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Matthias Keese
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# Are You Well Prepared for Long-term Care?

## Assessing Financial Gaps in Private German Care Provision

Ruhr Graduate School in Economics
UNIVERSITÄT DUISBURG ESSEN

#203

# Imprint


## Ruhr Economic Papers

Published by

Ruhr-Universität Bochum (RUB), Department of Economics
Universitätsstr. 150, 44801 Bochum, Germany

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## Ruhr Economic Papers #203

Responsible Editor: Volker Clausen





ISSN 1864-4872 (online) – ISBN 978-3-86788-232-3

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## Bibliografische Information der Deutschen Nationalbibliothek

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über: *http://dnb.d-nb.de* abrufbar.

ISSN 1864-4872 (online)
ISBN 978-3-86788-232-3

Matthias Keese, Annika Meng, and Reinhold Schnabel[1]

# Are You Well Prepared for Long-term Care? – Assessing Financial Gaps in Private German Care Provision

## Abstract

*The development of expenditure for care services is one of the most intensively debated topics in public. However, studies calculating financial provision gaps only focus on the macro-level implications for the compulsory care insurance. In contrast, this paper examines the individuals' micro-level perspective. We use survey as well as regional and national statistical data to calculate expected individual costs of long-term care on a very detailed care arrangement and care level basis. Afterwards, we compare these costs with the individuals' total wealth. In our most conservative policy scenario, our results show that about a third of statutorily insured individuals will have to face a financial care provision gap. Among homeowners, an even higher share will have to liquidate the main residence. The privately insured are affected to a somewhat lower extent. In both groups, the situation will become much more severe if the development of public transfers does not keep up with future increases of long-term care costs. Furthermore, regression analyses show that provision gaps are more frequent among statutorily insured individuals, females, and individuals in single households.*

*JEL Classification: D91, H75, J14*

*Keywords: Long-term care costs; care prevalence; life expectancy; provision gap*

*September 2010*

1 *Matthias Keese, Annika Meng, Ruhr Graduate School in Economics (RGS Econ) and University of Duisburg-Essen; Reinhold Schnabel, University of Duisburg-Essen and ZEW Mannheim.*
*– We are grateful to Stefan Felder and to the participants of the RGS Doctoral Conference 2010, the DIW Workshop on Ageing, Savings and Retirement, and the Netspar Pension Workshop for valuable comments. Furthermore, we owe special thanks to Vera Bauchmüller, Daniel Kamhöfer, and Tobias Rühl for work-intensive research assistance. Financial support by the RGS Econ is gratefully acknowledged. – This paper uses data from SHARE Waves 1 & 2, as of December 2008. SHARE data collection in 2004–2007 was primarily funded by the European Commission through its 5th and 6th framework programmes (project numbers QLK6-CT-2001- 00360; RII-CT-2006-062193; CIT5-CT-2005-028857). Additional funding by the US National Institute on Aging (grant numbers U01 AG09740-13S2; P01 AG005842; P01 AG08291; P30 AG12815; Y1-AG-4553-01; OGHA 04-064; R21 AG025169) as well as by various national sources is gratefully acknowledged (see http://www.share-project.org for a full list of funding institutions).* *– All correspondence to: Annika Meng, RGS Econ, c/o University of Duisburg-Essen, Chair of Public Economics (Prof. Schnabel), 45117 Essen, Germany, e-mail: annika.meng@uni-due.de.*

# 1 Introduction

The incidence of long-term care is a turning point in a person's life. Apart from the associated physical and emotional burdens, long-term care constitutes a severe financial risk. The costs for care, room, and board in an institutional care facility can easily exceed 3,000 Euros per month. However, the statutory long-term care insurance only covers care costs up to a certain limit. Depending on the degree of care needs the insurance covers up to 1,510 Euro per month for institutional care. Thus, income or wealth of care recipients may fall short of care-related expenses. In this case, the financial burden will have to be borne by relatives or, ultimately, by social assistance. On the macro level, the future burden associated with long-term care is bound to rise considerably. Projections show that under favorable demographic conditions and constant age-specific prevalence rates, the number of care recipients in Germany will double by the year 2050, while the numbers of potential care givers and contributors to the unfunded insurance system are going to shrink. This will drive up the care-dependency ratio threefold (Schnabel, 2007). Consequently, the financing and the organization of long-term care is a political and economic challenge for ageing societies such as Germany. While this macro-level development of long-term care has received notable attention during the past years, the micro-level perspective has been widely ignored.

In order to fill this gap, this paper investigates individual financial provision gaps for long-term care in Germany. Using data from the Survey of Health, Ageing and Retirement in Europe (SHARE)[1] as well as federal and state-level statistics from multiple sources, we calculate care probabilities for different care levels and care arrangements on an individual basis. We differentiate between statutorily and privately insured persons, which differ considerably in mortality and morbidity. Subsequently, we calculate expected care costs and payments by the care insurance for each person in our micro data. Finally, we contrast these results with individual information on wealth so that we are able to identify provision gaps related to long-term care expenditure. The fundamental question to be addressed is whether elder German individuals are able to cover their expected costs for long-term care by own financial resources and payments of the care insurance or whether relatives or social assistance have to fill the financial gaps. Thereby, we distinguish three policy scenarios which assume different developments of care costs and public transfers.

[1]This paper uses data from SHARE Waves 1 & 2, as of December 2008. SHARE data collection in 2004-2007 was primarily funded by the European Commission through its 5th and 6th framework programmes (project numbers QLK6-CT-2001- 00360; RII-CT- 2006-062193; CIT5-CT-2005-028857). Additional funding by the US National Institute on Aging (grant numbers U01 AG09740-13S2; P01 AG005842; P01 AG08291; P30 AG12815; Y1-AG-4553-01; OGHA 04-064; R21 AG025169) as well as by various national sources is gratefully acknowledged (see http://www.share-project.org for a full list of funding institutions).

Our analysis extends the literature in several ways. First, we estimate care prevalence differentiated by gender, age, state, and insurance status based on a variety of statistical sources. We also use life-tables by age, gender, and insurance status. On a very detailed basis, we account for different care levels (indicating the severity of care needs) and care arrangements (informal, formal home-based, and institutional care). The main contribution is to link the financial burdens caused by long-term care to the financial resources of individuals. Although we focus on the German SHARE data, our results (esp. care probabilities, expected care costs, and out-of-pocket expenses) can easily be applied to other datasets as well. This paper constitutes an important contribution to the debate on the future of the German care insurance and the individuals' provision gaps in care. It is the first one to estimate expected care costs on an individual basis and to calculate future financial burdens to care-recipients which hints to costs possibly transferred to their first-degree relatives and to the social security system.

In the benchmark scenario in which costs and transfers exhibit an annual growth equal to the inflation rate, our findings suggest expected total care costs of about 54,800 Euros for women and 17,400 Euros for men at the brink of retirement (65 years). While the care insurance will pick up a little more than half of that bill in the case of the statutorily insured, individuals have to bear average care costs of about 24,300 Euros (females) and 6,700 Euros (males). Taking the entire sample (which includes individuals aged 65-97), average expected care costs amount to 45,700 Euros; the mean financial burden to be covered individually is 20,000 Euros. Consequently, about a third of the weighted sample faces a provision gap meaning that the expected out-of-pocket-expenses exceed the total wealth of these people. Among homeowners, financial resources and non-housing assets fall short of care expenses. As a consequence, these individuals or their heirs will have to liquidate the care-recipient's main residence and use at least part of the realized returns to finance long-term care. As expected, these figures are more pronounced for mandatorily insured individuals since they are usually less wealthy than privately insured people. In addition, we find that females and individuals in single households are more likely to face future provision gaps.

Since these gaps are in terms of expected value, they are at the same time estimates of fair insurance premia that would be required to cover the long-term care risk. Thus, they indicate whether or not a person has the resources to pay a fair insurance premium without cutting consumption. Our analysis indicates that a large fraction of the German population would not be able to pay the insurance premium out of financial wealth. Thus, these persons would have to cut consumption over the life-cycle in order to pay fair insurances premia. If individuals start to save for long-term care needs at the age of 45, the yearly premium would

be in the order of 1,002 Euros for women and 274 Euros for men.[2]

The paper is structured as follows: Section 2 provides a literature overview on care probabilities and the development of care costs on the macro level while the SHARE data are introduced in Section 3. Section 4 presents the methodology to calculate survival and care probabilities, care costs, and insurance payments. Section 5 discusses the results and Section 6 concludes.

## 2 Literature review

Several recent studies undertake macro projections on the development of the prevalence of care recipients, the potential of care givers and the demand for employees in institutional and outpatient professional care services, e.g., Eisen (2007), Hackmann and Moog (2009), Häcker and Raffelhüschen (2006), Raffelhüschen (2007), Schnabel (2007). Based on these projections, provision gaps in care potential (people available for giving informal care) and, in the wake of this development, increasing costs to the public care insurance are forecasted.

Different scenarios in this respect depend on different assumptions on the demographic development for e.g., fertility, employment rates, life expectancies and mortality rates, as well as incidence and prevalence rates in long-term care. At the same time, these assumptions correspond to different hypotheses on the development of age-specific care prevalence rates and therefore care-related expenditure.[3] Breyer and Felder (2006) name constant care probabilities despite a rise in life expectancy the "status-quo hypothesis". Verbrugge (1984) was the first who described the so-called "medicalization hypothesis". According to this hypothesis, increasing life expectancies will lead to a higher demand for long-term care services which will nevertheless go in line with worse age-specific health states and increased care prevalence rates. On the contrary, the "compression- of-morbidity hypothesis", which was first described by Fries (1980), implies a jump in morbidity only shortly before the individual's point-of-death. Age-specific prevalence rates are thus deferred to a constant or shorter time period before death. In a literature overview of selected papers, Hackmann and Moog (2009) state that more evidence can be found for the compression-of-morbidity hypothesis than for the

[2]This figure assumes that premiums are not paid after the age of 65. It does not account for the likelihood of dying before reaching that age. This result is not readily comparable to long-term care insurances of private supplementary insurance contracts in Germany because premia often have to be paid until death. In addition, it is crucial to compare the benefits for different care arrangements and levels if an individual actually needs long-term care.

[3]These hypotheses were designed to describe the development in health services. Here they are translated to explain possible future outcomes in care service demand and expenditure.

medicalization hypothesis. They also find evidence for the status-quo hypothesis. However, Werblow et al. (2007) illustrate that the demand for long-term care differs from the demand for health care as the former is rather correlated to age than to the individual's proximity to death. Therefore, the medicalization hypothesis might apply in the case of long-term care expenditure. Whichever hypothesis and scenario prevails, all projections mentioned above find an increase in the number of care recipients that leads to a gap between the budget of the social care insurance and the unknown extent to which the costs of care will increase.

Contrary to the macroeconomic perspective on the provision gap, this paper explores how the individual is financially affected under the current situation. We assume constant age-specific care prevalence rates in our sample. This is in line with data from the Federal Ministry of Health which shows that the age-specific distribution over care levels remains stable over the years 2001 to 2008. The share of care recipients using professional home-based care relative to institutional care has remained constant in this period as well. In addition, we keep the costs of care services constant. Although Hackmann and Moog (2009) find that moderate compression on morbidity is the hypothesis that is most often confirmed in the health expenditure literature, a disproportionately high increase in care expenditure is not unlikely (Werblow et al., 2007). Individual costs can be even more affected by this development if the adjustment of care allowance payments by the social care insurance does not compensate for this effect.[4] In our analysis, we address this important issue by applying three policy scenarios with different cost increases in the long-term care sector without sufficient compensation payments by the care insurance; these scenarios are explained in detail in Section 4.2.

# 3 Data and construction of the sample

The Survey of Health, Ageing and Retirement in Europe (SHARE) is a multidisciplinary panel database of micro data on health, socio-economic status, and social as well as family networks of more than 30,000 individuals aged 50 and over.[5] The first and second waves were collected in 2004 and 2006 in up to fourteen European countries.

For our analysis, we concentrate on German observations in 2004. Furthermore, we apply

[4] The so-called Pflegeweiterentwicklungsgesetz includes an adjustment of care allowance payments in three steps (Federal Law Gazette (ed.), 2008). However, these adjustments do not exceed the rise in prices due to inflation (Rothgang et al., 2009).

[5] For details on the sampling procedure, questionnaire contents and fieldwork methodology, readers are referred to Börsch-Supan et al. (2005).

several restrictions to our sample: To begin with, we only keep observations of individuals 65 or older. This has the following reason: We only observe household wealth while we cannot account for income and expenditure of the households under investigation. We argue that households in which someone still works fulltime are likely to undergo wealth and income dynamics before retirement that do not allow a reasonable comparison of wealth (as of 2004) and future long-term costs of care. Therefore, we restrict our analysis to people who are not likely to change their employment status anymore and who can be assumed to receive a relatively stable income (mostly pension incomes) until death. Thus, we argue that the individuals under investigation have to finance their long-term care costs out of wealth while income is spent for consumption purposes unrelated to care needs. This proceeding is similar to Poterba et al. (2010) who also focus on asset reduction in the retirement period to finance health shocks. Furthermore, we only consider households with two or less adult members. Otherwise, we cannot be sure that the household has indeed a joint budget and a joint wealth position. We exclude the lowest and highest percentile of total net wealth from the sample to reduce the risk that outliers drive the results.

*Table 1.* Sample composition (unweighted)

| | | GKV | PKV | Full sample |
|---|---|---|---|---|
| Age | Mean | 72.67 | 71.71 | 72.58 |
| | Median | 71.00 | 70.00 | 71.00 |
| Female | Mean | 0.55 | 0.37 | 0.53 |
| | Median | 1.00 | 0.00 | 1.00 |
| Household size | Mean | 1.73 | 1.83 | 1.74 |
| | Median | 2.00 | 2.00 | 2.00 |
| Singles | Mean | 0.27 | 0.17 | 0.26 |
| | Median | 0.00 | 0.00 | 0.00 |
| Observations | | 1,107 | 115 | 1,222 |
| Observations (weighted) | | 12.17 mill | 1.18 mill | 13.36 mill |

*Note.* GKV: statutory health insurance (Gesetzliche Krankenversicherung). PKV: privately insured individuals. Own calculations. Lowest and highest percentile excluded (total net wealth). Data source: SHARE 2004.

Our final working sample contains 1,222 individuals. Table 1 displays the descriptive statistics of the sample. Our observations represent more than 13.3 million German individuals. About 10 percent of the sample (115 observations) have a private health and care insurance. The vast majority of the sample (74 percent) is married and lives together with the partner.

The relevant national and regional statistical data are merged to the SHARE sample.

Each individual in the SHARE sample therefore receives the necessary population information required to calculate survival and care probabilities as well as costs (Section 4.1 and Section 4.2).

# 4 Methodology

## 4.1 Survival probabilities

We use statistical survival probabilities from cohort life tables for 2004 provided by the Federal Statistical Office (2006). These figures discriminate between age and gender. Age-specific survival probabilities are reported until the age of 100. However, a 100-year-old individual has a survival probability larger than zero so that we assume constant survival probabilities until the age of 120. This means that a 105-year-old woman has the same probability to reach the age of 106 as a 100-year-old woman has to reach the age of 101. At the age of 120, we assume a survival probability of zero. Given the age for each individual in the observation period 2004, we calculate conditional probabilities to reach any age until 120. For example, the probability for an 87-year-old person to reach the age of 89 is her probability to reach the age of 88 multiplied with the probability to survive from age 88 to 89. In practice, the individuals in our sample have a calculated positive probability to reach ages above 100 years. However, reaching the age of 120 years is very unlikely for any observed age in our dataset given the very low survival probabilities for the age of 100. All in all, this seems to be a quite reliable reproduction of reality.

Furthermore, we discriminate mortality between statutorily insured and privately insured people. Privately insured individuals are usually wealthier, better educated, and have a higher income. Applying the same survival probabilities to the entire sample would neglect the well-known fact that wealthier people have a higher live expectancy (as shown by e.g., Attanasio et al., 2003). We therefore correct the survival probabilities taken from the cohort life tables for the group of privately and for the group of statutorily insured people by applying an age-specific correction factor. This factor is calculated using period life tables of the private health insurance.[6] The reason for this proceeding is straightforward: since different cohorts face different mortality risks, using cohort life tables is superior to using period life tables. However, estimated cohort tables are only available for the entire population and

[6]We use period life tables for 2007 provided by the association of private health insurances in Germany (PKV Verband).

do not discriminate between the health insurance status. Therefore, we use the additional information on the heterogeneity of mortality included in the period life tables of the private health insurers.

To sum up, for each individual we obtain the probability to reach a certain age given age, gender, and health insurance status in 2004.

## 4.2 Care prevalence

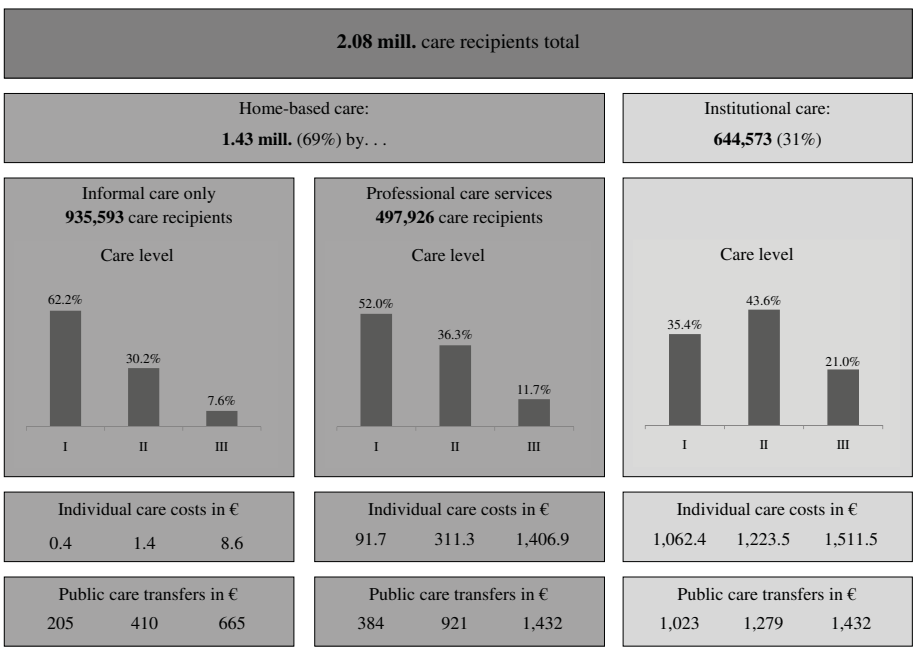
The German social care insurance differentiates between three different care levels which correspond to the severity of an individual's disability. Care level I is the lowest level which is assigned to an individual that needs support due to physical limitations in personal care for at least 90 minutes per day and help in housework for several times a week. Care level III implies round-the-clock personal care also at night (German Social Code, SGB XI, § 15). Public transfers from the care insurance increase with the care level but, in addition, they differ by the care arrangement chosen by the care recipient. Impaired individuals who choose informal care given by their family, friends, or neighbors receive fewer transfers than those who receive professional home-based care or institutional care. Consequently, not only long-term care transfers but also individual costs differ substantially depending on care levels and care arrangements.

Figure 1 illustrates the distribution of the 2.08 million care recipients in our population statistics. 69 percent of them receive home-based care and about 35 percent of these use professional care services. In both home-based care categories, namely informal care and professional care, more than 50 percent of individuals are ranked into care level I. More than 30 percent have care needs according to care level II. Care level III comprises only around 10 percent of people. 31 percent of the dataset receive institutional care. Contrary to the home-based care categories, only 35 percent of stationary care recipients are ranked into care level I. Care level II comprises most of the individuals, namely 44 percent. The share of those needing assistance according to care level III has in addition doubled in comparison to home-based care support. These numbers are marginally different from official statistics as we only use care recipients who can be clearly segmented into one of the three care arrangements.[7] Below the numbers on the distribution of care recipients, mean individual costs and the amount of public transfers are shown by care arrangement and care level. All values are presented on a monthly basis. While the amount of public transfers is statutory,

[7] Compare Figure 1 to *Eckdaten der Pflegestatistik in 2005* in the publication *Pflegestatistik 2005* (Federal Statistical Office (ed.), 2007b). The percentages are fairly similar.

mean individual costs of home-based care services are taken from the Statistical Yearbook 2007 (Federal Statistical Office (ed.), 2007c) that only presents aggregate figures for each care arrangement. We divide these values by care-level shares in public transfers. More information is available for the individual costs in the case of institutional care. Values are taken from the study by Augurzky et al. (2007) which gathered stationary care costs by federal state and care level. These figures also include room and board expenditure as well as investment costs.

*Figure 1.* Descriptive care statistics



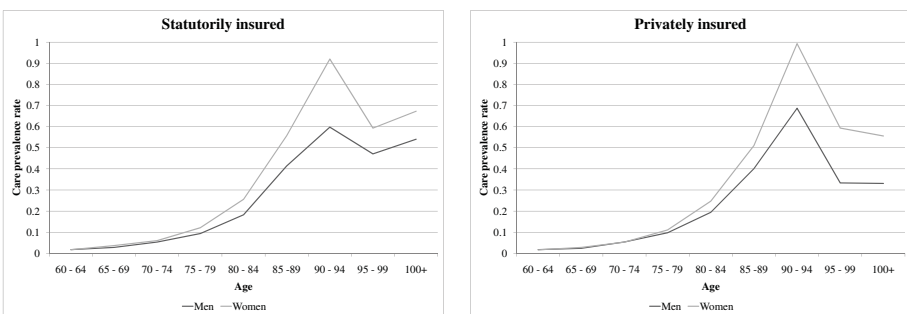

*Note.* Own calculations. Euro amounts on monthly basis. In the style of the Pflegestatistik 2005 - Deutschlandergebnisse (Federal Statistical Office (ed.), 2007b). Data sources: Care statistics from all Land Statistical Offices, the Statistical Yearbook 2007 (Federal Statistical Office (ed.), 2007c), Augurzky et al., 2007, SGB XI.

To calculate expected care costs ($ECC_{ik}$) for individual $i$ living in the federal state $k$, we therefore have to distinguish the probability of care in nine different categories. As we calculate private provision gaps, we are interested in care prevalence rates by age where we truncate the figures of those younger than 65 years. The care prevalence rate of those who

are between 100 and 120 years old is taken from those who have reached the age of 100 years. In addition, we distinguish the probability of care by gender and by the federal state in which the individual lives as there are differences in life expectancy, insurance status, long-term care costs, and the choice of care arrangements depending on the place of residence (Augurzky et al., 2007, Federal Statistic Office (ed.), 2007a).

We differentiate by insurance type (public or private), since mortality and morbidity differ substantially between these groups. We are able to calculate heterogenous mortality rates and we can also do this for care in the case of professional home-based and institutional care. Using one without the other does not make sense, because mortality and morbidity (and care prevalence) are systematically linked. Persons with higher mortality tend to become disabled earlier in the life cycle than those with lower mortality as the comparison of privately and publicly insured individuals shows. Thus, we use heterogeneous care prevalence rates if possible. Figure 3 illustrates that the development of unweighted care prevalence rates is quite similar for statutorily and privately insured individuals up to the age of 90. Even older individuals in the private care insurance have higher morbidity rates than the statutorily insured. The difference amounts to about 10 percentage points. After the age of 95, statutorily insured individuals have higher care prevalence rates.

*Figure 2.* Care prevalence rates of statutorily and privately insured individuals




*Note.* Own illustration. Unweighted care prevalence rates aggregated over all federal states. Data sources: Care statistics from all Land Statistical Offices; Pflegestatistik 2005 - Deutschlandergebnisse (Federal Statistical Office (ed.), 2007b).

The probability of care which fulfills the above mentioned requirements is not readily available from a comprehensive national statistic. We first have to collect the number of care recipients distinguished by gender, age, care level, care arrangement [8], federal state, and in-

[8] For institutional care, we only look at those care recipients who receive full stationary care to avoid

surance status[9]. However, the national care statistic which compares federal states in 2005 does only provide information on the distribution of care recipients for two of these characteristics (Federal Statistical Office (ed.), 2007a). We therefore gather the necessary information directly from the care statistics from 2005 from every single federal state.[10] Unfortunately, the information presented in the statistics is not unitary. For instance, the share of female recipients of cash allowance for informal care in Hesse is taken from the share of the individuals in that same category in Rhineland-Palatinate.

As the number of care recipients is only available in age groups, we redivide the aggregate numbers to every single age between 65 and 100 years. The age-group specific number of care recipients in the private care insurance is treated in the same way and subtracted from the overall German figures in the federal care statistics. According to Sullivan (1971), we then divide the number of care recipients of each of the nine categories by the age-specific total population to calculate the probability of care in each category. These figures are taken from the population statistics which distinguishes between age, gender, as well as East and West Germany (Federal Statistical Office (ed.), 2007c).

The population figures are also subdivided by insurance status. We employ the age-specific share of privately to statutorily insured individuals for this purpose. These are constant ratios over five-year age groups. To receive federal-state-specific numbers, we weight by the share of the federal-state-specific population of those aged 65 and older. Unfortunately, we do not have private care insurance statistics on the number of care recipients that receive informal home care. Therefore, prevalence rates for informal care are the same for statutorily and privately insured individuals but differ for professional home-based and institutional care. To give an example, a 90-year-old man in Baden-Wurttemberg who is statutorily insured has a probability of receiving professional home-based care in care level II of 3.0 percent. The care probability of a man of the same age in Thuringia for the same category reaches 5.1 percent. If he was a member of the private health and care insurance, these probabilities would be 8.9 and 10.1 percent, respectively.

double counting. Therefore our total number of care recipients is lower than the total number of the national care statistic for 2005 presenting the results for whole Germany (Federal Statistic Office (ed.), 2007b).

[9]We use care recipient and insurance statistics for 2004 provided by the association of private health insurances in Germany (PKV Verband).

[10]As these comprise 16 different documents, we refer the reader to the reference list for further bibliographic details.

## 4.3 Care costs

The total costs of care can be divided into costs that are covered by the compulsory insurance and into costs that have to be borne by the care recipient. These rules are the same for the two branches of the German care insurance. The two sub-systems differ in the way the expenditures are financed. The social insurance levies earnings-related contributions (currently 1.95 percent of earnings or pensions with a 0.25 percent supplement for childless persons). The private insurance is fully funded and charges uniform insurance premia unrelated to income.

The two insurance pools differ in many respects. With minor exceptions, people insured in the statutory health insurance belong to the social care insurance (with the same insurer). Accordingly, people with a private health insurance status usually have a compulsory private long-term care insurance contract. Thus, we can use information on the heterogeneity of the people in the two health insurance systems (e.g., mortality, see Section 4.1; morbidity, see Section 4.2) to draw conclusions for the care insurance systems which are in the focus of this paper. As we have seen, life expectancy in the private branch is considerably higher.

While the maximum insurance benefits can easily be found (SGB XI, § 28 ff), it is very difficult to assess actual costs. Thus, we have to gather this information from several sources. Institutional care costs for each care level and federal state are taken from a scientific expertise on behalf of the Ministry of Labour, Health and Social Affairs in Northrhine-Westfalia (Augurzky et al., 2007). The transfer amount from the public care insurance is subtracted from this measure. We calculate costs for professional home-based care by dividing the aggregate expenditure of private households on professional care in 2005, taken from the Statistical Yearbook 2007 (Federal Statistical Office (ed.), 2007c), by the respective number of care recipients. Beforehand, the aggregate expenses are weighted by the expenditure structure that the public transfer assigns to the different care levels. The same procedure is used to calculate care-level-specific individual costs for informal care.[11] Using the age-profile of the prevalence of care by sex, federal state, insurance status and a care level and arrangement combination as well as the costs of care and the survival probabilities according to the insurance status, it is possible to calculate the expected expenditure discounted to the current age of each person.

Let $a_i$ be the age of individual $i$ in year 2004. The conditional survival probability $s_i$ is the probability to reach at least age $a$ given that the person is $a_i$ years old (here in the sample at year 2004); the index $i$ allows for individual-specific survival rates.

[11] However, we expect that the expenditure on informal care in 2005 are at the lower end of actual individual expenses as they only amount to 8.55 Euro per month in care level III.

$p_j(a)$ is the probability to receive care at age $a$ (given that one is still alive), and $c_j(a)$ is the cost incurred in a certain care arrangement and a certain care level. As there are three different levels of care and three care arrangements, we end up with nine possible care combinations which we denote with the index $j$. $p_j(a) * c_j(a)$ are replaced by the sum over these possible states $j$. Furthermore, the care probabilities and care costs vary by federal state $k$. All in all, expected care costs of individual $i$ are calculated as follows:

$$ECC_{ik} = \sum_{a=a_i}^{120} s_i(a|a_i) * \sum_{j=1}^{9} (p_{jk}(a) * c_{jk}(a)) * (1+r)^{a_i - a} \tag{1}$$

Due to our sample design and the data availability, this figure accounts for gender, age, the insurance-system-specific survival probability, federal state and individual costs distinguished by care level, care arrangement and the individual's insurance status. Since we aim to relate future expected individual costs of care to current household wealth (as of 2004), we discount expected care costs and transfers to the year 2004 with a discount factor of two percent. The resulting expected care costs and transfers in values of 2004 can then directly be compared to household wealth in 2004. In our benchmark scenario described here (in the following, scenario 1), we assume care costs and public transfers to experience a real growth of zero percent. Consequently, future costs and transfers are equivalent to the present figures (expressed in real terms).

However, our analysis allows different policy scenarios for the evolution of costs and transfers. Obvious alternative scenarios assume cost increases in the care sector that exceed increases in public transfers. Accordingly, scenario 2 assumes an annual (real) cost increase of one percent; scenario 3 of three percent. Following the development of the German long-term care insurance system in the last years, these assumptions are quite realistic. Since the introduction of the German long-term care insurance in 1995, the public transfers associated with a certain care arrangement and care level have been stable and did not even rise with the inflation rate. Just recently, care allowances have experienced stepwise adjustments within the so-called *Pflegeweiterentwicklungsgesetz* (Federal Law Gazette (ed.) 2008), however, below the inflation rate (Rothgang et al., 2009). While assumptions on the exact development of future long-term care costs are more or less speculative, it is very unlikely that future transfers will indeed keep up with the cost evolution. Therefore, we argue that our policy scenarios are well-founded.

## 4.4 Household wealth

SHARE includes a very detailed questionnaire on wealth and assets. Household net wealth is an aggregated figure combining both real assets (owner-occupied housing wealth and related mortgage debt, further real estate, cars, business shares) and financial assets (building loan contracts, banking accounts, life insurances, government bonds, stocks, shares, mutual funds, individual retirement accounts, and non-mortgage debt). The corresponding individual wealth is household wealth divided by the number of household members.

The descriptive wealth figures are displayed in Table 2. The weighted average individual in our sample owns 126,654 Euros; the median net wealth is 54,719 Euros. About 78 percent (mean) and 34 percent (median) of individual net wealth belong to real assets.

*Table 2.* Individual wealth (weighted)

| | | GKV | PKV | Full sample |
|---|---|---|---|---|
| Real wealth | Mean | 83,915 | 242,453 | 98,019 |
| | Median | 11,000 | 100,000 | 18,679 |
| (Housing wealth) | Mean | (70,422) | (174,774) | (79,705) |
| | Median | (0) | (90,000) | (0) |
| Financial wealth | Mean | 26,075 | 54,846 | 28,635 |
| | Median | 9,685 | 20,479 | 10,000 |
| Total net wealth | Mean | 109,990 | 297,300 | 126,654 |
| | Median | 46,449 | 155,000 | 54,719 |
| Observations | | 1,107 | 115 | 1,222 |

*Note.* GKV: statutory health insurance (Gesetzliche Krankenversicherung). PKV: privately insured individuals. Own calculations. Lowest and highest percentile excluded (total net wealth). Data sources: SHARE 2004.

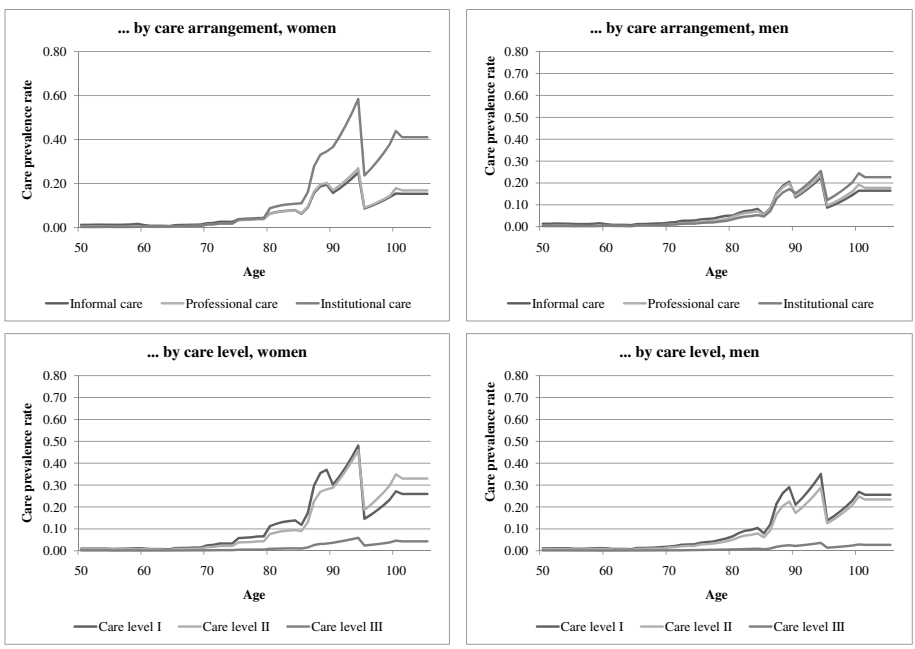
The wealth figures differ notably by insurance status. The mean and median wealth of privately insured is about three times as high as the corresponding values for statutorily insured people.

# 5 Results

## 5.1 Care probabilities

Figure 3 illustrates the distribution of care recipients over care arrangements as well as care levels for men and women, respectively. Like in Figure 1, the calculations are based on the data collected from multiple national statistics. Overall, the probability to become a care recipient grows with the age of an individual. It increases sharply for all individuals older than 85 years. The increase in care level I is, however, much more pronounced for women than for men. Drops in the line graph correspond to dying individuals: Those who are in a better condition survive which means that the care prevalence rate starts to rise again from a lower level.

*Figure 3.* Distribution of age-specific care prevalence rates




*Note.* Own calculations. Euro amounts on monthly basis. In the style of the Pflegestatistik 2005 - Deutschlandergebnisse (Federal Statistical Office (ed.), 2007b). Data sources: Care statistics from all Land Statistical Offices, the Statistical Yearbook 2007 (Federal Statistical Office (ed.), 2007c), Augurzky et al., 2007, SGB XI.

Overall, women have a considerable higher risk of becoming a care recipient as their average life expectancy is higher than for men. They are much more likely to receive informal home care. Between 85 and 95 years of age, most care recipients are ranked into care level I. After this age, the prevalences of care level I and II are very close to each other. Care level III is much less common for both sexes.

## 5.2 Expected care costs and transfers

Using mortality rates, prevalence rates, as well as care costs and transfers in a certain care level and arrangement combination, we calculate the total expected care costs until death for each individual in our dataset as described in the previous sections. Table 3 displays the total and individual expected care costs, as well as expected public transfers for the sample.

In our scenario 1, the statutorily insured individuals in the SHARE sample will face average total expected care costs of 45,915 Euros. While the care insurances will probably carry 25,725 Euros of these costs, the remaining financial burden to be covered individually amounts to about 20,190 Euros. Thus, the average public share of future care costs is 59 percent. The respective median figures are lower than the mean values (33,696 Euros; 18,056 Euros; 15,090 Euros). The results for the privately insured individuals are somewhat lower: the mean figures for total expected care costs are about 43,730 Euros and expected care cost that have to be carried individually are 18,480 Euros as 25,250 Euros are covered by the expected transfers. Thus, the costs privately insured individuals have to cover individually are about eight percent (or 1,700 Euros) lower than statutorily insured have to face.

Looking at scenario 2 and scenario 3 reveals much higher financial burdens due to long-term care that are directly imposed on the future care recipients since we keep public transfers (in real terms) constant. Average total expected care costs amount to 68,276 Euros with an individual part of 42,594 Euros (scenario 3, full sample). Consequently, the public share of total care costs reduces to 40 percent.

## 5.3 Provision gaps

Comparing the expected financial burdens that will not be covered by the care insurance with individual wealth allows us to detect provision gaps for future long-term care burdens. These results are displayed in Table 4.

We start with our benchmark scenario in which public transfers and care costs have a real

*Table 3.* Individual care costs and insurance payments (weighted)

| | Scenario | | GKV | PKV | Full sample |
|---|---|---|---|---|---|
| Expected costs (covered individually) | 1 | Mean | 20,190 | 18,480 | 20,038 |
| | | Median | 15,090 | 12,645 | 15,018 |
| | 2 | Mean | 26,453 | 24,733 | 26,300 |
| | | Median | 20,140 | 15,161 | 19,950 |
| | 3 | Mean | 42,738 | 41,111 | 42,594 |
| | | Median | 31,089 | 26,008 | 30,282 |
| Expected transfers | 1 | Mean | 25,725 | 25,250 | 25,683 |
| | | Median | 18,056 | 19,600 | 18,436 |
| | 2 | Mean | 25,725 | 25,250 | 25,683 |
| | | Median | 18,056 | 19,600 | 18,436 |
| | 3 | Mean | 25,725 | 25,250 | 25,683 |
| | | Median | 18,056 | 19,600 | 18,436 |
| Total expected care costs | 1 | Mean | 45,915 | 43,730 | 45,721 |
| | | Median | 33,696 | 32,823 | 33,682 |
| | 2 | Mean | 52,178 | 49,983 | 51,983 |
| | | Median | 37,344 | 34,723 | 36,761 |
| | 3 | Mean | 68,463 | 66,361 | 68,276 |
| | | Median | 52,458 | 42,121 | 51,559 |
| Share public transfers / total costs | 1 | Mean | 0.59 | 0.59 | 0.59 |
| | | Median | 0.57 | 0.60 | 0.57 |
| | 2 | Mean | 0.52 | 0.52 | 0.52 |
| | | Median | 0.50 | 0.53 | 0.50 |
| | 3 | Mean | 0.40 | 0.40 | 0.40 |
| | | Median | 0.40 | 0.39 | 0.39 |
| Observations | | | 1,107 | 115 | 1,222 |

*Note.* GKV: statutory health insurance (Gesetzliche Krankenversicherung). PKV: privately insured individuals. Own calculations. Lowest and highest percentile excluded (total net wealth). Data sources: SHARE 2004; care statistics of the German federal states (Pflegestatistiken der Bundesländer 2005); Statistisches Jahrbuch 2007; Cohort life tables (Federal Statistical Office, 2006); PKV Verband (2004).

*Table 4.* Financial provision gaps

| | Scenario | | GKV | PKV | Full sample |
|---|---|---|---|---|---|
| Provision gap | 1 | % | 33.5 | 14.0 | 31.7 |
| (expected care costs > wealth) | 2 | % | 36.9 | 16.8 | 35.1 |
| | 3 | % | 43.1 | 23.1 | 41.3 |
| Observations | | | 1,101 | 114 | 1,215 |
| *For homeowners only:* | | | | | |
| Housing wealth affected | 1 | % | 38.6 | 25.8 | 37.0 |
| (expected care costs | 2 | % | 44.8 | 26.8 | 42.6 |
| > non-housing wealth) | 3 | % | 57.3 | 36.9 | 54.7 |
| Observations | | | 565 | 80 | 645 |

*Note.* GKV: statutory health insurance (Gesetzliche Krankenversicherung). PKV: privately insured individuals. Own calculations. Lowest and highest percentile excluded (total net wealth). Data sources: SHARE 2004; care statistics of the German federal states (Pflegestatistiken der Bundesländer 2005); Statistisches Jahrbuch 2007; Cohort life tables (Federal Statistical Office, 2006); PKV Verband (2004).

annual growth rate of zero percent. First, about a third of the statutorily insured individuals in our sample have a provision gap in the sense that these people will be unable to defray their costs for long-term care by themselves. If the income of the affected people is not adequate to close these gaps, the remaining financial burdens must be carried by their family , especially by their children, or, in the end, by social assistance. The picture is by far less severe for the privately insured individuals: only 14 percent of them will not be able to finance their future care costs with their own assets. Second, 38.6 percent of the statutorily insured homeowners will have to downsize their main residence in order to meet care expenses since their financial assets and non-housing wealth will not be sufficient to cover expected care costs. The same holds for 25.8 percent of the privately insured homeowners. Overall, this shows that care costs do heavily affect future bequests and may collide with expectations of both the testator and the beneficiaries even without a provision gap.

Again, the results are more drastic in the remaining policy scenarios (Table 4). In both scenarios, the share of statutorily insured individuals with a provision gap is notably higher compared to our benchmark scenario: 36.9 percent (scenario 2) or 43.1 percent (scenario 3) will face a provision gap; housing wealth will be liquidated in 44.8 percent (scenario 2) or 57.3 percent (scenario 3) of the cases (homeowners only). Among the privately insured, we find provision gaps in 16.8 percent (scenario 2) and 23.1 percent (scenario 3) of the cases. Furthermore, housing wealth will have to be liquidated in order to cover cost of long-term care in 26.8 (scenario 2) and 36.9 percent (scenario 3) of the cases (homeowners only).

## 5.4 Regression analyses

The results up to this point refer to the entire sample that includes individuals from different age groups. In this section, we have a look at the link between wealth and care costs as well as on the determinants of provision gaps for long-term care expenses. While the people in our sample have reached a position in their life-cycle in which the occurrence of a provision gap is more or less inevitable, younger cohorts may reduce current consumption in order to self-insure against future financial burdens. Therefore, we predict provision gaps for both females and males at different ages which can be interpreted as the additional amount of wealth that has to be accumulated by an individual of a certain age in the employment phase to meet financial needs of long-term care in later life. We conduct OLS regression analyses with robust standard errors for four different dependent variables.

To begin with, we regress expected care costs on age, sex, living in East or West Germany, the individual's marital status, the number of children, and whether the individual is privately insured or not. Table 5 illustrates that expected care costs rise with age and with being female. Both findings are not surprising. However, the size of the marginal effect requires further attention: females face total expected care costs that are (on average) 36,657 Euros higher. The insurance status is not a significant determinant of total care costs. However, the expected care costs of East Germans are 16,254 Euros lower compared to West Germans. As we do not distinguish mortality rates by federal state, this effect may stem from the lower care prevalence rates in the East German states.

*Table 5.* Regression: determinants of total expected care costs (scenario 1)

| **Dependent variable: Expected care costs** | **Coefficient** | **Robust Std. Err.** | **t** | **P>t** |
|---|---|---|---|---|
| Age | **713** | 206 | 3.47 | 0.00 |
| Female | **36,657** | 1,979 | 18.52 | 0.00 |
| East German | **-16,254** | 1,916 | -8.48 | 0.00 |
| Living alone | 1,637 | 3,083 | 0.53 | 0.60 |
| # Children | -782 | 754 | -1.04 | 0.30 |
| PKV | 1,963 | 1,356 | 1.45 | 0.15 |
| Constant | -24,562 | 14,886 | -1.65 | 0.10 |
| Observations | 1,222 | | | |

*Note.* Lowest and highest percentile excluded (total net wealth). Dependent variable: total care costs for long-term care (expected care costs to be covered individually plus expected transfers by the public long-term care insurance). PKV: privately insured. Data source: SHARE 2004.

In Table 6, we illustrate predicted expected care costs for both sexes at the age of 65 to 90 at intervals of five years (scenario 1). We find that differences in total expected care costs as well as in individual cost burdens between women and men are relatively stable over the different ages; however, these differences are dramatic: at any given age between 65 and 90, a woman faces total expected care costs that are more than 34,000 Euros higher compared to a man at the same age. About half of this amount has to be carried individually. The differences between the two sexes peak at the age of 90 with a cost difference of more than 41,600 Euros.

*Table 6.* Predicted expected care costs at a given age (scenario 1)

| **Age** | | **Female** | **Male** | **Difference** |
|---|---|---|---|---|
| 65 | Total: transfers and individual costs | 54,809 | 17,448 | 37,361 |
| | To be covered individually | 24,338 | 6,673 | 17,665 |
| 70 | Total: transfers and individual costs | 57,313 | 21,428 | 35,884 |
| | To be covered individually | 25,518 | 8,579 | 16,938 |
| 75 | Total: transfers and individual costs | 59,553 | 24,278 | 35,275 |
| | To be covered individually | 26,427 | 10,112 | 16,314 |
| 80 | Total: transfers and individual costs | 64,543 | 26,475 | 38,068 |
| | To be covered individually | 28,942 | 10,775 | 18,167 |
| 85 | Total: transfers and individual costs | 69,502 | 35,063 | 34,439 |
| | To be covered individually | 31,491 | 15,106 | 16,385 |
| 90 | Total: transfers and individual costs | 74,256 | 32,619 | 41,636 |
| | To be covered individually | 33,529 | 13,940 | 19,589 |

*Note.* Lowest and highest percentile excluded (total net wealth). Predicted expected care costs at a given age. Data source: SHARE 2004.

We use the same list of explanatory variables to analyze the determinants of having a provision gap. Table 7 shows that the probability to have a provision gap increases with age. Furthermore, being female increases the probability of facing a provision gap by about 16.6 percentage points; living alone leads to a similar increase of 18 percentage points. One should also keep in mind that woman are more likely to live alone as they have a higher life expectancy. Individuals who are privately insured are 10.2 percentage points less likely to face a provision gap. This stems from the simple fact that the privately insured are much wealthier than the statutorily insured individuals.

In Table 8, we provide regression results for the amount of the provision gap. As we subtract expected care costs from total net wealth, negative values represent the provision

gap. Positive values indicate that there is no gap. The results show that the amount of the provision gap is 68,152 Euros higher for East Germans than for West Germans. Individuals who live alone have a gap that is 43,401 Euros higher compared to individuals living together with their partner. The amount for privately insured individuals is 142,734 Euros lower than for publicly insured. Therefore, this regression indicates that we are mainly dealing with a wealth effect here. Since the provision gap that we have defined for our analysis is composed by overall wealth as well as by the individual cost share of long-term care, the results for the privately insured are mainly driven by their prosperity while the effect for East Germans is an interaction of lower accumulated wealth and lower expected care costs.

Lastly, we regress total net wealth on the explanatory variables used before as well as on expected individual care costs. The results are provided in Table 9. As the coefficient of the individual cost burden is insignificant, we can conclude that higher expected individual care costs do not influence savings and, thereby, the accumulation of wealth. Individual savings behavior does not respond to the necessity to prepare for expected financial burdens due to long-term care.

# 6 Conclusion

This paper investigates provision gaps for long-term care. Due to the introduction of the German social care insurance in 1995, a large share of care costs is paid by insurance payments. However, people have to bear the remaining individual financial burden by themselves. Using German data from the SHARE survey and multiple official statistics, we first calculate expected total care costs, expected insurance payments, and remaining provision needs until death. Thereby, we rely on survival probabilities derived from cohort life tables (which distinguish between age and gender) and we further differentiate between privately and statutorily insured people. Furthermore, we use federal state statistics on care probabilities for different care levels (degrees of care dependency), care arrangements, insurance status, and associated costs. We then compare the resulting expected total care costs, public transfers, and remaining burdens to be carried by the insured individuals themselves with individual wealth figures of the sample population.

Thereby, our benchmark scenario assumes real growth rates of zero percent for care costs and transfers. We provide results for two additional policy scenarios assuming that future cost increases exceed increases in payments by the care insurance (which has indeed been the case since the introduction of the German long-term care insurance). In the following

*Table 7.* Regression: long-term care provision gap: yes/no (scenario 1)

| **Dependent variable: Provision gap yes/no** | **Coefficient** | **Robust Std. Err.** | **t** | **P>t** |
|---|---|---|---|---|
| Age | **0.011** | 0.002 | 5.21 | 0.00 |
| Female | **0.166** | 0.025 | 6.75 | 0.00 |
| East German | 0.003 | 0.029 | 0.09 | 0.93 |
| Living alone | **0.18** | 0.033 | 5.43 | 0.00 |
| # Children | 0.01 | 0.01 | 1.04 | 0.3 |
| PKV | **-0.102** | 0.034 | -3.04 | 0.00 |
| Constant | **-0.676** | 0.151 | -4.48 | 0.00 |
| Observations | 1,222 | | | |

*Note.* Lowest and highest percentile excluded (total net wealth). Dependent variable: total care costs for long-term care (expected care costs to be covered individually plus expected transfers by the public long-term care insurance). PKV: privately insured. Data source: SHARE 2004.

*Table 8.* Regression: long-term care provision gap: amount (scenario 1)

| **Dependent variable: Provision gap: amount** | **Coefficient** | **Robust Std. Err.** | **t** | **P>t** |
|---|---|---|---|---|
| Age | -706 | 1,254 | -0.56 | 0.57 |
| Female | -20,084 | 13,029 | -1.54 | 0.12 |
| East German | **-68,152** | 9,041 | -7.54 | 0.00 |
| Living alone | **-43,401** | 14,928 | -2.91 | 0.00 |
| # Children | -4,243 | 4,027 | -1.05 | 0.29 |
| PKV | **142,734** | 40,314 | 3.54 | 0.00 |
| Constant | **196,461** | 84,697 | 2.32 | 0.02 |
| Observations | 1,222 | | | |

*Note.* Lowest and highest percentile excluded (total net wealth). Dependent variable: amount of provision gap for long-term care (total individual wealth minus expected care costs to be covered individually). PKV: privately insured. Data source: SHARE 2004.

*Table 9.* Regression: total net wealth and expected care costs (scenario 1)

| **Dependent variable: Total individual net wealth** | **Coefficient** | **Robust Std. Err.** | **t** | **P>t** |
|---|---|---|---|---|
| Exp. individual care costs | -0.11 | 0.25 | -0.45 | 0.66 |
| Age | -325 | 1,274 | -0.25 | 0.8 |
| Female | -999 | 13,881 | -0.07 | 0.94 |
| East German | **-78,944** | 9,806 | -8.05 | 0 |
| Living alone | **-42,525** | 14,823 | -2.87 | 0 |
| # Children | -4,670 | 4,061 | -1.15 | 0.25 |
| PKV | **142,366** | 40,342 | 3.53 | 0 |
| Constant | **182,091** | 85,071 | 2.14 | 0.03 |
| Observations | 1,222 | | | |

*Note.* Lowest and highest percentile excluded (total net wealth). Dependent variable: total individual net wealth. PKV: privately insured. Data source: SHARE 2004.

regression analyses, we have a closer look at the determinants of provision gaps and identify groups who are at risk to rely on their children's assets and income or to fall back on social assistance. Lastly, we predict expected provision gaps by age and gender. These predicted values correspond to the additional amount of resources that people in the employment phase have to put aside in order to meet future care needs.

Our analysis yields several findings: (1) In our benchmark scenario, average expected care costs amount to about 45,900 Euros. While, on average, a share of 59 percent of these costs will be carried by the care insurance, an average individual in our sample bears care costs of about 20,200 Euros that have to be financed out of own resources. (2) About a third of the sample has a provision gap meaning that these people are not wealthy enough to meet care expenses with own assets. About 37 percent of homeowners will have to sell their home to cover expected care costs. The situation of the privately insured is much more relaxed due to the notably higher amount of assets these people own: only 14 percent will face a provision gap; homeowners will have to liquidate their housing wealth in about 26 percent of the cases. While these figures hold for our quite conservative benchmark scenario, the results for the additional scenarios are notably more drastic as the number of statutorily insured individuals having a provision gap increases to about 57 percent. (3) The regression analyses illustrate that the probability to face a provision gap strongly increases with being female and with living alone. Furthermore, expected care costs of women exceed those of men by more than 34,000 Euros at any age between 65 and 90. (4) On average, a privately insured is 10.2 percent less likely to face a provision gap. (5) The coefficient of expected care costs on total net wealth is not significant which illustrates that individuals do not accumulate wealth in response to their expected care risk.

Especially this latter finding encourages our analysis on private provision gaps as there are good reasons to believe that most people are not aware of the costs that care can incur in later life rather than neglecting precautionary savings on purpose. However, a large fraction of the population may not have an incentive to build up wealth for long-term care reasons. Individuals with low wealth may act rationally since own savings efforts to close the private provision gap would require notable cuts of consumption expenditure. The incentive to self-insure may be low if social assistance is of acceptable quality and provides the required financial means (moral hazard problem). Similarly, individuals with high amounts of wealth are likely to cover their long-term care costs anyway so that there is no need for extra saving efforts due to the risk of long-term care.[12]

[12] Meier (1996) formulates these effects on a theoretical basis when a social aid regime or a compulsory care insurance is introduced in a context in which individuals can only choose voluntary private care insurance beforehand.

Without doubt, the financial burdens of long-term care expenditure for both public and individual budgets will drastically rise in the following years. This paper is a first step to combine statistical figures from life tables, care probabilities, care costs, and insurance payments with individual data on socio-demographic conditions and wealth. Future work should first concentrate on the improvement of data availability and quality. This includes heterogeneous care probabilities for informal care provision, more detailed specifications of costs of care, as well as precise information on income and expenditure dynamics of the care recipients and their relatives to follow the financial burdens due to long-term care on the individual level. This would help people to make better-informed insurance decisions instead of fearing a diffuse disability scenario in old age.

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