statistical Office in its variants of population prospects through to 2060 uses yearly migration balances at the level of 100,000 and 200,000 (Statistisches Bundesamt, 2009).
observed how the age distribution peak shifts from left to right. In the year 2000 the modal age is 36, while ten years later it increases to 46; and in the following decade to 54. By 2030 the cohort of baby boomers will have retired, and that is when the age distribution flattens out. "Correspondingly, the average age of the population aged 15-64 will increase from 29 to 42.5 years in the next 20 years, will then stagnate for 15 years and will subsequently increase by one further year" (Börsch-Supan, 2008a, p.60).

Figure 1.3. Age structure of the working-age population in Germany 2000-2030.

The projected change in the share of persons aged 55-64 within the working-age population presented in Figure 1.4 demonstrates the scale of expected change in the age structure (Börsch-Supan, 2008a). Moreover, if increased numbers of older employees postpone their retirement the ageing of labour force will be accelerated (Dixon, 2003).
In the context of future economic growth it can be expected that once “growth of labour supply declines or becomes negative, growth of GDP is reduced unless this is offset by higher productivity and capital input” (Gräf, 2003, p.3). At the same time, in line with neoclassical growth theory, “productivity per unit of production factor employed decreases as factor input rises (declining marginal returns). The greater the extent to which human capital is replaced by physical capital, the smaller the increment rise in production” (p.4). Moreover, due to globalisation investments are likely to be made mainly in places where productivity is highest at the expense of areas where productivity is in decline.

**Labour force participation rates**

Estimating future labour force participation rate – the ratio of the labour force (total number of people employed or seeking employment) to the overall size of their cohort - is the next step, and this is more difficult than making population projections (e.g. Deutscher Bundestag, 2002; Fuchs and Söhnlein, 2005) because labour force participation rates are related to more factors than simply demography. They also depend on:

- regulations determining speed, quality and stability of labour market entry through the specificity of education system and employment protection legislation, see e.g. Wolbers (2007). Closer analysis of this factor reveals that there still is an unused potential within the existing labour force as there is currently a significant, 10-year peak in the level of youth unemployment (EUROSTAT, 2011);
- regulations determining labour market exit through statutory retirement age and ‘actuarial adjustments’\(^5\). Social security systems in Europe tend to encourage early retirement in that they provide benefits which replace a sizeable proportion of pre-retirement earnings and at the same time offer virtually no benefits for work beyond retirement age.

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\(^5\) ‘Actuarial adjustment’ is a change made to pension payment based on when, in relation to the statutory retirement age, the person decides to retire.
the early entitlement age. Consequently, these pensions systems “financially penalise a longer working life” (Gruber and Wise, 2001; the same view can be found in Bloom and Canning, 2005). Here one could also raise the question about the relationship between social security programmes, retirement age and youth employment⁶ (e.g. Gruber and Wise, 2010);

- labour market policies determining part- and full-time working hours (Leibfritz and Roeger, 2008);
- social factors, e.g. change in gender roles, and diffusion and adoption of contraceptives (e.g. Gustafsson, 2001; Goldin and Katz, 2002) determining participation of women in the labour market⁷, compare Leibfritz and Roeger, 2008;
- general population health level, which impacts on labour supply, as health status (‘healthy/unhealthy ageing’) increases/decreases the time available for both work and leisure (Dormont et al., 2010);
- overall state of the economy and resulting unemployment level (e.g. Gräf, 2003; Börsch-Supan, 2008a; Wolbers, 2007).

Based on above featured estimates about the development of the size and structure of the total population and working-age population, one can calculate various dependency ratios representing the relationship between the numbers of economically dependent and economically active. Two ratios helpful in analysing the economic impact of ageing are the old age dependency ratio and retirement (dependency) ratio. The former is the sum of people aged 60+ (or 65+), divided by the number of people aged between 20 and 59 (or 64). The latter depicts the relationship between the number of retired people and the number of people in employment. The retirement (dependency) ratio is the core statistic for judging the economic effects of global population ageing⁹ (Börsch-Supan, 2008a). This is because it takes into consideration not only the size of the different cohorts in the country's population but also labour force participation and the employment rate. Only taking into account all these elements considered together it is possible to judge how resilient a particular economy is against ageing.

This can be exemplified through comparison between Figure 1.5 and Figure 1.6. It is plain to see that although the old-age dependency ratio in Germany is projected to be lower than in

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⁶ Gruber and Wise (2010) analyse this issue using the data from 12 countries (Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, United Kingdom, and United States). They find no evidence supporting the claim that increasing participation of older persons in the labour force reduces the job opportunities for young people. Instead, they find evidence to suggest that increased participation of older people in labour force couples with reduction in youth unemployment and improvement in youth employment.

⁷ The same factors seem to be fuelling demographic change. For example, continuing low fertility in Western Germany in recent decades can be explained by factors like: rising age at first marriage; rising age of mother at first birth; increasing level of childlessness; increasing number of divorces and separations; economic pressure (unsatisfactory work-life balance, especially for women) (Höhn, 2008).

⁸ It is worth observing that (for Germany) the old age dependency ratio 60+ is higher than the 65+ ratio, which suggests that labour market reforms to increase working life time would contribute to keeping this ratio at a lower level (Börsch-Supan, 2008).

⁹ Börsch-Supan (2008) refers to it as economic dependency ratio. However, in economic literature 'economic dependency ratio' is used as a name for the group of 'ratios' describing the relationship between the number of those who are economically dependent and the numbers of those who are economically active. The quoted 'retirement ratio' is one of its variations, 'total economic dependency ratio' being another (it is calculated as a ratio of the number of economically inactive population (including children) to the economically active. The total economic dependency ratio in the EU in 2011 was 122:100 with the forecast of this ratio reaching 151:100 in 2060 (Wöss and Türk, 2011).
Japan for the great majority of the time in the period from 2000-2050, it is Japan that has a lower economic dependency ratio. This is due to the higher labour force participation in Japan, which makes this country more resilient against ageing.

Figure 1.5. Old-age dependency (65+/15-64) in selected OECD countries as projected from 2000 to 2050.

[Graph showing age dependency ratios for Japan, EU 14, Germany, United States, and OECD 13 from 2000 to 2050]

Note: EU 14 and OECD 13 show unweighted averages of the country dependency ratios. EU 14 is defined as the EU15 minus Germany. The OECD 13 consists of OECD without EU15, United States and Japan.

Source: Börsch-Supan, 2008a, p.55.
Figure 1.6. Aggregate employment rates (employment related to total population) and economic dependency ratios (number of retired persons related to the number employed) in selected OECD countries as projected from 2000 to 2050.

These old age and economic dependency ratios are the highest in the countries of pay-as-you-go social pension systems. Arguably, “the dependency burden of the elderly is a function of the institutional welfare systems that are in place rather than an immutable state of affairs” (Bloom and Canning, 2005, p.36).
1.1.2. Labour productivity

Labour productivity is defined as output per unit of labour input\textsuperscript{10}. It depends on various factors: human capital (workers’ health and level of skills), the accumulation of machinery and equipment, institutional infrastructures and technological innovation.

*Individual productivity (level of skills and experience)*

There is an ongoing discussion about the correlation between age structure of the workforce (which we analysed in the previous section), labour productivity and general economic performance. “Understanding this relationship is important because of the useful and predictable characteristics of demographics and because the significance of the relationship is strong” (Feyrer, 2007, p.108). There are numerous studies measuring age-productivity profiles by using employer-employee panels, production records or supervisors’ rating (for surveys see e.g. Warr, 1994; Skirbekk, 2003, 2008; and Frosch, 2011).

There are three main views about how the level of skills and individual productivity evolve with age (Figure 1.7). “It is commonly assumed that individual productivity follows a (quadratic) inverted U-shaped age profile” (Oliveira Martins et al., 2005, p.17; also Miles, 1999; Blanchet, 2001). However, if progress in health care counteracted this late age decline in individual productivity, one could envisage a more optimistic (‘healthy ageing’\textsuperscript{11}) scenario (Dormont et al., 2010), where the productivity of an average worker increases through to a peak during the forties and remains constant thereafter (see Aubert and Crépon, 2003) or follows a flatter, intermediate path.

Figure 1.7. Different hypothetical age-productivity profiles.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.7}
\caption{Different hypothetical age-productivity profiles.}
\end{figure}

Source: Oliveira Martins et al., 2005, p.66.


\textsuperscript{11} “Looking across countries, as average levels of health expenditure per capita increase, healthy life expectancy increases at a greater rate than total life expectancy” (Mathers et al., 2001, p. 1689).
The theory of the bell-shaped age-productivity profile seems to find support in the research results of Feyrer (2002, 2005, 2008). These suggest that countries with a large proportion of workers in their teens, twenties and thirties are significantly less productive than countries with large cohorts in their forties. He also finds workers in their sixties to be the least productive of all. Feyrer (2007) suggests that “one-quarter to one-third of the rich-poor productivity gap can be explained by steady-state demographic structure”.

On a positive note, the results of the calculations for the US, Japan, Germany and France comparing the most optimistic scenario with the most pessimistic (U-shaped productivity profile) show (Figure 1.8) that the magnitude of potential change is small (+/- 2.5%), and this levelling effect should stabilise around 2020 (Oliveira Martins et al. 2005; same conclusion can be found in Blanchet, 2001; Dormont et al., 2010).

Figure 1.8. Mechanical impact of ageing on productivity levels (per cent change relative to 2000 levels)

![Graphs showing the impact of ageing on productivity levels for different countries](source: Oliveira Martins et al., 2005, p. 67.)
Börsch-Supan (2008a) works with two bell-shaped age-productivity profiles based on Kotlikoff and Wise’s (1989) micro-data (base on salary measures\textsuperscript{12}) originating from a major US service company (Figure 1.9 and Figure 1.10). The author points out that in jobs, where the age-productivity profile is rather flat (as among sales staff) ageing should have almost no negative impact on aggregate labour productivity. However, if age-productivity follows the steep curve (as for office workers), aggregate labour productivity might slump and negatively affect economic growth.

Figure 1.9. Estimated relative labour productivity by age of sales stuff and office workers (age 45=1).

![Figure 1.9](image1.png)

Source: Börsch-Supan, 2008a, p.62.

Figure 1.10. Potential effect on aggregate labour productivity, Germany 2000-2050.

![Figure 1.10](image2.png)

Source: Börsch-Supan, 2008a, p.63.

\textsuperscript{12}Salary measures can be misleading as there tends to be a seniority element in salaried workers’ pay, which can distort the link between salary and productivity in the working life cycle (Börsch-Supan, 2008a).
In their latest work Börsch-Supan and Weiss (2011) measure productivity in an assembly line environment at a Daimler truck assembly plant in Wörth, Germany with the standardised production process and standardised quality of the final product. In this environment, they use data on errors made in the production process as a precise measure of productivity. Over the period of four years the authors analyse age-productivity profiles of individual workers and of the teams. They draw the following conclusions:

- the average age-productivity profile of individual worker increases until age 65;
- job tenure keeps older workers’ productivity from falling;
- older workers’ competence is their ability to avoid especially severe errors. While older workers are slightly more likely to make errors, they hardly make any severe errors;
- older workers are especially able to grasp difficult situations and then concentrate on the vital tasks.

It should be noted that individual productivity is multidimensional, and age affects various skills differently. Individual productivity relates to a number of characteristics of the individual and the working environment. The net effect of the age-specific productivity determinants depends on how individual skills are used in the work process, how the work is organised and how the individual interacts with other workers and firm-level factors such as technology and capital levels (Ilmakunnas et al., 2010). Furthermore, it might be hard to separate age effects from other drivers of productivity at the company level (Aubert and Crépon, 2003; Skirbekk, 2008), Figure 1.11.

Figure 1.11. Outline of key factors affecting job performance.

Source: Skirbekk, 2003, p.35.
Moreover, perceived age-productivity can vary depending on the changing labour market requirements, i.e. importance attached to particular cognitive and non-cognitive skills (Skirbekk, 2008).

Figure 1.12 shows two contrasting productivity profiles. The solid line marks a profile where the only skills of significance are managerial ability and experience, which are said to increase or to be stable with age. In this case productivity potential is expected to increase up to ages 35–44 and remain stable afterwards. The dashed line on the other hand marks a profile where only numerical and clerical skills matter. In this instance productivity decreases from ages 25–34. Although somewhat unrealistic, since most professions also require other abilities, the scenarios presented illustrate the fact that older and younger workers may have comparative advantages in different types of jobs and professions (Skirbekk, 2008).

Figure 1.12. Estimates of hypothetical professions where only ‘management-communication’ skills or ‘estimations-analytical’ skills matter.


Based on these assumptions it can be expected that in an economy where adopting new technologies will result in demand for manual labour decreasing and demand for highly skilled workers increasing, older individuals will increasingly maintain productivity until later ages (Ilmakunnas et al., 2010).

Dormont et al. (2010) consider in turn two factors that affect the long-time profile of workers’ productivity – education and health. They suggest that long-term productivity depends on the quality and quantity of education at the beginning of the career and also on the training. They point to the fact that the expansion of life expectancy allows for higher returns over the longer period of time and thus creates incentives to invest more in education. On the other hand, life-long-learning can be also affected by existence or lack of relevant incentives including wage systems.

Health also influences the decision to supply labour through its impact on wages, preferences, and expected life horizon – the net effect depending on substitution and income effect. Healthy workers are more productive and work longer hours. There is also a link
between age and absenteeism rates. Authors argue that younger employees tend to have a higher number of absences. The number of absences starts to fall when the employees are in their late thirties and absences are clearly less common in the older age groups. At the same time, when older employees are absent from work, the durations of the absences are long.

Capital intensity

In the case of shrinking and ageing of the labour force, increasing capital intensity - equipping fewer workers with more capital – would be a potential way of maintaining labour productivity at the current level (Leibfritz and Roeger, 2008). If we abstract from capital flows from outside an economy, achievable capital intensity is directly related to the level of savings in the economy. At the same time, there are many different views about how important the demographic effects on savings really are. The pure life-cycle hypothesis of saving (Modigliani, 1966, 1970) suggests that private saving behaviour can be influenced by the age structure of the population, with the working-age population prone to save for retirement and retirees dis-saving to maintain consumption. Masson, Bayoumi, and Samiei (1998) observe that a higher total dependency ratio is associated with lower saving rates. In this case ageing of society could lead to a fall in growth of fixed capital stock (unless the gap is not filled by more foreign direct investment flows). It, however, may as well be that ageing will have a less negative influence on savings than this hypothesis asserts (Haque, Pesaran and Sarma, 1999; Börsch-Supan, 2008a). These authors point out that older people often continue to save rather than dis-save. So rather than running down their assets during retirement they continue building them up and also transfer them to their children. Attanasio et al. (2000) add that a higher dependency ratio may be associated either with a higher or lower saving ratio depending on the precise shape of the utility function, demographic structure and other factors. Hondroyiannis (2006) argues that an increase in the old-age dependency ratio will increase private savings, implying the need of individuals for their own provision through private saving due to the existing financial pressure on the social security systems. It still remains to be seen whether saving behaviour will change in the future. As people live longer they may increase their precautionary saving at all ages (Leibfritz and Roeger, 2008).

In particular, “pension reform away from pay-as-you-go financed pensions toward funded pensions might change saving behaviour because it revives the retirement saving motive” (Börsch-Supan, 2008a, p.66). International comparison of age-related saving profiles in different European countries suggests a positive correlation between saving profiles and existing public pension systems. In countries like France, Italy and Germany (all have pay-as-you-go pension systems) individual saving profiles are flat and no dis-saving occurs in old age. A different saving profile can be found in the Netherlands, where the public pay-as-you-go pension system provides only a small basic pension and all additional retirement income is gained through mandatory saving plans existing within occupational pension systems. Effectively, the median Dutch household has a different, more hump-shaped life-cycle savings profile than median households in Italy, France and Germany (Figure 1.13).
Multi-factor productivity (MFP)

Multi-factor productivity is the sum of all efficiency gains which raise output growth above the rate which can be attributed to the change of factor inputs (labour and capital). If growth in inputs of labour and capital slows down in ageing economies, economic growth will increasingly depend on growth of multifactor productivity. This in turn is mainly driven by innovation. There are different views about the effects of ageing on MFP growth. If an ageing society reduces economic dynamism by becoming more protectionist and more distribution-focused and spends less on R&D, MFP growth declines. Furthermore, if markets for capital goods shrink, innovation becomes less profitable and certain technologies may become inefficient and inapplicable (Leibfritz and Roeger, 2008).

Some authors have also argued that with fewer people there may be less opportunities for clever inventors to be born, e.g. results of calculations made by Feyrer (2008) suggest that the supply of workers who are at the prime age to innovate (median age of inventors 48 and not varying by more than one year over the analysed period 1975-1990 of US patenting information) or manage may have an impact on the rate of innovation. Reductions in the level of inventive activity will more likely be caused by a declining number of workers, rather than by lower age-specific inventive performance at older ages.
On the other hand, as labour is becoming the scarce factor of production there could be pressure for more labour-saving innovation which would tend to raise technical progress and MFP. An ageing society may also benefit from the global environment by importing innovation from abroad through foreign direct investment and international R&D linkages, by importing new products and by attracting high-skilled workers and researchers. This requires, however, that the economy is open and flexible enough to adjust. Maintaining a high level of human capital and enough saving and investment also helps to sustain MFP growth as qualified labour and a modern capital stock are important sources for the creation and diffusion of innovation (Leibfritz and Roeger, 2008).

A comprehensive literature survey on workforce age and innovation is presented by Frosch (2011). The author concludes in her paper that hard empirical evidence “on the causal relationship between workforce age and innovation” is still sparse, mostly due to methodological issues.

1.2. Product demand

Changes in population size and age-structure are expected to result in changes in product demand and effectively have an impact on labour markets in specific sectors.

Börsch-Supan (2003) discusses how “consumption behaviour changes with increasing age”. Based on the example of a German 1993 income and consumption survey he analyses shifts in spending between nine broad expenditure groups (Figure 1.14). He points out that over the life cycle there is a decrease in spending on ‘transport and communication’ related goods and an increase in spending on ‘health and hygiene’ goods, as well as on shelter related costs. Oliveira Martins et al. (2005) who find similar results in analysis of data from the US, the EU and Japan make an observation that “changes in projected consumption shares are relatively moderate, at most a +/-17% change. This is due to the fact that changes in the consumption shares of age-sensitive products tend to offset each other across age groups” (p.9).
Börsch-Supan (2003) is of the opinion that these age-related changes in demand structure are expected to have an impact on employment in related sectors. His rough estimation of quantitative effects (Figure 1.15; shows the results compared with the year 2000) suggests that by 2040 [compared to the 2010 distribution] there will be an approximately 7% increase in health sector employment and an approximately 5% fall in transport sector employment. The author estimates that effectively more than one-sixth of all workers in the German economy will need to change their jobs.
It should be noted that in their analysis both Börsch-Supan (2003) and Oliveira Martins et al. (2005) make the assumption that age-related consumption patterns will stay the same over time. However, an increase in participation of old-age people in the labour force could change their consumption patterns and make them more similar to those of prime-age workers. Additionally, through increased implementation of information and communication technologies (ICT) some of the products could become more old-age friendly and more consumed by older people (Oliveira Martins et al., 2005).

Indeed, baby boomers may revolutionize the meaning of being ‘old’ because they differ a lot from the generation of their parents. They are expected to be demanding as consumers of both products and services. The economic potential of the emerging ‘silver economy’ in Europe comes from the fact that many retirees of the baby boomer generation will be wealthy\textsuperscript{13}, accustomed to consuming, and highly educated, which may result in an increase in demand for high-quality services. (Kunz, 2007; Martinez-Fernandez and Weyman, 2012).

On the downside, Oliveira Martins et al. (2005) suggest that it may well be that the main impact of the elderly on the structure of consumption will be a shift towards labour intensive services (such as long-term care) which could affect aggregate productivity gains.

Another possible result of the demographic change might be a decline in total consumption demand due to two main reasons. Firstly, in the face of a shrinking labour force GDP per capita will decline unless this is offset by higher capital input and productivity. Secondly, it is likely that more retirement income will need to rely (or rely proportionately more) on asset income, which fluctuates more than annuitized pension and labour income. Consequently,

\textsuperscript{13} Provided that state pension systems that provide the bulk of pension payments in the EU with remain solvent.
future retirement income may be more volatile. This would increase precautionary savings and depress consumption (Börsch-Supan, 2008a).

2. Impact of ageing and shrinking of population on urban areas

2.1. Ageing and shrinkage of urban areas

Ageing and shrinking of the population have traditionally been a major socio-economic problem of rural areas in Europe. The outflow of population to urban areas in search of education and jobs was the main cause of this phenomenon. In more recent times, the ageing and shrinking problem has started to affect some urban areas.

Urban shrinkage in Europe is a result of the combined consequences of intense economic restructuring and demographic trends. Among the worst affected are mono-industrial cities, which have been particularly hit by deindustrialisation and increased competition connected to globalisation trends. These cities, sometimes entire regions, are enduring the out-migration of human capital and other resources and are suffering from socio-economic stagnation (Martinez-Fernandez et al., 2012).

In shrinking cities economic slump, falling employment, population loss and increasing social problems are the symptoms of the structural crisis. In this context population shrinkage is a result of a complex economy-driven process rather than a triggering factor. However, once in full swing depopulation fuels economic problems even further, as areas without human capital and consumer base have slim chances of attracting new business.

Ageing might be adding to this problem in that it reduces the local tax base as in most cases older inhabitants do not work and their other income sources are in most places either untaxed locally or taxed at a low level.

2.2. Urban labour markets

2.2.1. Specificity of micro perspective

The analysis of the impact of ageing on labour utilisation and labour productivity patterns at the macro-level, presented in the previous section of the study, is not sufficient to make generalisations about the impact of ageing on the urban labour markets14. The main reason for this is two-fold. First, population changes in small sub-areas occur much faster and are more pronounced that at the country level (Just, 2011). The main reason for this is that on the local and regional level migration is the prime driver behind population changes both with regard to size and structure (ECOTEC, 2007; Kroll and Haase, 2010). This can be illustrated with the use of Germany data presented by Just (2011, p.2): “...since 1995 net in-migration for Germany as a whole has not exceeded 0.16% per year. In the counties most heavily

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14 It should be stressed that there are almost no scientific papers addressing the impact of ageing on labour markets at an urban/local level. This may be due to the fact that cities and their labour markets differ considerably in terms of size, economic structure and economic performance, which often makes it more appropriate to analyse them as case studies rather than drawing general conclusions.
affected by in-migration or out-migration the annual changes were, however, an average of 20 times higher”.

Second, cities, and consequently urban labour markets, differ in size, economic structure, and economic performance. Their performance is also dependent on the economic performance and political governance at the higher (regional, national) levels.

Consequently, the existence of these differences suggests that an ageing population will have a different impact on different types of cities, and it would not be appropriate to expect the same demographically driven changes in labour markets of fundamentally different types of cities (e.g. it is inappropriate to compare Frankfurt (Main) in Germany with the city of Vidin in Bulgaria, given that the difference in GDP per capita between these two cities is nearly 50-fold).

2.2.2. Local labour supply

As has already been mentioned shrinking and ageing of the working-age population in Europe will lead to a workforce shortage. Although replacement migration is not an option for Europe (compare with subsection 1.1.1 Labour utilisation), regional work force shortages might be potentially at least partly solved by attracting migrant workers from other parts of the country or abroad. The closer look at the issue reveals that this is likely to happen between the regions of the same country rather than between different countries, as there is a low international mobility across Europe. Gáková and Dijkstra (2008) find that in 2006 the share of EU residents who arrived in another EU NUTS-2 level region represented less than 1% of the working-age population (compared to 2% for inter-regional mobility in the United States). Moreover, they identify that some 85% of these moves happened between regions of the same country, which indicates particularly low international mobility profiles across Europe (Table 2.1).

Table 2.1. Comparison of mobility between the EU and the US, 2008.

<table>
<thead>
<tr>
<th>Share of working age residents who moved from a different region of the EU/US state</th>
<th>US</th>
<th>EU-27</th>
<th>EU-15</th>
<th>CEECs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.60%</td>
<td>1.21%</td>
<td>1.46%</td>
<td>0.36%</td>
</tr>
<tr>
<td>Share of working age residents who moved from a different region/state of the same country</td>
<td>2.60%</td>
<td>1.03%</td>
<td>1.26%</td>
<td>0.24%</td>
</tr>
<tr>
<td>Share of working age residents who moved from a EU country/US state</td>
<td>2.80%</td>
<td>0.18%</td>
<td>0.20%</td>
<td>0.14%</td>
</tr>
<tr>
<td>Share of working age residents who moved from outside the EU/US</td>
<td>0.74%</td>
<td>0.19%</td>
<td>0.23%</td>
<td>0.03%</td>
</tr>
</tbody>
</table>


Similarly, the 2008 United Nations World Population Prospects reveal that net migration across Western Europe was only 1.7 per 1,000 population over the period 2005 to 2010, about half the level of the United States (3.3 per 1,000 population); big member states – Germany (1.3), France (1.6) and the Netherlands (1.2) – are below average (Peschner, 2012).
Data speaking for very limited mobility in Europe seems to be strengthened by the results of the research conducted by Decressin and Fatas (1995) which suggest that in Europe, during the first three years a region-specific increase in labour demand is mainly met by higher labour force participation, whereas in the US immigration plays the most important role in the adjustment from the first year onwards.

Moreover, empirical evidence has shown that migrants frequently move for short-term periods; many of them on a regular, often seasonal, basis, as migration is not usually regarded as a once and for all decision, but rather as part of a long-term adjustment process, where people respond to long-run expectations in both markets, and in which migrants choose to work for a limited period in another market acquiring skills and improving their own and their families’ lives through remittances sent to the home country.

Nevertheless, labour migration remains a politically sensitive topic with a wide range of concerns for both receiving and sending regions. In receiving regions an influx of workers taking up a variety of jobs ranging from low-paid work in long-term care for elderly to knowledge-intensive jobs in industry may lead to reduced income for low skill jobs, displacement of local workers and/or an increase of the costs of social and welfare services, as well as issues around integrating incomers into local communities (Martinez-Fernandez and Weyman, 2012).

For sending regions, potential outflow of labour force (highly skilled in the first place) would certainly mean labour sourcing problems and consequently a potential spiral of decline in these cities. It remains to be seen to what extent labour shortages in strong economies like Germany can be expected to increase competition between cities and trigger intensified migration flows to Germany from source regions and cities in other countries (DV, 2007), as well as which regions will have the strongest pulling power and which source regions will face the greatest working-age population losses. Finally, what it will mean for the future age structure of their populations.

It can be expected that, as is already the case now, while in general ageing of population is an overarching trend across Europe, the cities experiencing rapid economic growth and accompanied by population growth will have the lowest share of elderly people and, correspondingly, the highest share of children and young people. Present examples of such fast growing and young cities are London, Dublin and Madrid (ECOTEC, 2007).

2.2.3. Local labour demand

Forecasting labour demand is more difficult than forecasting labour supply (Ragnitz, 2011) as the latter can be concluded from the demographic trend in the area while the earlier requires considering some complex factors.

Local economic structure
Depopulation of the area, as well as change of the age structure of the consumers towards the older less well-off ones means a change in domestic demand structure - a decline in demand for locally consumed goods and services (such as retail trade or transport). In case of the goods traded beyond the region this might not be the case or may be a case but to a lesser extent. In generally, sectors producing goods for international markets can be
expected to be considerably less affected by demographic developments on the demand side. Demographic effects in their case can be partly compensated by exporting to economies with different demographic structure and higher economic growth rates than Europe (Bräuninger et. al., 2002).

(Un)employment rates

Demographic shrinking is expected to lead to a lower unemployment as long as the number of jobs declines slower than the number of inhabitants (Kropp, 2012). At the same time, due to the ‘high-tech oriented’ structural change in western economies it is not unlikely that expected shortages of highly qualified workforce will coincide with the increased unemployment among poorly qualified.

In discussions about future work force shortages two groups of jobs come across most often - ‘technical jobs’ (mathematicians, engineers, scientists, technicians) and ‘service sector jobs’ (caring professions like hospital nurses, caring stuff for elderly etc.) (Elmas and Wydra-Somaggio, 2012)

Moretti (2010) finds that “as the number of workers and the equilibrium wage increase in a city, the demand for local goods and services increases”. He comes up with job creation multipliers that show that in a given city each newly created manufacturing job leads to creation of 1.6 jobs in the non-tradable sector and one additional skilled job in the tradable sector generates 2.5 jobs in local goods and services. The corresponding figure for unskilled jobs is one. Moretti points out that the multiplier varies across industries and that tech industries have the largest multiplier.

It can be expected that there is also a ‘negative multiplier’ functioning in a reverse situation, where the jobs are being cut. The question here would be - how many additional jobs disappear once one job in tradables or non-tradables disappears?

Impact of locational decisions of elderly on companies

Gaigné and Thisse (2008) build a model to see how locational decisions of the elderly (whose income does not come from labour) affect locational decisions of companies. They find that cities accommodating large numbers of elderly people would be attractive markets for services firms, which in turn would make these locations more attractive to the manufacturing workers. This trend gets stopped once the level of urban costs (urban and commuting costs) in cities attracting retirees rises extensively due to the intensive inflow of the retirees. At one point the costs there will be too high, which will re-direct manufacturing firms back to the working cities. Moreover, during the whole process of ageing working cities are expected to remain the larger ones. These results are in line with the empirical evidence provided by Chen and Rosenthal (2008) suggesting that American cities will specialise either as working cities (locations with improving business environments) or elderly cities (locations with improving amenities).

2.2.4. Labour force productivity at the local level
According to Feyrer (2008), the composition of the workforce at the country level matters because changes in workforce age structure are strongly correlated with productivity and output\textsuperscript{15}. These demographic effects nevertheless are less pronounced at a lower spatial level. Feyrer explains that this result should not come as a surprise, as age-related efficiency gains at the local/plant level are not necessarily captured at the plant level in the form of increased wages of the plant workers but rather materialise in the form of profit in the central company accounts. They can then be e.g. partly reinvested or passed on to shareholders in the form of dividends. Where product markets are competitive, consumers may gain from lower marginal production costs resulting in lower prices. Certainly, these consumers may be located in a different geographic area than the workers and plants.

2.3. Urban technical infrastructure

2.3.1. Urban technical infrastructure – definition and characteristics

The term infrastructure embraces “the basic physical and organisational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise”\textsuperscript{16}. Urban or municipal infrastructure refers to technical infrastructure systems generally owned and operated by municipalities, such as streets, water distribution, and sewers. It also includes social infrastructure, such as educational facilities, public pools and libraries.

Infrastructure projects are \textit{capital intensive}. They have a very high proportion of fixed and overhead costs. They also exhibit a fall in average cost per user with the increase of the number of consumers due to \textit{indivisibility} of infrastructure networks. Another key dimension of infrastructure is the \textit{high durability of the assets} (e.g. power lines can last about 40-60 years and sewers as long as 80 years). This allows for investment cost recovery over time, but comes with uncertainties, because the framework conditions under which the infrastructure was built can change over time. Furthermore, the provision of these goods is \textit{heavily regulated} and \textit{publicly coordinated} (often also publicly executed) with \textit{long planning times}. Effectively, planning errors leading to upsizing or downsizing may result in a significant waste of resources (Just, 2004).

2.3.2. Impact of demographic change

Provision of public infrastructure is affected by demographic trends in three main ways. First, the shrinking of the population can affect the revenue side of public budgets, because a smaller active population is likely to narrow the growth potential of the income-related tax intake. Second, ageing of society leads to a shift in the structure of demand for public goods. Third, due to scale effects the number of city inhabitants, and most importantly the size of the relevant user group, have a considerable influence on how efficiently the public goods are provided (Just, 2004).

\textit{Fiscal implications - decline in revenues}

\textsuperscript{15} Feyrer (2005, 2007, 2008) finds changes in the proportion of workers between the ages of 40 and 49 to be linked with productivity levels.

\textsuperscript{16} http://oxforddictionaries.com/definition/infrastructure (accessed on 02.03.2012).
There is a general consensus that the projected shrinking of the labour force in Europe over the coming decades will result in a decline of GDP and GDP per capita unless it is offset by higher capital input and technological progress (e.g. Börsch-Supan, 2008a; compare with section 1). In the case where both those variables will not grow any faster in the next few decades than at present, demographic change will gradually reduce the average rate of growth in the countries with shrinking populations (Just, 2004). Seitz (2002) estimates that a 1% drop in the population at the country level leads to a 1% decline in tax revenues\(^\text{17}\). If the tax base recedes or slows down higher spending can only be financed through increased tax rates. However, even this solution may turn out to be purely theoretical, since considerably higher tax rates are likely to provoke significant tax evasion among tax payers (Just, 2004). Consequently, the public infrastructure will most likely undergo cutbacks rather than spending increases.

**Altered demand**

Shrinking and ageing of urban population are likely to bring about a shift in the size and structure of demand for urban infrastructure.

**Structure – a changing mix of services**

Since older people have different needs than younger people, with respect to certain infrastructure services, ageing of urban population is likely to have a strong influence on the structure of demand and effectively on the spending structure of public budgets.

**Size – problem of underutilisation in urban infrastructure**

A fall in urban population generally leads to a decrease in demand for infrastructure. This constitutes a challenge for urban infrastructure provision. The problems that a dwindling of population numbers poses for network-related technical infrastructure can be summarised under the rubrics of reduction in efficiency and increase in maintenance costs. Reduction in efficiency in this case stems from the fact that operations of infrastructure systems are characterised by high fixed costs, which amount to up to 80% of the total cost (Herz, 2006), and therefore also economies of scale, where the increase in number of users reduces the unit cost of the infrastructure service. Additional maintenance costs result from the necessity to undertake additional maintenance measures in order to avoid network deterioration through underuse. These two factors make it in general difficult to adjust capacity to lower demand, especially in the case of a rapid change in the number of users. "...[E]lements of urban infrastructure are optimised for a certain demand structure in an area, and their set up cannot be changed without incurring additional costs" (Schwarz and Haase, 2010, p.2; see also Moss, 2008; for examples of network-specific consequences of urban shrinkage refer to Koziol, Difu, section 2\(^\text{18}\)).

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\(^{17}\) Provided that other growth factors do not compensate for the negative effect of population decline on the tax base.

Schwarz and Haase (2010) point out that in the worst case population decline and underutilisation and then dismantling of the infrastructure may fuel one another and end in a vicious circle of overall decline, which leads to depreciation of the area (Figure 2.1).

Figure 2.1. Possible vicious circle for a specific area within a shrinking city.

The idea of a ‘vicious circle of shrinking’ can be also found in Herz (2006) and consists of: increasing excess-capacities; increasing maintenance costs; reduction of investments; and declining quality of service.

2.3.3. Economic repercussions

In general terms, the economic consequences of urban shrinkage for network-related technical infrastructure can be summed up as follows. Population decline and consequent decreasing population densities in residential areas lead to a lowering of system utilization, which in turn increases the per capita costs for operating and maintaining roads, sewer or drinking water networks. Effectively, fewer residents have to pay more for oversized and underused infrastructure facilities. Kuckshinrichs et al. (2011) estimate further that a 10% decrease in population numbers leads to a 10-20% increase in specific user costs (analysed infrastructures included water supply, waste water, road transport and long-distance heating). Moreover, additional costs can arise from a change in the infrastructure consumption patterns, or from modernisation investments (Koziol and Walther, 2006) to maintain system efficiency or to demolish and downsize non-efficient facilities (Schiller, 2007). These developments pose a question about infrastructure efficiency (Schiller, 2004) and sustainability. Similar results can be found in Koziol (2007), and Kuckshinrichs and Schlör (2005).

The question of infrastructure efficiency here is closely related to the issue of urban form as “...costs for the provision, operation and maintenance of technical infrastructure facilities and
systems are highly dependent on the characteristics of urban form (Schiller, 2007, p.2). This is due to the fact that the level of residential density is directly linked to the level of required investment in infrastructure. Per capita length of water distribution lines, sewer collection lines and collector roads per capita decreases with the increase in residential density. "Below a density of 40 dwellings per hectare of net urban land network-related per capita costs increase exponentially" (p.2). Consequently, the construction costs can vary enormously for the same number of housing units.

Shrinking processes negatively affect residential density (inhabited housing units per hectare) and population density (inhabitants per hectare), which leads to a widespread underutilisation of technical infrastructure. The obligation to supply services, the immobility and the indivisibility of facilities (dictated by technological and regulatory requirements) as well as high fixed costs (70-80%) all contribute to considerable cost persistence in technical infrastructure networks. Maintenance of the infrastructure provision in areas with decreasing density results in considerable losses in efficiency. In extreme cases this can lead to the malfunctioning of systems.

The level of service underutilisation at which additional operational and building measures are required varies with the utility. Survey conducted among public utility companies (Herz, 2002) revealed that:

- In the case of sewage treatment and district heating networks operational measures are required when utilization drops by 20–30% from the original rated capacity. Additional building measures are necessary when underutilisation figures are as high as 50–60%.
- In the case of drinking water and electricity networks operational measures become necessary when underutilisation reaches 60–70%. 70–80 % of underutilisation calls for additional building measures (Schiller, 2007; similar results can be found in Koziol und Walther, 2006).

2.3.4. Technical infrastructure vs. social infrastructure

Demographic change and negative developments in public finance are modifying also conditions for provision of the social infrastructure. In shrinking areas there is a fall in a volume of required services. Additionally, ageing of population brings a shift in the type of

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19 Infrastructure costs are also influenced by other factors such as topography, the building plot, reserve capacities in local infrastructures (Biermann, 2002; Schwarz, 2001) and the quality of urban design. In this paper, however, the focus is primarily on the effect of general settlement structure on infrastructure costs.

20 By 'net urban land' the author means net building land (Netzbauland in German) – the sum of developed building plots and those available for development within a building area/ specific land-use area. This is gross building area minus the land for public purpose (read space, green areas etc.).

Density of 40 dwellings per hectare of net urban land corresponds approximately to a floor space ratio of 0.5 m² (floor space per m² net urban land) or a gross population density of 70 (inhabitants per hectare gross residential area).

21 The requirement of maintaining a ubiquitous provision even in the face of a declining population.

22 Here operational measures are additional maintenance measures which need to be undertaken to maintain functionality of the network. For example, if there is water stagnation in the drinking water networks due to underutilisation, then additional operational costs will arise from the need for additional pipe flushing required to protect the water from germ contamination. Building measures in this context are related to downsizing and replacement of the networks.

23 Rated capacity = design capacity = maximum capacity.
needed services (Winkel, 2008b). Sectors most affected by demographic trends are education, healthcare, social services and public administration. Although social infrastructure does not have as high fixed costs as technical infrastructure, the necessary restructuring or closing down of the facilities is a complex and often controversial undertaking.

Hereby we present an exemplary analysis of the impact of demographic change on educational services in Germany

With a decline in the number of births demographic trends suggest that the demand for educational services (and facilities) will be substantially downsized in the coming years. However, a distinction needs to be made between primary, and secondary and tertiary education. It is due to the fact that demographic development curves are only a rough measure of the demand for schools and universities.

In case of primary schools, for example, area-wide availability must be guaranteed so that the youngest pupils do not have an excessively long way to school. So even if the number of schoolchildren declines, there will presumably still be little potential for economising in primary education. An education at upper secondary, intermediate and lower secondary schools will also have to be provided in out-migration areas, yet the possibilities for merging these are limited. In general, all schools providing general education in out-migration areas are likely to be significantly smaller in size than in agglomerations. That means rising financial burdens in what are already economically weakened out-migration regions, because schools exhibit considerable economies of scale. Seitz (2002) estimates that per capita expenditure on basic (primary and lower secondary) education in sparsely populated communities is already 40 to 50% higher than in agglomerations. The cost difference in education alone, Seitz maintains, puts the sparsely populated Germany states and municipalities at a cost disadvantage equivalent to between 1.5 and 2.5% of their total budgets. Moving forward, this efficiency loss will be intensified, given that the sparsely populated areas are typically those from which people move away. Net education costs per pupil in Germany will work out higher even without any improvement in quality, because in the medium term pupil numbers are also set to drop in the agglomerations. Substantial savings on education that would help ease the pressure on public budgets or offset surging social welfare burdens are not to be expected, at least not in the wake of demographic development. Another element here will be very pronounced regional differences triggered by different population developments (e.g. education will further intensify internal migration flows) (Just, 2004).

2.4. Urban housing

2.4.1. Housing demand – the special position of households

The demand for housing is determined by the number of households in a population, which constitute the demand side of the housing market. Therefore, the number of households is more important for housing demand than the number of residents. Consequently, these are changes in the numbers and characteristics of households that are critical for the

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24 A household is a group of individuals sharing a dwelling unit.
development of housing demand\textsuperscript{25} (Just, 2009). For a given population size, more households generate more demand for housing; just as a smaller average size of households implies a non-intensive use of dwellings Gober (1992). Furthermore, the attributes of households\textsuperscript{26} influence the demand for housing with particular location, space, and price characteristics. Finally, changes in household size and composition influence residential mobility patterns (Myers, 1990; Randolph, 1991). Consequently, the demographic, economic and cultural dynamics at the household level influence the direction of urban transformation - “cities simultaneously shape, and are shaped by, the consumption practices and mobility patterns of their constituent households” (Buzar et al., 2005, p.424).

In the past few decades most developed countries have experienced a steady decrease in the average size of households (Table 2.1 and Table 2.2).

Table 2.1. Household characteristics in European countries, 1960-2001.

<table>
<thead>
<tr>
<th>Average household size</th>
<th>% of single-person households</th>
<th>% of households with 5 or more persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-27</td>
<td>25</td>
<td>29</td>
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<tr>
<td>EU-15</td>
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<td>SE</td>
<td>25</td>
<td>29</td>
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<tr>
<td>UK</td>
<td>25</td>
<td>29</td>
</tr>
</tbody>
</table>

Source: European Commission, 2008, p.79

\textsuperscript{25} There are five main factors determining demand for living space (Just, 2009): income, interest rate trends, regulatory environment, demographics and construction price.

\textsuperscript{26} Myers (2008) comments that while many economic models assume that households are nuclear families this is far from accurate in times of rising divorce rates, increased female employment rates, acute childlessness, and higher levels of alternative households types (unmarried couples of the same and opposite sex).
Table 2.2. Distribution of household types, 2007.

<table>
<thead>
<tr>
<th>Country</th>
<th>No children under 18 in household</th>
<th>Children under 18 present</th>
<th>Household size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single adult under 65</td>
<td>Single adult 65+</td>
<td>Couple both under 65</td>
</tr>
<tr>
<td>Sweden</td>
<td>24.0</td>
<td>15.6</td>
<td>16.6</td>
</tr>
<tr>
<td>Finland</td>
<td>25.6</td>
<td>13.0</td>
<td>19.7</td>
</tr>
<tr>
<td>Denmark</td>
<td>30.2</td>
<td>14.0</td>
<td>16.5</td>
</tr>
<tr>
<td>Netherlands</td>
<td>23.5</td>
<td>11.7</td>
<td>17.0</td>
</tr>
<tr>
<td>UK</td>
<td>16.7</td>
<td>13.6</td>
<td>16.6</td>
</tr>
<tr>
<td>France</td>
<td>20.0</td>
<td>14.2</td>
<td>15.9</td>
</tr>
<tr>
<td>Germany</td>
<td>24.4</td>
<td>14.0</td>
<td>14.7</td>
</tr>
<tr>
<td>Austria</td>
<td>21.7</td>
<td>13.4</td>
<td>12.5</td>
</tr>
<tr>
<td>Belgium</td>
<td>20.6</td>
<td>13.5</td>
<td>15.6</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>18.0</td>
<td>10.9</td>
<td>13.7</td>
</tr>
<tr>
<td>Ireland</td>
<td>11.3</td>
<td>10.1</td>
<td>9.5</td>
</tr>
<tr>
<td>Italy</td>
<td>14.1</td>
<td>15.0</td>
<td>8.5</td>
</tr>
<tr>
<td>Spain</td>
<td>8.6</td>
<td>8.7</td>
<td>12.2</td>
</tr>
<tr>
<td>Portugal</td>
<td>6.4</td>
<td>10.6</td>
<td>9.5</td>
</tr>
<tr>
<td>Greece</td>
<td>10.4</td>
<td>9.7</td>
<td>8.8</td>
</tr>
<tr>
<td>Cyprus</td>
<td>8.9</td>
<td>7.2</td>
<td>9.6</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>12.4</td>
<td>11.4</td>
<td>14.4</td>
</tr>
<tr>
<td>Hungary</td>
<td>11.5</td>
<td>12.8</td>
<td>12.8</td>
</tr>
<tr>
<td>Estonia</td>
<td>18.3</td>
<td>15.4</td>
<td>11.1</td>
</tr>
<tr>
<td>Latvia</td>
<td>12.8</td>
<td>12.4</td>
<td>8.6</td>
</tr>
<tr>
<td>Lithuania</td>
<td>12.1</td>
<td>14.9</td>
<td>9.6</td>
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<tr>
<td>Slovenia</td>
<td>9.0</td>
<td>11.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Slovakia</td>
<td>11.4</td>
<td>13.1</td>
<td>8.0</td>
</tr>
<tr>
<td>Poland</td>
<td>11.3</td>
<td>13.4</td>
<td>10.0</td>
</tr>
<tr>
<td>EU25</td>
<td>17.6</td>
<td>13.2</td>
<td>13.5</td>
</tr>
<tr>
<td>EU15</td>
<td>18.5</td>
<td>13.3</td>
<td>14.0</td>
</tr>
<tr>
<td>EU10</td>
<td>16.6</td>
<td>13.0</td>
<td>10.8</td>
</tr>
</tbody>
</table>

Note: Based on EU-SILC database – EU Statistics on Income and Living Conditions.
Source: Iacovou and Skew, 2010, p.11.
Bongaarts’ (2001) comprehensive review of changes in household patterns in several European countries as well as Canada and the US reveals a constant downward trend in average household size in the developed world between 1850 and 2000 (Figure 2.2).

Figure 2.2. Trends in average household size in selected European and North American countries, between c. 1850 and 2000.


The structure of the household is expected to change together with the changing age structure of the societies. As seniors tend to live in small (one- or two-person) households the ratio of these households to the overall household number will increase sharply (Just, 2009).

Börsch-Supan (2008a) analyses the situation in Germany and shows that whilst the 1998 revision of the UN’s World Population Prospects27 forecasts that the population in this country would decline from 2005 onwards28, the decreasing household size would keep the number of households growing until 2020, “the number of households will not drop below today’s figures before 2043 and the figure will be just under 3% lower than today in the year 2050” (p.81).

This suggests that even though in Germany there will be a decline in population, aggregate demand for dwellings – the amount of dwellings needed – will remain at almost the same level in the coming decades (Figure 2.3 and Figure 2.4).

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28 Medium variant.
Figure 2.3. Trends in population and households in Germany.

Note: Population projection in accordance with the UN (2000); household projection according to age of reference persons; Börsch-Supan’s calculations based on age-specific household ratios in the 2001 micro census.
Source: Börsch-Supan, 2008b, p.82.

Figure 2.4. Development of demand for housing in Germany, indexed (2002=100).

Note: Scenario assumptions:
Scenario W1 (pessimistic): The demand for residential accommodation among future generations is assumed to stay at the same level as for today’s youngest generation. The demand for housing is assumed to develop in accordance with the age-specific demand for housing and the decline in the population. There will either be absolutely no increases in income or these will not be reflected in the
Demand for more residential space. Also, the demand in the federal states in the Eastern part of Germany is maintained at today's level: there is no further convergence with the situation in the former West Germany. This scenario is considered by one author to be unrealistic.

Scenario W2 (middle/ baseline): Demand for housing among future Eastern German birth cohorts is expected to converge with the Western German level by 2050. The demand for housing is saturated at the 1990 level in the Western part of Germany. The future cohort-related growth in demand is therefore purely derived from the need for the lower demand that currently exists in the East to catch up with the level in the West. When it comes to the future development of assets in the residential property sector, our middle scenario definitely errs on the side of caution.

Scenario W3 (optimistic): Projects the growth in the years prior to German Reunification. It assumes that East German demand will latch onto this growth trend.

Source: Börsch-Supan, 2008b, p.84.

This estimation of aggregated demand may not mirror the situation in particular regions and cities, as some of them will be more economically and demographically successful than others. Neither pure household number informs us about the structure of the demand shaped by needs and preferences of the ageing population. Both these elements – locational decisions of the ageing population and its housing preferences – will be discussed below.

2.4.2. Locational decisions of the elderly - ageing in the same place or not?

In order to understand housing decisions of the elderly we start with analysing their locational choices. The question we want to answer is whether, as they grow old, senior citizens prefer to stay where they have been living or look for new housing, possibly in new locations.

The first observation is that it is highly likely that the majority of senior citizens will 'age in place' i.e. in the same state or metropolitan area where they have lived, though not necessarily in the same community or house (Frey, 2007, for the US) – “the common pattern (...) is that ageing in place dwarfs net migration as a driver of future senior growth” (p.13).

Figure 2.5. Annual migration rates by age, United States, 2004-2005.

Figure 2.5 presents annual migration rates by age in the US (they are similar worldwide). The shape of the curve shows that from the age of 60 less than 5% of citizens still decide to change their place of residence, and less than 2% leave their state.

Friedrich (2008) presents an analysis of internal migration of senior citizens in Germany and asks if it could be a ‘solution’ for the shrinking cities in Eastern Germany, i.e. whether eastern German cities could attract senior citizens from other states through lower housing prices, attractive landscapes and urban amenities. The author considers such development to be unlikely for the following reasons: First, senior citizens are considerably less mobile than the younger residents (compare with Figure 3). Second, the majority of moves (41%) are family-related and often connected to health problems or death of the senior citizen’s partner. Third, some 20% of all the moving seniors (especially the older ones) are moving into retirement homes. Of those who move to a private dwelling, only 20% are requesting a attractive location. And finally, a further one-third of the seniors moves due to the inadequacy of the housing they currently inhabit. Summing up, seniors are more tied to the places they live in than they are willing to move. Additionally, seniors value social and house-related infrastructure (access to health- and long-term care services, proximity to shopping facilities and age-adjusted housing), and these are still scarce in Eastern Germany.

Urban or suburban?

The academic papers researched suggest that today’s senior citizens, who are the generation that triggered the suburbanisation process, will not play an important part in reurbanisation. Myers and Ryu (2008) point out that, although there is a considerable residential growth in the centres of some metropolitan areas, “there is little evidence of any net shift of total or elderly population toward central cities” (p.28). According to Just (2009) both Eastern and West Germany experience an outflow of senior citizens from the inner-cities. The author claims that reurbanisation will happen rather through an adjustment in the offer of housing to the needs of younger generations and by stopping these generations from moving to suburbs in the first place.

European sunbelt?

Warnes (2001) examines the volume, directions and motivations of international migration of older beneficiaries of state social security programmes. He finds that, contrary to a widely held view, the overseas retirement migration is not dominated by ‘amenity-seeking’ migrations to ‘sunbelt destinations’. Based on American, Australian, British and German evidence the author develops two connected hypotheses. First, the international migration of retirees from affluent countries is strongly influenced by prior family connections – many retire to live near relatives and compatriots. Second, the geographical distribution of these destinations is changing with the transition in labour migration patterns. Consequently, “there are a third more British pensioners in Germany than in Cyprus, Gibraltar, Greece, Malta and

---

29 Schneider (2010) presents figures showing an increase in the number of German seniors drawing their pensions abroad, from 115,000 in 1992 to 170,000 in 2005. However, when these numbers are considered against the total number of German seniors receiving pensions it turns out that seniors drawing their pensions abroad constituted 13% of the total number of German pensioners in 1992 and 12% in 2005 (http://www.deutsche-rentenversicherung.de/SharedDocs/de/Inhalt/Servicebereich2/presse/themenschwerpunkte/pressemappe_ausland/04_Rente_Ausland_Infografik_1_text.html?nn=28190)
Portugal put together, while among German pensioners there are more in Switzerland and in Austria than in either Spain or Italy, Portugal and Greece combined" (Warnes et al., 2004).

Friedrich and Kaiser (2002) consider possibilities and limits of transferring the North American concept of ‘sunbelt migration’ to Europe. They use elderly Germans living in Mallorca for this analysis and come to the following conclusions. Preferred homes are in three types of settlements: coastal tourism resorts, planned urbanizations and rural settlements. Of these only the urbanisations bear clear similarities to retirement communities in the USA, in that they are 'gated communities', privately managed and offer a variety of amenities. Nevertheless, they do not operate age-restrictions on purchase or residence nor substantial elements of self-governance. Moreover, the European ideal that seeks to integrate elderly people into society and to reduce their spatial separation contradicts the age-specific and social segregation of American retirement communities.

What kinds of accommodation do seniors want?

Banse et al. (2008) conducted a survey on housing preferences among senior (60+) residents of Dresden. The authors found that residential mobility is decreasing with age and that the majority of seniors would like to stay in their own dwelling as long as possible. The main reason for older people in Eastern Germany moving is inadequate equipment in the dwellings (e.g. absence of lifts in the building) while in Western Germany it is the inappropriate (excessively large) size of the dwelling. Asked about the sort of dwelling they would desire in the event of a move, almost 60% chose an independent flat in a multiple dwelling unit. A similar percentage of respondents chose flats designed for older people with or without services. Among the least popular options were ‘hotels’ for the elderly and flat-sharing communities (Figure 2.6).

The structure of housing demand will depend not only on the preferences but also on the financial situation of the elderly. The Pestel Institute in Hanover forecasts an increase in the number of poor elderly. From 2008 to 2020 they expect a 125% increase in seniors receiving basic state provision. These recipients will only be able to afford small and cheap accommodation (Haimann, 2011).
2.4.3. Ageing and housing prices

Attempts to estimate the impact of ageing of the baby-boom generation on house market prices have a long tradition in the academic literature and will be of special significance in the next few decades. This is due to the fact that the baby-boom generation has been a dominant force in the housing market for decades, swelling housing demand at each stage of the life cycle. When baby boomers first stepped onto the property ladder in the 1970s, they escalated gentrification in the city centres and intensified construction of starter houses in the suburbs. Later with the rise in their earnings and spending power they moved up the housing ladder. Now they are starting to retire, sometimes relocate and gradually withdraw altogether from the housing market (Myers and Ryu, 2008).

In one of the first empirical studies of demographics and housing the Harvard economists Mankiw and Weil (1989) found a significant positive relationship between housing prices and demand in the US and infamously predicted a controversial 47% decline in house prices through the 1990s, based largely on their modelling of the decline of baby-boomers’ housing demand as they aged. Their forecast turned out to be completely wrong, as prices surged until the sub-prime mortgage crisis of 2006-2008. The economist's paper motivated a series of other pieces of work on this topic. Engelhardt and Poterba (1991) find no similar relationship in Canada. Poterba (1991) identifies significant effects of housing demand on housing prices. DiPasquale and Wheaton (1994) challenge the view of instantaneous adjustment and proposed a gradual price adjustment process. In a different approach, DiPasquale and Wheaton (1996) perform a cross-section analysis for the United States. Studies outside North America are rare; Meese and Wallace (2003) elaborate on the Parisian

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30 Each respondent could choose three options.
real estate market; Terrones and Otrok (2004) estimate the growth in house prices using a multivariate model, and found a significant influence of population growth at a highly aggregated national level, in 18 industrialized countries on a yearly basis (1970–2003) and 13 on a quarterly basis (1980–2004). Meaning and Dust (2008) examine real estate prices for single-family houses on a disaggregated level of German metropolitan areas and studied the effects of both population growth and decline on prices. The authors conclude that falling population numbers are likely to be followed by significant (and varied at the regional level) price reductions.

Myers and Ryu (2008) analyse what will happen when the baby-boomers, who have driven up housing demand and prices for three decades since beginning to buy homes in the 1970s and who have since continued to ascend the property ladder, begin to sell off their high-priced homes to relatively smaller and less-advantaged generations. Based on the observation that seniors are net home sellers and that existing homes constitute ca. 85% of homes sold each year, they draw the conclusion that a continuous increase in the share of seniors in the society would effectively cause the ‘generational housing bubble’ to burst.

Börsch-Supan (2008b) analyses the potential future housing demand in Germany and finds that even under pessimistic assumptions (see Figure 2.5), a dramatic fall in housing demand and consequent fall in residential property prices are unlikely.

Levin et al. (2009) also examine the impact of demographic transition on house prices. The authors stress that the effects of demographic change on housing supply and demand are difficult to model empirically due to the coexistence and correlation of the significant number of institutional and economic variables which are additionally evolving over time. They conclude that ageing and shrinking of population exert “downward pressure on prices”.

2.4.4. Housing markets in shrinking cities

Interaction between the declining population numbers and demand patterns leads in a long run, despite the increase in the number of households, to structural vacancies. If these vacancies get accumulated in particular districts they can be a cause of spatial and social deterioration processes as it proved to be the case in many communities in eastern Germany31. Vacancies have had damaging impact on the whole districts (BMVBS, 2000). They mean loss of the value of the properties in the affected districts, lower or zero rental income, often inability to sell the property if needed. At the same time, most of property related costs in case of vacancies remain the same (interest on pre-existing debts, mortgage, refurbishment/modernisation loans, insurance, general repairs, cleaning, property tax).

The increase in number of vacancies contributes to and accelerates the process of social segregation. Typically, the most economically stable households leave as the first ones. From that moment on demographic structure of the property/ area is changing negatively. The number of older, one-person households increases and the number of young families with middle to higher income is on decrease. The inhabitants that stay experience the feeling of being left behind. The remaining households often start feeling insecure and also move away if only can afford that, not because there are no jobs or that they want to move into

31 In 2000 13% of housing stock in eastern Germany was vacant.
other particular location, but rather because of the anxiety related to increasing rate of vacancies and connected to it change in the image of the neighbourhood (according to estimations it happens where vacancies reach 30% or more of the housing stock – BVBS, 2012).

Development on the housing market goes in parallel and strengthens developments on the labour market and provision of services. The purchasing power in the area is going down, shops close down or move to other areas. The concentration of work places decreases. The high dispersion of work places leads to diffusion of work and shopping related travels with public transport. The utilisation rate of public local transport goes down faster than the number of working population. The use of private cars is on increase. Next to the housing stock itself there are problems with public infrastructure (compare sub-section 2.3). Schools are being closed; public transport provision cannot be kept on the existing level. All of these factors lead to further decline of the troubled neighbourhoods.

In consequence there appears the need to balance the housing market. In eastern Germany this has been done through the programme of massive demolition of existing, vacant housing stock. The programme Urban Redevelopment East (Stadtumbau Ost) has been introduced in 2002. Within 10 years of its functioning ca. 300 000 flats has been demolished as well as various improvement measures have been undertaken to improve the state of public space as well as technical and social infrastructure. Territorial and financial scope of the programme can be seen on Map 2.1. It presents locations of intervention and the scale of financial investment. On the whole, in 2002-2012 some 400 municipalities took part in the programme, and Bund allocated to it 1,2 billion Euros (BVBS, 2012).
Map 2.1. Cities and municipalities taking part in Stadtumbau Ost and financial resources dedicated to undertaken measures in these locations, 2002-2012.

References


Gáková, Z., Dijkstra, L., 2008: Labour Mobility between the Regions of the EU27 and a comparison with the USA, Regional Focus 02/2008, European Commission, DG REGIO. http://epc2010.princeton.edu/papers/100976


Fulmer, J., 2009: What in the world is infrastructure?, PEI Infrastructure Investor (July/August 2009), 30–32.


Hoisl, K., 2007: A closer look at inventive output – the role of age and career paths, Munich School of Management Discussion Paper No. 2007-12, University of Munich.


Just, T., 2009: Demografie und Immobilien, Oldenbourg, München.


Miles, D., 1997: Modelling the impact of demographic change upon the economy, CEPR Discussion Paper Series No 1762.


OECD, 2006a: Defining and measuring metropolitan regions OECD, Paris. www.oecd.org/document/28/0,3343,en_2649_34413_37837660_1_1_1_1,00.html


Online sources:

Infrastructur und Stadtumbau
http://www.stadtumbau.com/infrastruktur_und_stadtumbau.htm

Infrastructure, Online Compact Oxford English Dictionary
http://www.askoxford.com/concise_oed/infrastructure (accessed March 5, 2012)


OECD Family database: www.oecd.org/els/social/family/database

PART II: Demographic change and local government finance

Case study – Saxony, Germany
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1. Demographic change and local government finance

1.1. Sub-national territorial and institutional landscape in the EU27

1.1.1. Territorial organisation in the EU27

The territorial organisation of the 27 EU member countries is very varied, both at the state and at the sub-national level. The ways that local governments function and are financed differ considerably between countries, and depend on the geographical preconditions, political culture, and the advancement and characteristics of the decentralisation processes. Furthermore, the European territorial and institutional organisation is by no means a fixed structure; instead it is constantly evolving as a result of decentralisation and regionalisation processes (Dexia, 2008a).

At the state level EU member countries can be divided into three main categories: federal states (Austria, Belgium and Germany), quasi-federal “regionalised” states (Italy and Spain) and unitary states (all the remaining countries).

At the sub-national level EU countries are organised into one, two or three tiers of government:

- Nine countries have only one local government level, that of municipalities.
- Eleven countries have two local government levels: municipalities and the intermediary tier.
- The remaining seven countries, which are generally also the largest, have a three-level system: the municipalities, the intermediary tier and the regional level (CEMR-Dexia, 2011).

Municipalities enjoy different status in different countries. Even within the same country municipalities are often far from homogeneous and have different statutes based on their localisation, demographics, administrative organisation, economic structure or cultural characteristics (Dexia, 2008a). Consequently, there is a significant variability in the structure of local budgets across localities.

1.1.2. Sub-national government revenues

Sub-national public sector revenue can be divided into four major categories:

- Tax revenue from businesses and households;
- Grants and subsidies from the central state, the EU or the other levels of sub-national government;
- Revenue from providing goods and services (fees and charges);
- Borrowing.

---

1 State of play in 2010-2011.
2 Bulgaria, Cyprus, Estonia, Finland, Ireland, Lithuania, Luxembourg, Malta, Slovenia.
3 Austria, the Czech Republic, Denmark, Greece, Hungary, Latvia, Netherlands, Portugal, Romania, Slovakia, Sweden.
4 Belgium, France, Germany, Italy, Poland Spain, the United Kingdom.
At the EU27 level, excluding borrowing, tax revenue represents approximately 47% (27% own tax revenue and 20% shared sources), revenue from the operation of goods and services represents approximately 16% of total revenue. The remaining 37% come primarily from grants and subsidies\(^5\).

It is noticeable that sub-national government revenue structures in Europe vary between countries.

*Own tax revenue*

Own tax revenue is levied in almost every country in the EU (except Latvia and Malta), but its percentage in total revenue varies considerably among countries. Whilst Sweden derives 69% of its local revenue from own taxes, they make only 4% in Estonian sub-national budget. There are three main types of local tax: the property tax\(^6\), the local business tax and the local personal income tax. Their construction and share in the own tax revenue also varies across Europe.

*Shared taxes*

Systems of shared taxation and inter-governmental transfers of tax revenues are widespread in Europe. They are especially common in federal and regionalised countries. Shared taxes exist in a total of 20 EU countries. The only countries not using them are: Sweden, Luxembourg, the Netherlands, Ireland, Greece, Cyprus, and Malta. Taxes distributed via shared tax arrangements are most often high-yielding taxes, such as the personal income tax, the business tax and the VAT. Here, again, distribution rules are diverse.

*Grants*

Grants are financial flows that are allocated to sub-national governments, most often by the central government. They are used in all the countries and represent ca. 40% of total revenues of sub-national governments. The intensity of their usage differs among the countries. In some countries like Malta and Ireland they represent the majority of the local revenue – 80% and 65% respectively. In some others they represent a relatively small percentage of the local revenue, e.g. Belgium (17%) and Romania (6%).

\(^5\) This is data for 2005 based on Dexia (2008a).

\(^6\) By far the most common local tax in Europe.
Table 1.1. Breakdown of sub-national revenue in 2005* (%).

<table>
<thead>
<tr>
<th>Country</th>
<th>Own tax</th>
<th>Shared tax</th>
<th>Grants</th>
<th>Other revenue (incl. operations of goods and services)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>69</td>
<td>0</td>
<td>22</td>
<td>9</td>
</tr>
<tr>
<td>France</td>
<td>49</td>
<td>4</td>
<td>34</td>
<td>13</td>
</tr>
<tr>
<td>Denmark</td>
<td>49</td>
<td>3</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td>Finland</td>
<td>43</td>
<td>4</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Italy</td>
<td>34</td>
<td>10</td>
<td>47</td>
<td>8</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>34</td>
<td>0</td>
<td>44</td>
<td>22</td>
</tr>
<tr>
<td>Belgium</td>
<td>27</td>
<td>50</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Spain</td>
<td>25</td>
<td>24</td>
<td>42</td>
<td>9</td>
</tr>
<tr>
<td>Portugal**</td>
<td>25</td>
<td>4</td>
<td>40</td>
<td>31</td>
</tr>
<tr>
<td>Slovenia</td>
<td>17</td>
<td>40</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Netherlands</td>
<td>17</td>
<td>0</td>
<td>56</td>
<td>27</td>
</tr>
<tr>
<td>Poland</td>
<td>15</td>
<td>22</td>
<td>47</td>
<td>16</td>
</tr>
<tr>
<td>Germany</td>
<td>15</td>
<td>42</td>
<td>28</td>
<td>15</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>15</td>
<td>12</td>
<td>49</td>
<td>24</td>
</tr>
<tr>
<td>Hungary</td>
<td>13</td>
<td>16</td>
<td>29</td>
<td>41</td>
</tr>
<tr>
<td>Romania</td>
<td>12</td>
<td>75</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Slovakia</td>
<td>12</td>
<td>32</td>
<td>34</td>
<td>22</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>10</td>
<td>30</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>Austria</td>
<td>9</td>
<td>33</td>
<td>32</td>
<td>25</td>
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<tr>
<td>Ireland</td>
<td>9</td>
<td>0</td>
<td>65</td>
<td>26</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>6</td>
<td>43</td>
<td>39</td>
<td>12</td>
</tr>
<tr>
<td>Lithuania</td>
<td>5</td>
<td>30</td>
<td>55</td>
<td>10</td>
</tr>
<tr>
<td>Estonia</td>
<td>4</td>
<td>44</td>
<td>34</td>
<td>17</td>
</tr>
<tr>
<td>Malta</td>
<td>0</td>
<td>0</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>Latvia</td>
<td>0</td>
<td>47</td>
<td>40</td>
<td>13</td>
</tr>
<tr>
<td>TOTAL EU27</td>
<td>27</td>
<td>20</td>
<td>37</td>
<td>16</td>
</tr>
</tbody>
</table>

Notes: *Data for Cyprus and Greece do not appear due to the fact that no distinction is made between taxation and revenue from operational services. This category of revenue represents 57% of local government revenue in Cyprus and 32% in Greece. **Data for Portugal applies to municipalities only.

**Revenue categories:**

**Own taxes at sub-national level:** Property tax, local business tax, local personal income tax, other own local taxes.

**Shared taxation:** In shared tax schemes, sub-national governments receive a percentage of national tax revenue.

**Grants:** Grants are financial flows that are allocated to sub-national governments, most often by the central government. They can also come from federal states in federally-structured countries, from other local governments or from the EU.

Source: Dexia, 2008a, p.97.
1.1.3. Sub-national government areas of competence

The responsibilities and consequently also expenditures of the sub-national governments have been increasing successively since the end of 1970s when the decentralisation and regionalisation processes started occurring in the majority of European countries.

At the EU27 level, the two main sub-national public expenditures are social protection (19%) and education (20.8%). General services account for an average of 15.7% of sub-national budgets and the economic affairs for 12%, followed by health services and then housing and community amenities. However, the weight of these expenses varies considerably according to the responsibilities carried out by the sub-national sector in each country. For example, in Denmark, social protection services are responsible for 53.7% of local expenditure whereas in Slovenia, more than 41.4% of local expenditure is directed towards education. In Italy, 44.9% of sub-national expenditure is allocated to public health and in Malta 59.3% of the sub-national budget goes to general services, etc. (Dexia, 2008a, p.83).

Table 1.2. Main areas of sub-national public sector expenditure\(^7\) (in % of expenditure in 2009).

<table>
<thead>
<tr>
<th>Country</th>
<th>Education</th>
<th>Social protection</th>
<th>General services</th>
<th>Health</th>
<th>Economic affairs</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>18.6</td>
<td>19.2</td>
<td>15.7</td>
<td>22.2</td>
<td>13.9</td>
<td>10.4</td>
</tr>
<tr>
<td>Belgium</td>
<td>32.1</td>
<td>17.9</td>
<td>18.2</td>
<td>1.6</td>
<td>15.9</td>
<td>14.3</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>29.7</td>
<td>6.8</td>
<td>20.0</td>
<td>4.9</td>
<td>10.9</td>
<td>27.8</td>
</tr>
<tr>
<td>Cyprus</td>
<td>0.0</td>
<td>0.0</td>
<td>43.7</td>
<td>0.0</td>
<td>0.0</td>
<td>56.3</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>28.9</td>
<td>11.3</td>
<td>11.6</td>
<td>2.3</td>
<td>23.3</td>
<td>22.6</td>
</tr>
<tr>
<td>Denmark</td>
<td>10.8</td>
<td>54.2</td>
<td>4.2</td>
<td>23.2</td>
<td>3.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Estonia</td>
<td>37.9</td>
<td>7.4</td>
<td>7.9</td>
<td>15.0</td>
<td>17.8</td>
<td>14.0</td>
</tr>
<tr>
<td>Finland</td>
<td>18.7</td>
<td>24.4</td>
<td>14.6</td>
<td>29.1</td>
<td>6.2</td>
<td>7.0</td>
</tr>
<tr>
<td>France</td>
<td>16.5</td>
<td>16.7</td>
<td>18.7</td>
<td>1.1</td>
<td>12.4</td>
<td>34.7</td>
</tr>
<tr>
<td>Germany</td>
<td>22.3</td>
<td>27.5</td>
<td>22.1</td>
<td>1.6</td>
<td>10.3</td>
<td>16.2</td>
</tr>
<tr>
<td>Greece</td>
<td>2.4</td>
<td>11.1</td>
<td>39.5</td>
<td>0.0</td>
<td>20.2</td>
<td>26.8</td>
</tr>
<tr>
<td>Hungary</td>
<td>28.3</td>
<td>13.2</td>
<td>17.7</td>
<td>13.6</td>
<td>8.1</td>
<td>19.1</td>
</tr>
<tr>
<td>Ireland</td>
<td>16.1</td>
<td>9.4</td>
<td>3.6</td>
<td>0.0</td>
<td>26.3</td>
<td>44.7</td>
</tr>
<tr>
<td>Italy</td>
<td>8.1</td>
<td>4.7</td>
<td>15.7</td>
<td>44.2</td>
<td>13.9</td>
<td>13.4</td>
</tr>
<tr>
<td>Latvia</td>
<td>37.4</td>
<td>6.9</td>
<td>10.2</td>
<td>11.4</td>
<td>16.9</td>
<td>17.3</td>
</tr>
<tr>
<td>Lithuania</td>
<td>41.0</td>
<td>8.3</td>
<td>6.5</td>
<td>20.2</td>
<td>5.0</td>
<td>19.1</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>21.4</td>
<td>4.4</td>
<td>22.0</td>
<td>0.1</td>
<td>16.1</td>
<td>36.0</td>
</tr>
<tr>
<td>Malta</td>
<td>0.0</td>
<td>0.0</td>
<td>52.2</td>
<td>0.0</td>
<td>15.5</td>
<td>32.3</td>
</tr>
<tr>
<td>Netherlands</td>
<td>28.4</td>
<td>13.8</td>
<td>16.0</td>
<td>1.6</td>
<td>16.8</td>
<td>23.4</td>
</tr>
<tr>
<td>Poland</td>
<td>26.6</td>
<td>11.5</td>
<td>9.2</td>
<td>16.0</td>
<td>16.1</td>
<td>20.5</td>
</tr>
<tr>
<td>Portugal</td>
<td>9.7</td>
<td>6.4</td>
<td>31.7</td>
<td>5.3</td>
<td>19.0</td>
<td>28.0</td>
</tr>
<tr>
<td>Romania</td>
<td>25.6</td>
<td>17.3</td>
<td>12.4</td>
<td>2.1</td>
<td>18.8</td>
<td>23.9</td>
</tr>
</tbody>
</table>

\(^7\) According to COFOG classification of the Eurostat. The Classification of the functions of government, abbreviated as COFOG, was developed in its current version in 1999 by the Organisation for Economic Co-operation and Development and published by the United Nations Statistical Division as a standard classifying the purposes of government activities.
1.2. Demographic development at the regional level in the EU27

The EU27 population is projected to increase from 501 million in 2010 to 525 million in 2035, to peak at 526 million around 2040, and thereafter gradually decline to 517 million in 2060. The EU27 population is also projected to continue to grow older, with the share of the population aged 65 years and over rising from 17% in 2010 to 30% in 2060, and those aged 80 and over rising from 5% to 12% over the same period (Eurostat, 2011).

At the same time, while the total EU population is projected to rise by approximately 5% between 2010 and 2035, there is expected to be a considerable variation in local demographic development among different regions in the member countries.

Population numbers

According to the regional EUROPOP 2008 forecast by 2030, 98 EU regions are expected to lose population and 169 are expected to gain population. As shown in Figure 1.3 population may increase in Cyprus, Luxembourg and Malta and in all regions in Belgium, Denmark, Ireland, the United Kingdom, Norway and Switzerland. Similarly, the most heavily populated

---

8 In the EUROPOP2010 “convergence scenario”, which is based on the population on 1st January 2010 and on the assumption that fertility, mortality and net migration will progressively converge between Member States in the long run. Alternative assumptions in a different conceptual framework would yield different results. The Eurostat publication: Eurostat Population Projections 2010-based (EUROPOP2010): Methodology and results of a long-term scenario of demographic convergence provide additional details on methodology.
regions of Austria, the Czech Republic, Spain, Finland, France, Greece, Italy, the Netherlands, Portugal, Sweden and Slovenia are projected to increase in population over the period. At the same time, Estonia, Latvia and Lithuania and the majority of regions in Bulgaria, Romania, Hungary, Poland, Slovakia and Germany are expected to have a lower population by 2030 (Giannakouris, 2010).

Figure 1.1. Number of regions with decreased/ increased population between 2008 and 2030.

Note: CY, EE, LV, LT, LU, MT: NUTS level 2 coincides with the country level. FX: Metropolitan France. Total number of regions for the respective countries in parenthesis. Source: Giannakouris, 2010, p.1; (original source: Eurostat, regional EUROPOP2008).
Population age structure

The population in almost all analysed regions is projected to age. The joint effect of the existing population structure, fertility at below-replacement levels, and steadily increasing longevity is likely to increase the median age in all but a couple of all 267 regions. For the EU27, the median age of the population is projected to increase from 40.4 in 2008 to 45.4 in 2030 (and 47.9 in 2060). Consequently, nearly one in four regions is expected to have a median age of the population beyond 48 years in 2030. Table X presents a ranking of the top 20 regions with the highest proportion of elderly aged 65-79 and 80+. A relatively high share of inhabitants aged 65+ could predominantly be found in Germany (for those aged 65-79) and in Italy (for those aged 80+).

Table 1.3. Ranking of the top 20 regions with the highest proportion of elderly persons, 1 January 2009 (% share of total population).

<table>
<thead>
<tr>
<th>Ranking</th>
<th>NUTS</th>
<th>Region name</th>
<th>Aged 65-79</th>
<th></th>
<th>Ranking</th>
<th>NUTS</th>
<th>Region name</th>
<th>Aged 80+</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DE6</td>
<td>Chemnitz</td>
<td>19.0</td>
<td></td>
<td>1</td>
<td>IT1C</td>
<td>Liguria</td>
<td>8.1</td>
</tr>
<tr>
<td>2</td>
<td>IT6C</td>
<td>Liguria</td>
<td>18.7</td>
<td></td>
<td>2</td>
<td>FR63</td>
<td>Limousin</td>
<td>7.8</td>
</tr>
<tr>
<td>3</td>
<td>DE60</td>
<td>Sachsen-Anhalt</td>
<td>18.5</td>
<td></td>
<td>3</td>
<td>ES41</td>
<td>Castilla y León</td>
<td>7.5</td>
</tr>
<tr>
<td>4</td>
<td>DE62</td>
<td>Dresden</td>
<td>18.3</td>
<td></td>
<td>4</td>
<td>IT2E</td>
<td>Umbria</td>
<td>7.2</td>
</tr>
<tr>
<td>5</td>
<td>DE61</td>
<td>Brandenburg-Nordost</td>
<td>17.7</td>
<td></td>
<td>5</td>
<td>IT1E</td>
<td>Toscana</td>
<td>7.1</td>
</tr>
<tr>
<td>6</td>
<td>DE62</td>
<td>Brandenburg-Südwest</td>
<td>17.6</td>
<td></td>
<td>6</td>
<td>IT3E</td>
<td>Marche</td>
<td>6.9</td>
</tr>
<tr>
<td>7</td>
<td>DE63</td>
<td>Leipzig</td>
<td>17.6</td>
<td></td>
<td>7</td>
<td>IT4D</td>
<td>Friuli-Venezia Giulia</td>
<td>6.9</td>
</tr>
<tr>
<td>8</td>
<td>DE90</td>
<td>Thüringen</td>
<td>17.6</td>
<td></td>
<td>8</td>
<td>IT5D</td>
<td>Emilia-Romagna</td>
<td>6.9</td>
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<tr>
<td>9</td>
<td>DE90</td>
<td>Mecklenburg-Vorpommern</td>
<td>17.5</td>
<td></td>
<td>9</td>
<td>ES12</td>
<td>Principado de Asturias</td>
<td>6.9</td>
</tr>
<tr>
<td>10</td>
<td>PT18</td>
<td>Alentejo</td>
<td>16.7</td>
<td></td>
<td>10</td>
<td>IT2F</td>
<td>Mollise</td>
<td>6.7</td>
</tr>
<tr>
<td>11</td>
<td>GR25</td>
<td>Pomerania</td>
<td>16.6</td>
<td></td>
<td>11</td>
<td>UKK2</td>
<td>Dorset and Somerset</td>
<td>6.7</td>
</tr>
<tr>
<td>12</td>
<td>DE0</td>
<td>Saarland</td>
<td>16.6</td>
<td></td>
<td>12</td>
<td>FR53</td>
<td>Poitou-Charentes</td>
<td>6.6</td>
</tr>
<tr>
<td>13</td>
<td>GR21</td>
<td>Ipiros</td>
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<td></td>
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<td>FR72</td>
<td>Auvergne</td>
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</tr>
<tr>
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<td>Piemonte</td>
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<td>Galicia</td>
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<tr>
<td>16</td>
<td>ITD4</td>
<td>Friuli-Venezia Giulia</td>
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<td></td>
<td>16</td>
<td>IT1F</td>
<td>Abruzzo</td>
<td>6.4</td>
</tr>
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<td>GR14</td>
<td>Thessalia</td>
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<td></td>
<td>17</td>
<td>ES24</td>
<td>Aragón</td>
<td>6.4</td>
</tr>
<tr>
<td>18</td>
<td>GR24</td>
<td>Sterea Eliadha</td>
<td>16.2</td>
<td></td>
<td>18</td>
<td>DE61</td>
<td>Chemnitz</td>
<td>6.3</td>
</tr>
<tr>
<td>19</td>
<td>DEF0</td>
<td>Schleswig-Holstein</td>
<td>16.2</td>
<td></td>
<td>19</td>
<td>PT18</td>
<td>Alentejo</td>
<td>6.3</td>
</tr>
<tr>
<td>20</td>
<td>IT1E</td>
<td>Toscana</td>
<td>16.2</td>
<td></td>
<td>20</td>
<td>IT1C</td>
<td>Piemonte</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Note: 2008 instead of 2009 for regions in Belgium, the UK and Turkey.

Old-age dependency ratio

The increase in share of 65+ citizens will increase the old-age dependency ratio. Whereas in 2008 in the EU27 there were 4 persons of working age (15-64 years old) for every person aged 65 and over, in 2060 the ratio is expected to be 2 to 1 (Eurostat).
1.3. Impact of demographic change on the various categories of revenues and expenditures of local governments.

1.3.1. Impact on tax revenues at a state level and its implications for the local budgets

As already discussed in Section 1 of the study, shrinking and ageing of the European population in the coming decades will have a direct effect on the structure of working population. The number of working-age people will decline and the age structure of the workforce will change – the median age among working-age population will increase. Moreover, in the foreseeable future the shrinking and ageing workforce will have to support ever growing number of elderly.

There seems to be general consensus that the projected shrinking of the labour force in Europe over the coming decades will result in a decline of GDP and GDP per capita unless it is offset by higher capital input and technological progress (e.g. Börsch-Supan, 2008). In the case where both those variables will not grow any faster in the next few decades than at present, demographic change will gradually reduce the average rate of growth in the countries with shrinking populations (Just, 2004). Additional losses in GDP growth may need to be incurred, if ageing of the workforce results in lower productivity and increased labour costs.

At the same time, from a macro-economic point of view, the development of tax revenues depends on the development of the economy and on how the fiscal system relies on economic elements like income, turnover, value of real property, etc., as the basis for taxation (Figure 3.1). As a first approximation, a measure of this reliance is given by the tax burden ratio. If we assume that the tax burden ratio remains constant, public revenues will develop in line with gross national product (GNP) (Mäding, 2004). Seitz (2002) estimates that unless other growth factors do not compensate for the negative effect of population decline on the tax base a 1% drop in the population at the country level leads to a 1% decline in tax revenues. If the tax base subsides, or at least grows more slowly than before, higher expenditure can only be financed by higher tax rates. However, even this is merely theoretical, as the evasion effects and the impairment of growth would possibly frustrate attempts of this sort.
Age-related tax arrangements

The level of the nation-wide income tax collection will depend (among other things) on the state income tax treatment of pension and retirement income. The countries where pension income received by seniors is being preferentially taxed will experience a significant loss of revenue as the share of the population drawing pensions increases (Dye, 2007).

Potential negative development of the national GDP/GNP will have a direct negative impact on the shared taxes. Similarly, such negative development will affect grants and subsidies, as these are a function of the GDP/GNP.

Spending priorities

The amount of funds available to the particular levels of government will depend also on the spending priorities (and necessities) agreed at the national level. In this respect the expected increase in public spending on public pensions9, health care10 and long term care 11 is likely to limit funds directed to other causes, including local budgets.

9 Overall public pension expenditure in the EU27 is projected to increase by 1.5 percentage points (p.p.) over a period 2010-2060 to a level of 12.9% of GDP. The change in this spending is expected to vary largely across member countries from -3.8 p.p in Latvia to 9.4 p.p. in Luxembourg (European Commission and Economic Policy Committee, 2012, p.101).

10 Overall public spending on healthcare in the EU27 is projected to increase by 1.1. p.p. over a period 2010-2060 to a level of 8.3% of GDP. The projected difference in increase among countries range from 0.4 p.p in Belgium and Cyprus to 2.9 p.p. in Malta (European Commission and Economic Policy Committee, 2012, p.184; Age Working Group reference scenario).

11 Overall public spending on long-term care in the EU27 is projected to increase by 1.5. p.p. over a period 2010-2060 to a level of 3.4% of GDP. The projected difference in increase among countries range from 0.1 p.p in
All the elements discussed above affect the local budgets in that categories of local government income like shared taxes, subsidiaries and grants are directly related to the development of revenues at the state level.

1.3.2. Local budgets

Ageing and shrinking of population numbers will have a negative impact on sub-national revenues and expenditures. How exactly this impact will manifest depends on the following factors:

- sensitivity of local budget structures to demographic change (induced by different institutional frameworks);
- characteristics (severity) of the demographic change at the local level;
- economic standing and climate of local, regional and state economies.

1.3.2.1. Local revenues

Local revenues depend on development of the GDP at a country level (compare subsection 3.1), changes in the local tax base (e.g. property values, or taxable sales) and changes in tax rates at both national and local level.

Changes in local tax base

Decline in the number of inhabitants of the particular municipality equals reduction in the local tax base. Especially the outmigration of middle- and upper-income households (which are the most mobile ones) is likely to negatively impact local budgets as not only the likely tax payers are moving out, but also those remaining in the community are likely to be the poor and aged, and dependent on government (CBO, 2010).

Also, if younger age group (25-45) leave a community or decrease as a percentage of population, business activity can decrease in greater proportion, as people in this age group usually spend more of their income than those in any other age group. If this age group leaves, the community also loses a significant portion of its labour force, which can further damage the local economy.

Similarly, an increase in amount of elderly in the community can further reduce existing tax base. Revenues may be affected for two reasons. First, the income of senior citizens is often in the form of social security and pension payments, which might not change at the same rate as the general economy, and senior citizens often have full or partial exemption from property taxes and user charges. Second, older persons may spend less money than younger persons (Havesi, 2006).

1.3.2.2. Local expenditures

The concept of ‘Residual costs effect’

At first glance a decline in population appears to relieve the pressure for expenditures, because the population requiring services is smaller. However, in practice a local government faced with population decline is rarely able to make reductions in expenditures that are proportional to the population loss. It is due to so called ‘residual cost effect’.

‘Residual costs effect’ (Remanenzkosteneffekt) takes place where per capita costs for the municipality services increase although the demand for these services falls (together with the population decline). Residual costs may arise due to the high fixed costs of the particular service (as in case of infrastructure). They can be however also caused by chosen structure/ pattern of service provision, e.g. where social infrastructure at the certain proximity to the settlements (e.g. schools, hospitals), although the utilisation of the facilities is decreasing. This can be either intentional or a consequence of unprofessional/inefficient reduction of the existing supply.

The isolation of ‘residual costs effect’ is at the heart of BMVBS/BBR (2007) – study analysing the impact of demographic change in eastern Germany on the local budgets. Its authors analyse 87 areas of municipal responsibility, in urban and rural municipalities as well as in the cities and counties. They differentiate between 4 different levels of residual costs intensity. Within the wide range of services affected by residual costs authors of BMVBS/BBR (2007) enlist:

- representative bodies;
- financial controlling, head office, financial administration, administration facilities;
- emergency rescue services;
- school administration, schools and school transport;
- cultural administration, adult education centres, libraries;
- general social services, youth welfare services, local insurance offices, public health administration;
- child-raising support;
- healthcare and sport facilities;
- building authorities, town planning, building regulations, housing promotion services;
- municipal and county roads;
- technical infrastructure.

Elderly-biased local expenditures

As the proportion of senior citizens increases, expenditure rates for government services may increase because senior citizens often require specialised programs, especially in the areas of health, welfare, and transportation.
1.4. Demographic indicators signalling potential negative fiscal development

BMVBS/BBR (2007) (p.37) proposes monitoring two demographic indicators related to the fiscal development of the area.

a. Decline in population numbers

Long lasting and severe decline in population numbers is likely to lead to diminishing of local income tax revenues, and decline in allocation of resources from other sources/levels of government where they are dependent on the local population numbers. At the same time, persistence of residual costs leads to increase in the per-capita expenses in many areas of infrastructure (Mäding, 2004).

b. Percentage of 64+ year olds in local population

The percentage share of people over 64 can signal a weak economic standing of the localisation, where demographic development is a result of younger generations moving out due to lack of jobs and future perspectives. This trend is likely to develop into a ‘vicious circle’ where decrease in number of younger people brings further population decline, due to the ever lower amount of births in the area (Pohlan and Wixforth, 2005). Moreover, an increase in the percentage of old inhabitants leads to a surge in the demand for additional infrastructure (Baum, Seitz and Worobjew, 2002)

Both elements should be considered not only in one point in time, but should rather be analysed in terms of their development in time – past trends and future forecasts.

1.5. Possible local reaction strategies to fiscal stress

In response to fiscal stress caused by shrinking and ageing of the population local governments can take four routes. They can reduce spending in some areas through budgetary reallocations, decrease spending altogether, increase taxes and fees, or increase debts to bridge a gap between spending and revenues (Gruber and Wise, 2001). The realm of those adjustments is necessarily limited by existing regulations, political decision making process, as well as other factors (CBO, 2010).

1.5.1. Budgetary reallocations

The structure of government spending can be seen as a function of the demographic makeup of the population. This is true for two reasons. First, different age cohorts make different use of different goods and services provided by the government. Second, changing demographics alter political outcomes and consequently also budget allocations (Auerbach and Lee, 2001).

Gruber and Wise (2001) suggest that if current trends carry on, the ageing of the societies will translate into significant increases in transfers to the elderly and consequent reductions in spending elsewhere, including the non-elderly. In their analysis of 13 developed countries they calculate that, if transfers of the recent past can be extrapolated into the future, the ageing of population will, by 2050, increase the percentage of the GDP devoted to spending on the elderly from 8.2 percent to 11.4 percent, on average, among the analysed countries.
Concurrently, they find that ageing of the population causes “equal and opposite reductions in spending elsewhere, so that on net there is no change in transfers as the population ages” (p.18).

The question of how population ageing affects the spending on non-elderly has been addressed by Borge and Rattso in their study of 2008. Authors, using panel data from Denmark, run an analysis of spending in child care, primary and lower secondary education, and care for the elderly related to the numbers of young and old voters. They conclude that, consistent with earlier European and US studies focusing on generational conflict, they find evidence of generational conflict in the sense that a larger share of elderly voters reduces educational spending.

Montén and Thum (2010) analyse the impact that ageing has got on the provision and distribution, between different age groups, of publicly provided goods at the local level in the context of fiscal competition between ageing municipalities. They come to the conclusion that although the young population faces the threat of under-provision once the elderly gain the majority, their situation improves if the share of elderly is sufficiently large and the competition for the mobile young population intensifies between municipalities. Where municipalities are financed largely through per capita grants and where local budget depends on the number of inhabitants, they are bound to provide young generations with services in order to attract them.

1.5.2. Decreasing spending

In the times of fiscal stress local governments tend to postpone capital investments. Although the consequences of putting those investments on hold are often not instantaneous they may eventually result in the breakdown of systems and equipment or the need to make an additional investment in repair costs in the future. Consequently, in the long run, a municipality may start losing residents who decide to change location if services are cut (or taxes raised) too extensively. That would cause the local government to lose the tax base and end up with lower revenues than before (CBO, 2010).

1.5.3. Raising taxes

In response to fiscal stress local governments have also an option of increasing local taxes and fees. This solution, however, has got its weaknesses. First, there might be a legally induced limitation on the extent to which local governments can increase tax rates or collections in the given year (CBO, 2010). Second, too high local taxes and fees may discourage individuals and businesses from staying or locating in a particular jurisdiction (UN Habitat, 2009).

Consequently, local governments might face a challenge of keeping their territories economically viable by delivering a required level of services while keeping taxes at the acceptable level. Moreover, the question is not only how the tax collection will change under the new demographic regime, but ultimately also how the tax structure will change under the dominance of older voters.
1.5.4. Increasing debts

Another possibility for the local governments is to increase the level of debt in order to cope with fiscal stress. As in case of delaying payments, borrowing does not resolve the need to pay for expenses but only postpones it, and may actually increase those expenses due to resulting debt-service costs. Municipalities typically use the short-term debt to fund operating deficits and the long-term debt to fund capital expenses. Local governments that borrow extensively and may end up being perceived as having a significant risk of default and, consequently, may have to pay considerably higher interest rates than those that borrow more conservatively. Additionally, differences in borrowing costs tend to widen in the periods of general economic decline (CBO, 2010).

2. Case study – Saxony, Germany

2.1. Fiscal federalism

Most studies that examine the interrelation between demographics and public finance take a look at the budget of the central government or the total government sector and concentrate on the financing of publicly funded social security systems. At the same time, in federal systems, each level of government has different tasks and different structure of revenues which in turn differ with respect to their sensitivity to demographic change. Repercussions of demographics on public expenditures and revenues depend on the structure of federal system, and can divert significantly across the different levels of governments. Consequently, the aggregate, total government sector’s financial position is only partly representative for financial situation on particular levels of government. It is therefore important to conduct a disaggregate analysis for each level of government (Seitz and Kempkes, 2007; Seitz, 2007).

Germany is a federal state composed of three levels of government: federal, state (Länder), and local - municipalities (Gemeinden), district-free cities (Städte) and counties (Kreise).12

The division of revenues and expenditures between the different levels of government goes as follows:

On the revenue side, there is a predominance of joint taxes. About 68 percent of all tax revenues belong to this type of revenues. Some 20 percent of tax revenues accrue to the federal government only, approximately 4 percent to state government, and about 8 percent to the local government sector. Sub-national governments have a rather low power to set taxes. However, by voting in the Upper Chamber (Bundesrat), the states participate in the tax legislation process considerably. In addition, the states and the federal government negotiate the distribution of tax revenues out of shared taxes, especially the value-added tax, between levels of government. At the state level, there is a pronounced fiscal equalization system in which financially strong states make equalization payments to financially weak states and the federal government provides additional complementary federal grants to financially weak states13. The most important variable that determines the distribution of tax revenues among

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12 In 2012 there were 11,292 municipalities, 116 district-free cities and 323 counties within 16 states.

13 This approach is rooted in the German constitution (art. 72) which states that policy should aim at making living conditions equal across regions in Germany.
the 16 states and among the numerous local governments is the number of inhabitants. Consequently, the strong equalization system brings about a weak correlation between state economic performance and per capita state revenues. Intergovernmental transfers are of considerable importance both between the federal and state government level as well as between state governments and the local government level. At the state level, about 16 percent of all expenditures are financed by other levels of government (primarily the federal government) and at the local level about 34 percent of total expenditures are financed out of grants provided by state governments. Finally, co-financing of tasks is quite common in Germany and consequently there is no clear division of (political and financial) responsibilities between the different layers of government14.

Table 1 presents the structure of tax revenues by level of government in 2004. About 70 percent of total tax revenues are from shared tax resources. At the federal and local level about 40 percent of tax revenues are from own resources, whereas at the state level the ratio is only about 15%.

Table 2.1. The structure of taxes in Germany, 2004.

<table>
<thead>
<tr>
<th>Level of government</th>
<th>Total tax revenues in mill. Euro</th>
<th>Share of tax revenue out of shared taxes</th>
<th>Share of own tax resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>federal</td>
<td>208.9</td>
<td>59.5%</td>
<td>40.5%</td>
</tr>
<tr>
<td>state</td>
<td>163.3</td>
<td>84.7%</td>
<td>15.3%</td>
</tr>
<tr>
<td>local</td>
<td>51.8</td>
<td>58.1%</td>
<td>41.9%</td>
</tr>
<tr>
<td>total</td>
<td>424.1</td>
<td>69.1%</td>
<td>30.9%</td>
</tr>
</tbody>
</table>


On the expenditure side, there also is co-sharing and co-financing of activities by different layers of government. In addition, wages and working conditions in the public sector are fixed centrally. Table 4.2 presents data on the spending structure of the different layers of government disaggregated by 29 spending categories. Because of the importance of intergovernmental transfers, the expenditures of the various government levels cannot simply be added. Therefore, net expenditures here are defined as total expenditures less transfers received from other levels of government.

At the federal level, the most important spending categories are welfare (41 percent), the bulk of which are transfers to the public pension system, interest payments (13.4 percent), and defence (9 percent). At the state level, spending on education has the highest share (about 31 percent). Public order (police), interest payments and pension payments for retired public servants, as well as social welfare account for about 10 percent of state expenditures. At the local level, spending on social welfare amounts to approximately 30 percent of expenditures. Most of these expenditures are means-tested social assistance benefits. Roughly 20 percent of local government resources are spent on community development, housing, and education. It should be noted that spending on health out of public budgets is of only minor importance at the federal, state, and local government level in Germany. Public health expenditures, including long-term care, are financed out of social security contributions paid by employers and employees. However, at the state and local government level, minor health-related expenditures arise because the public sector provides investment...

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14 Currently, a reform of the federal system is being discussed in Germany to generate more transparent federal-state relations and to reduce co-financing of tasks between the two levels of government.
grants for hospital buildings and homes for the elderly and the handicapped. In addition, there are means-tested social assistance benefits for handicapped and elderly persons that do not have sufficient claims on the social security system.

Table 2.2. Net expenditures by category as a share of total net expenditures at the federal, state and local government sector in Germany in fiscal year 2002 (in percentages).

<table>
<thead>
<tr>
<th>Function</th>
<th>Federal</th>
<th>State</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 General public services and administration</td>
<td>4.4</td>
<td>6.0</td>
<td>15.2</td>
</tr>
<tr>
<td>2 Defense</td>
<td>8.9</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>3 Public order and safety</td>
<td>0.8</td>
<td>5.9</td>
<td>6.3</td>
</tr>
<tr>
<td>4 Jurisdiction and prison</td>
<td>0.1</td>
<td>4.8</td>
<td>0.0</td>
</tr>
<tr>
<td>5 Schools</td>
<td>0.0</td>
<td>18.6</td>
<td>10.1</td>
</tr>
<tr>
<td>6 Kindergarten</td>
<td>0.0</td>
<td>1.4</td>
<td>7.1</td>
</tr>
<tr>
<td>7 Universities</td>
<td>0.8</td>
<td>8.6</td>
<td>0.0</td>
</tr>
<tr>
<td>8 Financial support to students</td>
<td>0.4</td>
<td>0.7</td>
<td>1.3</td>
</tr>
<tr>
<td>9 All other education</td>
<td>0.1</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>10 Research outside universities</td>
<td>2.4</td>
<td>1.1</td>
<td>0.2</td>
</tr>
<tr>
<td>11 Culture</td>
<td>0.1</td>
<td>1.7</td>
<td>4.4</td>
</tr>
<tr>
<td>12 Health and environmental protection</td>
<td>0.4</td>
<td>2.6</td>
<td>7.5</td>
</tr>
<tr>
<td>13 Housing and community amenities</td>
<td>0.6</td>
<td>2.4</td>
<td>17.6</td>
</tr>
<tr>
<td>14 Agriculture, forestry, and fishing</td>
<td>0.4</td>
<td>1.8</td>
<td>0.2</td>
</tr>
<tr>
<td>15 Fuel, energy, and water</td>
<td>2.4</td>
<td>2.9</td>
<td>1.8</td>
</tr>
<tr>
<td>16 Transportation and communication</td>
<td>3.6</td>
<td>2.7</td>
<td>7.1</td>
</tr>
<tr>
<td>17 Other economic affairs and public property administration</td>
<td>8.7</td>
<td>1.9</td>
<td>7.9</td>
</tr>
<tr>
<td>18 Pensions for retired public servants</td>
<td>2.2</td>
<td>9.7</td>
<td>4.2</td>
</tr>
<tr>
<td>19 Interest payments</td>
<td>13.4</td>
<td>9.5</td>
<td>5.1</td>
</tr>
<tr>
<td>20 Administration of social welfare</td>
<td>0.1</td>
<td>0.6</td>
<td>3.1</td>
</tr>
<tr>
<td>21 Transfers to the pension system</td>
<td>26.9</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>22 Other transfers to the social security system</td>
<td>3.4</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>23 Social assistance</td>
<td>0.2</td>
<td>4.0</td>
<td>19.8</td>
</tr>
<tr>
<td>24 Youth welfare</td>
<td>0.1</td>
<td>1.1</td>
<td>6.6</td>
</tr>
<tr>
<td>25 Support for families and mothers</td>
<td>2.1</td>
<td>1.6</td>
<td>1.2</td>
</tr>
<tr>
<td>26 Other social welfare</td>
<td>2.0</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>27 Labor market policy and support for the unemployed</td>
<td>6.2</td>
<td>1.1</td>
<td>0.0</td>
</tr>
<tr>
<td>28 Unconditional transfers to other levels of government (transfers received minus transfers paid)</td>
<td>8.9</td>
<td>6.1</td>
<td>29.7</td>
</tr>
<tr>
<td>29 Other expenditures</td>
<td>0.2</td>
<td>1.4</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note: Line 28 – these are transfers that are not earmarked to a specific purpose (as ones in positions 1-27). The federal government provides considerable unconditional transfers to state governments, especially to the East German states, and state governments pay a significant amount of money as unconditional transfers to local governments. Because the local government sector makes only small transfer payments to the state government sector, net expenditures in this function at the local level are negative.
Box 2.1. Age-profile model

Hofmann et al. (2008) propose a simple method of assessing the impact of demographic change on fiscal position of different government levels. Authors calculate per capita age-cost and age-revenue profiles for seven age groups at different levels of German government\textsuperscript{15} in 2004.

Figure 2.1. Age cost profiles for Germany in 2004 by level of government (Euro per capita).

![Age cost profiles for Germany in 2004 by level of government](image)

Source: Hofmann et al., 2008, p.32.

Figure 2.2. Age revenue profiles for Germany in 2004 by level of government (Euro per capita).

![Age revenue profiles for Germany in 2004 by level of government](image)

Source: Hofmann et al., 2008, p.32.

\textsuperscript{15} Only primary expenditures are taken into account.
Authors conclude that demographics have varied impact on budgets of different government layers. In the system like this, with demographic prognosis of less children and more elderly, government levels biased towards the elderly can expect increasing pressure and lack of space for manoeuvre, whilst governments focusing on younger generation can expect the burden to be eased.

This simulation suggests that in German system municipalities will be relative ‘winners’ in the process of ageing, as they services offer is biased towards young generations.

This analysis addressed the issue of ageing as in age-structure and does not address the issue of population decline. Therefore, it does not include residual costs which take place where per capita costs for the municipality services increase although the demand for these services falls following the population decline (compare with Part II, section 3.2.2).

2.2. Demographic development at the regional level

Germany is one of the most rapidly ageing countries in the industrialised world.

Population numbers

German regions are projected to be among the most severely ageing and shrinking European regions. 28 out of 39 regions are likely to lose population between 2008 and 2030 (compare with figure 2.1). All of the regions in eastern Germany except Berlin will be affected. The biggest population losses between 2010 and 2030 are expected in Chemnitz (-21,5%), Sachsen-Anhalt (-21,2%), Dresden (-19,5%) and Thuringen (-18,7%). Meklemburg-Vorpommern is projected to lose 10,9%, Leipzig - 8,2%, Brandenburg-Nordost - 7,9% and Brandenburg-Südwest - 7,7% (Ginnakouris, 2010).

Population structure

7 German regions are among the 10 regions with the highest median age of the total projected population in Europe in 2030. With median age above 52.8 years – these are
Chemnitz, Sachsen-Anhalt, Brandenburg-Nordost, Brandenburg-Südwest and Mecklenburg-Vorpommern (see Figure 5.2)

Figure 2.4. The ten regions with the highest median age in 2030 and 2008.

Saxony

The main features of population development in Saxony in the period 1990-2020 are as follows (compare with Table 4.3):

- There has been a constant decline in population from 4,775,900 in 1990 to 4,143,700 in 2010 and further down to forecasted 3,874,700 in 2020, which constitutes a 19 percent decline.
- The average age in the population was 39.4 years in 1990 and increased to 45 years in 2006. It is expected to further increase up to 48.8 years in 2020. There are also very considerable differences at the regional level expected.
- The number of children and youth under the age of 15 has been decreasing systematically. In 1990 there were 885,500 persons in Sachsen in this age group, and in 2006 there were only 437,400 of them. Until 2020 there is a slight increase in this group’s numbers expected. The share in the population of this group evolved from 18.5 percent in 1990 down to 10.3 in 2006 and it is expected to increased up to 11.4 percent in 2020.
- The number of people in the age group between 15 and 65 (working age population) has gone down from 3,139,400 in 1990 and is expected to amount to 2,328,200 in 2020. The share of this group in the population was relatively levelled up in 1990-2006 (66.6 percent). The expected development up to 2020 is a reduction down to 60.1 percent.
- There has been a considerable increase in the share of retired persons, and it is expected to increase further in the future – from 751,000 in 1990 to 1,102,900 in 2020. The share of this age group in the total population is expected to change from 15.7 percent (in 1990) to 28.5 percent (in 2020).
- Also the number of ‘very old’ citizens will increase. The age group 75-79 consisted of 170,900 in 1990 and is expected to increase to 218,800 in 2020. The increase in the ‘very old’ will be the most considerable, from 71,100 to 166,200, which is more than doubling.
Table 2.3. Indicators of demographic change in Saxony, 1990-2020.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average age (in years)</td>
<td>39,4</td>
</tr>
<tr>
<td>Total population</td>
<td>885,5</td>
</tr>
<tr>
<td>under 15</td>
<td>3,139,4</td>
</tr>
<tr>
<td>15 to 65</td>
<td>751,0</td>
</tr>
<tr>
<td>65 and over</td>
<td>18,5</td>
</tr>
<tr>
<td>Population (in %)</td>
<td>65,7</td>
</tr>
<tr>
<td>under 15</td>
<td>15,7</td>
</tr>
<tr>
<td>15 to 65</td>
<td>6,7</td>
</tr>
<tr>
<td>65 and over</td>
<td>1,5</td>
</tr>
<tr>
<td>Youth dependency ratio**</td>
<td>282</td>
</tr>
<tr>
<td>Old-age dependency ratio***</td>
<td>239</td>
</tr>
<tr>
<td>Total population</td>
<td>75 to 79</td>
</tr>
<tr>
<td>80 to 84</td>
<td>127,1</td>
</tr>
<tr>
<td>85 and over</td>
<td>71,1</td>
</tr>
<tr>
<td>Population (in %)</td>
<td>75 to 79</td>
</tr>
<tr>
<td>80 to 84</td>
<td>2,7</td>
</tr>
<tr>
<td>85 and over</td>
<td>1,5</td>
</tr>
<tr>
<td>In total</td>
<td>4,775,9</td>
</tr>
</tbody>
</table>


** Youth dependency ratio: Number of persons in age between 0 and 15 per 1000 persons age between 15 and 65.
*** Old-age dependency ratio: Number of persons in age 65 and over per 1000 persons age between 15 and 65.
2.3. Sensitivity of municipal budgets to demographic change

2.3.1. Impact of demographic change on municipal revenues

Table 4. Revenues of German municipalities and district-free cities.

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in Mrd. €</td>
</tr>
<tr>
<td><strong>Revenues:</strong></td>
<td>180,9</td>
</tr>
<tr>
<td>Taxes</td>
<td>67,0</td>
</tr>
<tr>
<td>- local business tax (Gewerbesteuer)</td>
<td>29,1</td>
</tr>
<tr>
<td>- share of sales tax (Anteil an Umsatzsteuer)</td>
<td>3,4</td>
</tr>
<tr>
<td>- share of income tax (Anteil an Einkommensteuer)</td>
<td>23,4</td>
</tr>
<tr>
<td>Payments from federal and länder governments (Investitionszahlungen von Bund und Land)</td>
<td>59,3</td>
</tr>
<tr>
<td>Investment payments from federal and länder governments (Investitionszahlungen von Bund und Land)</td>
<td>10,0</td>
</tr>
<tr>
<td>Fees and charges for services (Gebühren)</td>
<td>16,5</td>
</tr>
<tr>
<td>Contributions, consumption tax, capital revenues (Beiträge, Erwerbseinnahmen, Veräußerungserlöse)</td>
<td>5,3</td>
</tr>
<tr>
<td>Other (incl. property tax)</td>
<td>22,9</td>
</tr>
</tbody>
</table>


2.3.1.1. Own tax revenues

- **The local business tax (Gewerbesteuer)** is levied on all industrial and commercial companies. Local authorities are autonomously determining the level of this tax. Local governments retain 80% of the receipts and transfer the rest to the Central State and the Federated States.

Companies that produce for the local market can be confronted with reduction in the local demand and/or the change in the local demand related to the change in the numbers and age structure of the local population (which depending on the business can have positive or negative consequences). Companies that produce for the external markets are dependent on the demographic development in these markets in the context of number and age-profile of the customers. Additionally, the operations and profits of both types of companies can be potentially affected by the demographically driven quantity and quality of their workforce.

- **The property tax (Grundsteuer)** is based on the assessed value of the property. As in case of local business tax, local governments are autonomously determining the level of this tax. Revenue from this tax varies considerably between western and eastern parts of Germany. It is due to the fact that (a) economically attractive areas attract new property developments and investments, (b) the value of the properties in these areas is higher than in the economically weaker ones, and (c) thanks to the stronger income base in these areas property owners are able to pay higher levels of property taxes. It can be therefore said that if demographic change is likely to affect
the property tax to extent to which it affects local economic development and the value of the local property market.

- **Other local taxes** (*Steuerfindungsrecht*) e.g. the dog tax, the tax on entertainment, on weekend homes, or on beverages are setup freely by the municipalities.

### 2.3.1.2. Shared tax revenue

- **The personal income tax**¹⁶ (*Einkommensteuer*): municipalities obtain 15% of the national PIT. This share is distributed between municipalities according to specific distribution mechanism which links the tax capacity and the number of taxpayers of each municipality¹⁷.

The personal income tax capacity depends strongly on the number of the working-age persons (and potentially also on the age structure of the workforce). Therefore shrinking and ageing processes are likely to impact negatively on the local income tax share. It has been observed (BVBS/BBR, 2007) that shrinking municipalities not only loose in terms of the total share of the PIT but also in per capita terms.

- **The VAT** (*Umsatzsteuer*): municipalities receive 2.1% of the national VAT. Local tax receipts depend on the level of local business tax receipts and on the number of employed in each municipality.

- **The tax on interest** (*Zinsabschlag*): municipalities qualify for 12% of this tax.

### 2.3.1.3. Grants

- **General grants** (*Schlüsselzuweisungen*): these are assessed based on criteria combining the number of inhabitants and cost of running local services per capita¹⁸.

- **Specific requirement grants** (*Bedarfzuweisungen*): devised for municipalities suffering from severe budget difficulties.

- **Compensation grants** (*Kostenerstattungen*): compensate for the costs incurred while exercising responsibilities on behalf of the Land.

- **Investments transfers** (*Investive Zuweisungen*): allocated to investment projects prioritised by the federal or land level of the government.

These are assessed based on criteria combining the number of inhabitants and cost of running local services per capita¹⁹. In this respect shrinking of the local population can be directly linked to the fall in the general grants. Moreover, if demographic change negatively affects German GDP the payments to the particular states may decrease simply because of the shrinking of the general pool of money.

Municipalities in Sachsen (typically for municipalities in Eastern Germany) are highly dependent on the transfers, therefore their fiscal situation is tightly connected to the

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¹⁶ On Januar 1, 2005 a new law on taxation of old age pensions (Alterseinkünftegesetz) entered into force. According to this law, pension from the statutory pension insurance (and other forms of pensions) shall be gradually carried over to full taxation. This process will stretch from 2005 until 2040 ([http://www.canada.diplo.de/Vertretung/Kanada/env02/pension/pension-taxation.html#topic1](http://www.canada.diplo.de/Vertretung/Kanada/env02/pension/pension-taxation.html#topic1)).

¹⁷ There is a ceiling for the level of taxable income that can be taken into account (which is not the same for the western and the eastern parts of the country) in order to put a cap on the amounts received by municipalities with high earning taxpayers (Dexia, 2008).

¹⁸ Other criteria, such as area, the facilities or the number of unemployed are also taken into account.

¹⁹ Other criteria, such as area, the facilities or the number of unemployed are also taken into account.
financial development at the state level (this dependency is much weaker in western states).

2.3.1.4. Other revenue

- **Fees for provision of public services**

  Unless public services get adjusted in their scope and profile to the changing population, the decline in population is likely to result in the increase in costs per capita.

2.3.2. Impact of demographic change on municipal expenditures

Expenditures of the local government level in Germany have been presented in table 4.5. The three key spending categories of German municipalities are personnel expenditures, material expenditures and social services, which in 2011 amounted together to 69% of all expenditures of municipalities and district-free cities.

<table>
<thead>
<tr>
<th>Expenditures:</th>
<th>2011 in Mrd. €</th>
<th>2011 in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel (Personal)</td>
<td>46,4</td>
<td>25,0</td>
</tr>
<tr>
<td>Material expenditure (Sachaufwand)</td>
<td>38,2</td>
<td>20,5</td>
</tr>
<tr>
<td>Social services (Soziale Leistungen)</td>
<td>44,7</td>
<td>24,0</td>
</tr>
<tr>
<td>Payments to the government sector (Zahlungen a. öffentlichen Bereich)</td>
<td>7,7</td>
<td>4,4</td>
</tr>
<tr>
<td>Interest (Zinsen)</td>
<td>4,2</td>
<td>2,3</td>
</tr>
<tr>
<td>Capital investments in fixed assets (Sachinvestitionen)</td>
<td>23,1</td>
<td>12,4</td>
</tr>
<tr>
<td>Other</td>
<td>21,7</td>
<td>11,7</td>
</tr>
</tbody>
</table>


In this study we have already looked at how demographic change is likely to affect technical and social infrastructure as well as local housing markets. Please refer to Part I, subsections 2.3 and 2.4.

We now analyse how demographic change is likely to affect the three main spending categories of Germany municipalities.

2.3.2.1. Personnel

Spending on personnel will be affected by both – changing population numbers and age structure. If per capita spending in the shrinking areas was not to be increased, there should be personnel reductions implemented, adequate to the level of local population shrinkage. For Saxony that would mean reductions of ca 7% of staff between 2010 and 2020 (compare with table 4.3). However, practice shows that personnel numbers cannot be adjusted flexibly following the decline of population numbers, which leads to increasing costs per inhabitant (Seitz, 2002).
At the same time, the change in age structure of local population is likely to result in shifts in demand for particular services (e.g. less demand for children-related services and more for elderly-related ones).

2.3.2.2. Material expenditures

Material expenditure is a broad category of expenditure (Lenk, 2004; Schaden, 1995). It consists of (among others): maintenance of buildings and sites, rents, leasing related payments, keeping motor vehicles, current business necessities, consumables, teaching and learning aids, pieces of equipment etc. The amount of required materials is strongly correlated with the number of personnel, through the amount of needed office space, office materials etc. Where personnel reductions are not adequate to the level of local population shrinkage, there is likely also an increase in the material expenditure per person.

Empirical studies (Gemeindefinanzbericht SSG, 2004/2005) suggest that in the shrinking cities the decline of population of 1% leads to an increase in per-capita material expenditures of ca 2%.

2.3.2.3. Social expenditure

The level of social expenditure is defined by the number of persons entitled to benefits and on the level of the service that these persons are entitled to. The entitlement is being dictated at the federal and state level, so the municipalities do not have much power to make decisions in that regard.

Future oriented analysis of the impact of demographic change on social expenditure is very complicated due to the fact that not only there are many variables (demographic development, economic development, employment development etc.), but it is also likely that there will be some legal changes introduced in the provision of social care.

Although demographic shrinking might be expected to lead to a lower unemployment, the ‘high-tech oriented’ structural change in western economies and their labour markets might lead to a situation where qualified workforce will coincide with the increased unemployment among poorly qualified.

Another issue is the economic security of the elderly. Development on the labour market described beyond might lead to an increased problem of poverty among elderly.

Finally, in a society in which an increasing number of people live in one-person households will require growing per capita spending for elderly related services. According to some estimates, some 80 per cent of care services are today still performed in the family. With fewer children and growing work-related mobility, such services will in the future have to be delivered through specialised providers (at least some of them through municipal social assistance) (Mäding 2004).
2.4. Action, process and tool requirements in managing shrinking and ageing cities

Changing demographics require local governments to undertake adaptive measures. There are several fields of required action at a local level (Wiechmann and Siedentop, 2008, p.6; BVBS/BBR, 2007, p.75):

1. Monitoring of demographic development in the area

*Early/timely recognition of demographic changes and their consequences*

This should be organised as a long term activity. Lack of adequate forecasting and monitoring can result in too late and ad hoc reactions to the negative changes which neither solve the problem, nor can stop the negative trend. An example for that is Eastern Germany where, due to initial lack of long term consideration for the problem, a lot of ‘plattenbau’ has first been refurbished by the public hand and now stands empty and often waits to be demolished.

*Monitoring tools*

One of the classic tasks of the local government is monitoring of its spatial development. In the face of the high dynamic of demographic changes and possible resulting changes of the housing market, there is an increased need for a detailed data. It should be used as the basis for planning and evaluation of urban re-development processes as well as a compass for making decisions about division of the limited financial resources for urban re-development.

Such spatial monitoring is especially relevant in big cities and should be used for planning the re-development process and defining actions of the highest importance.

2. Residual costs prevention

Per definition residual costs resulting from past planning and investment decisions cannot be now lifted. It is therefore very important to consider current investments and planning decisions in the context of their potential for triggering future residual costs. For example, municipalities loosing population tend to loosen the building rights in order to attract young families. This should however be avoided as new building areas can lead to increased residual costs due to the necessary development of technical and social infrastructure. Another issue would be monitoring of all the development projects in terms of their adequateness to the demographic development.

3. Creative approach to cost saving and demography-adjusted responsibilities distribution.

*Defining planning and investment priorities*

In the context of limited and ever smaller local incomes governments need to define the list of their planning and investment priorities, which take into consideration demographic forecasts.

*Multifunctional use of existing facilities*
It allows for decreasing facility costs per user. Among the possible functions are kindergartens, primary schools, libraries, cultural- and senior-organisations, which could use/share the same premises.

*Inter-municipal co-operation*

Inter-municipal co-operation allows for co-ordination of planning and investment decisions on a broader scale. It is an important element of cost saving and residual cost prevention.

*Participatory approach to maintain the quality of life in shrinking and ageing urban areas*

It allows for providing some types of services and activities through engagement of local civil society.
References


DESTATIS, Rechnungsergebnisse der öffentlichen Gesamthaushalte (yearly on revenue and expenditure of the public hand)

DG Regio, 2008: Regions 2020, Demographic challenges for European Regions,


Kotlikoff L.J., Burns, S., 2012: The clash of the generations, Massachusetts Institute of Technology, Boston.


Sächsisches Staatsministerium der Finanzen, 2003: Die Gemeinden und ihre Finanzen, Dresden


