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## The impact of macroeconomic conditions on long-term care: Evidence on prices

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# 2096

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#### IMPRESSUM

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# The Impact of Macroeconomic Conditions on Long-Term Care: Evidence on Prices\*

Johannes Geyer<sup>†</sup>, Peter Haan<sup>‡</sup>, Mia Teschner<sup>§</sup>

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## Abstract

The price for institutional long-term care is a central determinant of the demand for formal and informal long-term care. In this paper, we show how macroeconomic conditions affect these prices. The analysis is based on administrative data that contains rich information on the universe of nursing homes and ambulatory care services and about all recipients of long-term care benefits in Germany. For identification, we exploit variation in macroeconomic conditions measured by the unemployment rate across districts and over time, applying a panel data approach with facility and time fixed effects. Our empirical results show that a higher unemployment rate increases prices for permanent long-term care as well as for prices of accommodation and meals in nursing homes. We provide empirical evidence for the mechanism of these price effects. While we find that employment, working hours, and quality of care in nursing homes are not significantly affected by macroeconomic conditions, our results show that a higher unemployment rate increases the price of nursing homes through a change in the composition of patients: it induces a shift from care recipients with a low degree of impairment to patients with high demands for labor-intensive care. We also document a substitution of low-impairment care from nursing homes toward ambulatory and informal home care.

**Keywords:** Long-Term Care, Nursing home prices, Unemployment rate, Macroeconomic Conditions, Informal care

**JEL classification:** E32, I11, J20

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# 1 Introduction

The organization of long-term care is a key challenge for welfare states in all OECD countries. The demand for long-term care services has been increasing in the past and is expected to grow even further (OECD, 2023). For example, the Federal Statistical Office of Germany estimates an increase in the number of people in need of long-term care from approximately five million in 2021 to 6.8 million in 2055, which is a relative increase of 37 percent (Destatis, 2023). Long-term care provision consists of a combination of informal care and formal ambulatory or institutional care arrangements that the care-dependent person and family members choose. In most countries, formal care is publicly financed with private co-payments. Therefore, the price of institutional long-term care is a central determinant of the demand for formal and informal long-term care. The care-mix has important implications for households but also on an aggregate level. Specifically, an increase in formal care might have negative effects on the well-being of the care recipient as the majority prefers informal care at home rather than formal care in nursing homes (e.g., Costa-Font, 2017; Achou et al., 2023). However, an increase in formal care reduces the care burden for family members and reduces the trade-off between informal care work and employment with potentially positive effects on labor supply and overall employment (e.g., Løken et al., 2017; Hollingsworth et al., 2022).

In this paper, we analyze how macroeconomic conditions affect the prices for formal long-term care in nursing homes. Moreover, we provide empirical evidence for the mechanism of the price effect and quantify the role of potential channels driving the price effects including employment and working hours of care workers, the quality of care, the composition of patients, and substitution between formal and informal care.

The analysis is based on administrative data that contains rich information about the universe of formal care providers and recipients of long-term care insurance benefits in Germany between 2005 and 2015. Importantly, the data include details about the prices for formal long-term care in nursing homes, staffing in nursing homes and ambulatory care services, the supply of beds in nursing homes, as well as the utilization of formal and informal long-term care. For the identification of the effect of macroeconomic conditions on prices and other long-term care outcomes, we exploit variation of the unemployment rate over time and across regions (districts), applying a panel data approach in which we control for region or facility fixed effects and time fixed effects.

Our empirical results show that a higher unemployment rate increases prices for permanent long-term care and also prices for accommodation and meals in nursing homes: A one percentage point higher unemployment rate raises the prices for long-term care by about one percent. The price for accommodation and meals increases by about 0.6 percent. Our findings are robust to alternative econometric specifications. Although the price effects are moderate, this finding is remarkable and important as prices for long-term care in Germany are highly regulated. While we find that employment, working hours, and quality of care

in nursing homes are not affected by macroeconomic conditions in the German context, our results suggest that a higher unemployment rate increases the price of nursing homes through a change in the composition of patients. Specifically, we find that the number of patients with a low degree of impairment decreases when the unemployment rate rises, while the number of patients with high demands for labor-intensive care increases. Our empirical findings also suggest that the decrease in low-impairment care in nursing homes is driven by a substitution toward formal ambulatory and informal home care.

We contribute to a large and growing literature that analyzes the relationship of general economic activity and health outcomes. Many studies document positive health effects in times of recessions (e.g., Ruhm (2003), Ruhm (2015), and Stevens et al. (2015) for the U.S., Johansson et al. (2006) for Finland, Buchmueller et al. (2007) for France, Hanaoka (2019) for Japan, Gerdtham and Ruhm (2006) for OECD countries, and Lin (2009) for Pacific-Asian nations.). However, only a few studies focus particularly on elderly mortality or health. These studies show mixed results. While some studies show that health improves when unemployment is high (e.g., Miller et al., 2009; Stevens et al., 2015), McInerney and Mellor (2012) find that mortality among the elderly in the U.S. increases during recessions. Similarly, Costa-Font et al. (2016) use SHARE data for 23 European countries and find a decline in elderly health in countries that were strongly affected by the Great Recession.

One potential explanation for the positive effect of recessions on elderly health are the input factors of healthcare, such as staffing and quality of care. Some studies find that an increase in the unemployment rate is associated with a general increase in healthcare employment (Buerhaus et al., 2009; Buerhaus and Auerbach, 2011; Dillender et al., 2021; Baughman and Smith, 2012). These findings suggest that employment in the healthcare sector responds differently to the business cycle than other sectors. Only a few studies focus specifically on staffing in the long-term care sector. While Stevens et al. (2015) and Baughman (2018) find the same effects, Konetzka et al. (2018) do not find this effect and explain their findings with a decrease of revenues for nursing homes in recessions and, thus, a shift from more to less expensive workers. Such a “downskilling” effect of recessions is also documented, e.g., by Stevens et al. (2015), Alameddine et al. (2012), and Heitlinger (2003), and Zabalegui and Cabrera (2010).

Studies show that recessions also influence the demand for formal care services. Generally speaking, long-term care utilization appears to be countercyclical (Baughman and Hurdelbrink, 2018; Mommaerts and Truskinovsky, 2020), which is particularly due to a higher utilization of informal care during recessions (Baughman and Hurdelbrink, 2018). Using SHARE data, Costa-Font et al. (2016) document an increase in the availability of informal care among the elderly and a decrease in the demand for formal care, suggesting a substitution of formal care during recessions. Similarly, Mommaerts and Truskinovsky (2020) find that an increase in the unemployment rate increases the overall probability of providing informal care.

The remainder of this paper is as follows: First, we provide an overview of the institutional background of the German long-term care insurance system. The data is presented in Section 3 before we turn to the empirical approach in Section 4. The results are then described in Section 5. Section 6 finally discusses the results and policy implications.

## 2 Long-term care and the role of macroeconomic conditions

### 2.1 Institutional background

In Germany, a universal long-term care insurance (LTCI) system was introduced in 1995.<sup>1</sup> LTCI is financed by mandatory contributions as a pay-as-you-go scheme.<sup>2</sup> LTCI is designed as a partial insurance that requires informal care and / or copayments (Heinicke and Thomsen, 2010; Geyer et al., 2023).

The LTCI provides cash benefits and ambulatory care at home or institutional care services, whereby eligibility and the amount of benefits depend on the level of impairments. Benefits are independent of age and income, only requiring a minimum insurance record of five years of contributions. Eligibility requires a limitation in activities of daily living due to physical, mental, or psychological illness or disability for at least six months (Arntz et al., 2007). Until the end of 2016, there had been three long-term care degrees (*Pflegestufe 1-3*), which have been replaced by a system of five long-term care degrees in 2017. The amount of benefits increases with the level of impairment (Geyer et al., 2016).

Eligible individuals can receive benefits for ambulatory care services or institutional long-term care. If long-term care is provided at home, recipients can choose between cash benefits, in-kind benefits, or a combination of both. If long-term care is provided institutionally, it is usually inpatient care in nursing homes. Benefits vary depending on the type of care provided. In the case of institutional long-term care, co-payments of up to 50% are standard, while in the case of professional ambulatory long-term care, co-payments are usually lower (Schmitz and Westphal, 2017). Furthermore, residents of nursing homes need to pay for food and accommodation.

If recipients choose cash benefits, the type of care is *informal long-term care*. Professional outpatient long-term care (through ambulatory care services) and professional inpatient long-term care (in nursing homes) are referred to as *formal long-term care*. It is possible to receive both formal and informal care in combination if a person applies for a combination of cash and in-kind benefits. Most long-term care beneficiaries (80% in 2019, Destatis, 2020) receive long-term care at home. Thereof, about 64% get cash benefits only, which amounts to 51.3% of all beneficiaries (in 2019, Destatis, 2020).

<sup>1</sup>Before 1995, long-term care was mainly provided by the health insurance. If people were not able to pay for care services, they could apply for means-tested social assistance.

<sup>2</sup>Contributions are shared between employees and employers. The contribution rate has risen from 1.7% in 1999 to 3.4% in 2023. Persons without children pay an additional 0.6%. Families with two or more children younger than 25 pay slightly lower contributions since 2023

Nursing homes can be differentiated by the legal form of organization. About half of all nursing homes are organized by private nonprofit organizations, about five percent are public nursing homes, and the remainder are private (for profit) nursing homes. Nursing homes offer different types of LTC: permanent care, temporary care, and day or night care. In this analysis, we only focus on permanent inpatient care.<sup>3</sup>

There is significant variation in nursing home prices both between and within states (e.g. Bauer and Stroka, 2013; Haun, 2020). Prices for stationary care, including food and accommodation, depend on the degree and type of care patients require. An important factor influencing this price variation is the regulation at the federal state level, where planning and investment details are specified by state laws. Prices, or reimbursement rates, are negotiated at the state level among LTCI funds, facilities, and social assistance authorities. Regional LTCI funds ensure that long-term care services meet certain quality standards by establishing supply contracts, and wage and price agreements with long-term care providers at the state level (Heinicke and Thomsen, 2010). Generally, reimbursement rates are set for twelve months and consist of three components: a price for general nursing services (care rates), a price for food and accommodation, and a price for investments made (which includes the base rent). Nursing homes can also generate additional income by offering extra services. The separation between care rates and costs for food and accommodation can be complex in some states, such as North Rhine-Westphalia (Augurzyk et al., 2008). Therefore, we exclude this state in one specification from our empirical estimation for robustness (see Section 5.1).

Care rates cover all general care services, with partial payment from LTCI and the remainder paid by nursing home residents or, if resources are insufficient, by social assistance. Once agreed upon, these fees are binding for nursing homes (for more details, see Augurzyk et al. (2008), Bauer and Stroka (2013), and Mennicken et al. (2013)).

Cross-sectional variation in facility prices is mainly driven by differences in wage levels for nursing professionals, with labor costs accounting for about 70 to 80% of total nursing home costs (Haun, 2020). Wage levels are likely correlated with other regional and facility-specific factors such as regional price levels, rents, and property prices. Regional differences in staffing requirements also impact prices, as states mandate minimum numbers of nurses and nurse assistants per resident (Rothgang et al., 2020). Variations in state regulations regarding nursing home quality further influence prices. Additionally, the composition of residents and their required care intensity affect pricing. Data show that private (for-profit) nursing homes are generally cheaper than others. These factors contribute to significant price variation between and within states. Our empirical analysis accounts for these differences by using fixed effects regressions at the facility or district level.

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<sup>3</sup>Permanent care is the most important type of care: In 2019, 90.5% of all beds were used for permanent care (Destatis, 2020).

## 2.2 The effect of macroeconomic conditions on prices of formal long-term care

The effect of macroeconomic conditions on formal long-term care prices is *a priori* ambiguous since prices are likely to be affected by different factors simultaneously. First, prices might increase during recessions as a response to higher labor costs. A positive effect of the unemployment rate on nurse staffing levels and working hours is documented in the U.S. context (e.g., Baughman, 2018; Stevens et al., 2015) and, given that wages in the long-term care sector are sticky and strongly regulated in the German context (see Section 2.1), this might imply an increase in labor costs during recessions.<sup>4</sup> Furthermore, higher staffing levels are associated with a higher quality of care during recessions (Antwi and Bowblis, 2018; Huang and Bowblis, 2019), which might also result in higher prices of formal care.<sup>5</sup> Finally, macroeconomic conditions might affect the cost structure of nursing homes. The literature shows that a higher unemployment rate leads to a decrease of revenues for US nursing homes (Konetzka et al., 2018), which supports the idea that costs might increase during recessions. One channel for an increase in costs is changes in the composition of care recipients in nursing homes and changes between care at home and care in nursing homes. It is well documented that informal care increases during recessions, which reduces demand for institutional care. Nursing homes can react to such economic pressure by adjusting their cost structure or prices to cover their costs, this might in turn lead to higher prices for formal long-term care.<sup>6</sup>

## 3 Data

For our analysis, we combine different administrative data sets. The main data source is the Statistic on Long-Term Care in Germany (*Pflegestatistik*), which is provided biannually by the Federal and State Statistical Offices (FDZ, 2021).<sup>7</sup> We link these data with population statistics and merge different measures of regional macroeconomic conditions and other regional covariates. Population data is obtained from the Federal Statistical Office (Destatis, 2021) and data on regional characteristics come from the *Indicators and maps on spatial and urban development in Germany and Europe* (INKAR, 2020).

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<sup>4</sup>Konetzka et al. (2018) and Hanaoka (2019) argue that a slow response of wages to macroeconomic conditions is likely, in particular in regulated settings of publicly financed health care where nurses' wages are less affected by economic downturns (Alameddine et al., 2012). Wages of nurses who stay employed might even increase during a recession (Konetzka et al., 2018).

<sup>5</sup>Reichert and Stroka (2018) analyze the relationship between prices and quality for Germany and find mixed results.

<sup>6</sup>Another channel could be related to changes in health. Previous studies find that macroeconomic conditions affect the health of elderly individuals; however, the results are ambiguous. If health improves during a recession, as documented in the US context by Stevens et al., 2015 and Miller et al., 2009, this could decrease the demand for labor-intensive elderly care. On the other hand, McInerney and Mellor, 2012 and Costa-Font et al., 2016 find that elderly health worsens when the unemployment rate is high, which would result in a higher demand for labor-intensive long-term care.

<sup>7</sup>The data are collected and recorded each December.

### 3.1 Sample

We use data from six waves of *Pflegestatistik* for the period 2005 - 2015. The *Pflegestatistik* is a longitudinal data set that includes information on all German long-term care services and all individuals who receive benefits from the LTCI for informal care via cash benefits. Data provide information on the universe of ambulatory care services and nursing homes, including information on staffing, beds, patients, and prices for long-term care in nursing homes.<sup>8</sup> About 86.6% of all nursing homes provide valid information about prices (see below), leaving us with a sample of 14,500 nursing homes (62,337 observations) and a sample of 19,194 ambulatory care services (72,908 observations) within the 2005 - 2015 period.<sup>9</sup> Ambulatory care services and nursing homes can be identified over time. Given our empirical approach (see Section 4), we construct two panel data sets for nursing homes and ambulatory care providers, respectively.

The *Pflegestatistik* also provides information on all persons who receive cash benefits through LTCI. This includes persons who receive only cash benefits as well as persons who receive a combination of cash and ambulatory in-kind benefits.<sup>10</sup> Recipients of cash benefits for informal care cannot be identified on the individual level over time with the given data structure. This information is aggregated at the regional level with 383 separate regions.<sup>11</sup> Thus, when estimating the effect of macroeconomic conditions on the substitution between formal and informal care we use the regional panel dimension.

### 3.2 Outcome variables

**Prices of in-patient long-term care:** Our main outcome variables of interest are the prices of inpatient care in nursing homes. Our data include information on prices of care for the three different care degrees and on accommodation and meal prices. Prices are measured as the daily price per person. We aggregate the prices for care degrees 1 to 3 as an overall price variable, where the prices for the different degrees are weighted by the number of patients with the degree in the nursing home, respectively.<sup>12</sup> The price variables are summarized in Panel A of Table 1. The average overall price is about 57 euro per day. The average price for impairment degree 1 is about 46 Euro per day and the price is

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<sup>8</sup>Information comes from the State Statistical Offices, which conduct interviews with long-term care providers. The providers are legally obligated to answer truthfully.

<sup>9</sup>In one state, North Rhine-Westphalia, between the waves 2011 and 2013 there was a change in facility IDs. Given that we implement an empirical approach with facility fixed effects (see Section 4), one concern is that this time break might affect our results. In a robustness test we show that the results do not change when including this state 5.1.

<sup>10</sup>We exclude individuals who live outside of Germany.

<sup>11</sup>In principle, 401 regions (districts) existed in 2017, however, there have been several administrative reforms regarding the number and size of districts since the 1990s. Given these administrative reforms and further administrative regulations regarding statistical confidentiality, information from specific districts has been merged in certain years. This leaves us with 383 observations ("constructed" districts) in each year

<sup>12</sup>As mentioned in Section 2, we look only at the prices for permanent care and exclude temporary care, and day or night care since permanent care patients make up the majority of all persons who receive inpatient long-term care (over 90% in the estimation sample). Moreover, we do not observe the price component for investments that are paid by care recipients. Investment costs are about 20% of copayments.

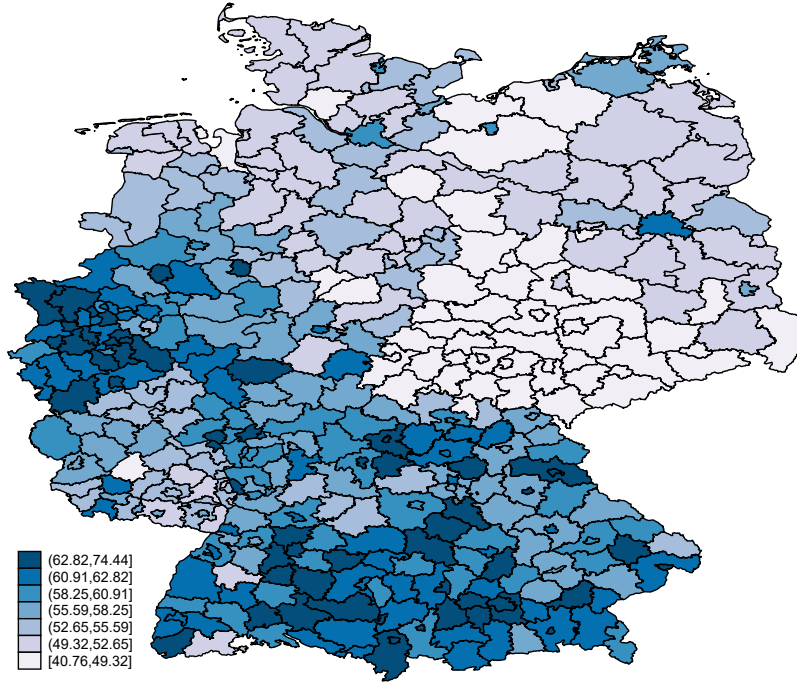


Figure 1: Mean overall price in 2011

Source: FDZ, 2021, own calculations.

increasing with the degree of impairment: about 60 euro for degree 2 and about 74 euro for degree 3. The average price for accommodation and meals is about 20 euro per day.

We further show the regional variation in the mean overall price across districts in Figure 1. Generally, the price for long-term care is lower in East Germany than in West Germany. Furthermore, we document a variation in the overall price within federal states. Figure 2 displays the percentage change in the mean overall price between 2005 and 2015. Prices increased more in East and South-West Germany than in the Northern or central part of Germany. We also document a variation in the change of long-term care prices within federal states.

**Employment and working hours:** The data include information on the absolute number of employees within each facility and for employment in full-time, part-time, and marginal employment separately. Based on this information, we construct the sum of weekly working hours for each facility. Specifically, we multiply the number of full-time employees by 38 hours per week, the number of part-time employees by 20 hours per week, and the number of marginally employed workers by 10 hours per week and add these terms up.<sup>13</sup> We are also able to distinguish between different occupational degrees of employees, i.e., nurses,

<sup>13</sup>38 is a common number of weekly working hours for a full-time nurse in Germany (Bispinck et al., 2021).

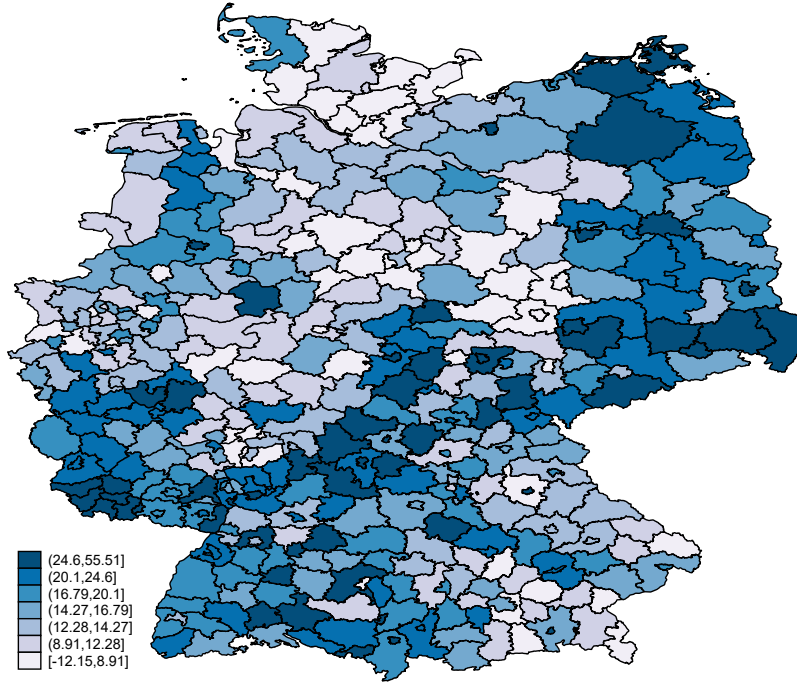


Figure 2: Percentage change in mean overall price between 2005 and 2015

Source: FDZ, 2021, own calculations.

nurse assistants, non-nursing medical employees, and other degrees.<sup>14</sup> A summary of the staffing variables for nursing homes is presented in Panel B of Table 1. About 50% of all employees in nursing homes have a nursing or nursing assistant degree. The share is higher for ambulatory care providers (about 70%), which is explained by the fact that the share of employees with a non-medical position is smaller than in nursing homes.

**Quality of care:** To approximate the quality of care we relate the sum of weekly working hours (see above) to the number of recipients and the number of beds. As an alternative measure, we divide the number of full-time employees by the number of recipients and beds, respectively. The quality measures are summarized in Panel C of Table 1. On average, a nursing home has 24 weekly working hours available per recipient (21 hours per bed), and the average number of full-time employees per resident is 0.31 (0.26 per bed).

**Recipients of formal care:** The data distinguishes between care recipients in nursing homes and people who receive ambulatory care services. Furthermore, we have information on the degree of impairment of recipients. This is important because the literature shows that macroeconomic conditions may affect the health of elderly individuals (Mommaerts and Truskinovsky, 2020; Costa-Font et al., 2016), which might result in a change in the composition of patients during recessions. Furthermore, patients with a higher degree

<sup>14</sup>Nurses include employees with an official nursing degree (*Pflegefachkraft* or equivalent). Nursing aides are employees with an aide degree (*Pflegehilfskraft* or equivalent). Non-nursing medical employees are, for example, occupational therapists or similar, and other degrees include all employees who are not included in the former, for example, housekeeping employees.



of impairment require a higher intensity of care and, thus, more working hours. These outcome variables are summarized in Panels D and E of Table 1. The average number of care recipients is 70 in nursing homes and 47 for ambulatory care providers. The share of patients with impairments of degree 1 is higher for ambulatory care providers (about 55%) than for nursing homes (about 37%), while the share of degree 2 and 3 recipients is higher in nursing homes (41% and 21%, respectively) than for ambulatory care services (34% and 11%, respectively).<sup>15</sup>

**Recipients of informal care:** In the analysis, we also focus on individuals who receive cash benefits, i.e., informal care to analyze the substitution between formal and informal care. We can differentiate the three degrees of impairment. This allows us to analyze the substitution between formal and informal care by degree of impairment. Previous literature shows that informal and formal care may be substitutes for care recipients who need assistance with activities of daily living, while informal care is complementary to more skilled or technical nursing tasks (e.g. Van Houtven and Norton, 2004; Sun et al., 2019), which are more relevant for people with a higher degree of impairment.

As mentioned above, we aggregate the number of individuals who receive cash benefits within the district-year cell. To adjust for population size, we divide the regional information by the district-year population size, multiplied by 100. Thereby, we distinguish between the whole population size and the size of the population aged 65 years or older. The variables on the utilization of informal care are summarized in Table 2. The average fraction of individuals who receive cash benefits in the whole population is 1.78 percent, while the share of cash beneficiaries in the population aged 65 years or older is 8.69 percent. Most individuals who receive cash benefits have long-term care degree 1. This is in line with the observation that the substitutability of formal care is higher when the degree of impairment is low.

### 3.3 Macroeconomic conditions

All measures of macroeconomic conditions come from INKAR data between 2005 and 2015 (INKAR, 2020). In general, the related literature relies on the unemployment rate as a proxy for macroeconomic conditions. We follow this literature and use the district-level annual unemployment rate as a proxy for macroeconomic conditions (following e.g., Konetzka et al., 2018; Mommaerts and Truskinovsky, 2020; Baughman and Hurdalbrink, 2020; Hanaoka, 2019; Huang and Bowblis, 2019; Stevens et al., 2015).

The unemployment rate considerably varies between districts and over time. In Figure 3, we plot the mean and standard deviation of the regional unemployment rate over time. First, the solid line plots the unweighted average unemployment rate across all districts for each year between 2005 and 2015. It varies between 6.4% in 2015 and 11.7% in 2005.

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<sup>15</sup>The share of nursing home recipients does not add up to 100% since some nursing homes accommodate patients with *Pflegestufe 0*. Information on this small group (about 2% of care recipients) is only available in 2013 and 2015 and, therefore, is not included in the analysis.

Table 1: Descriptive statistics on nursing homes and ambulatory care services, 2005 – 2015

Variable	Mean	Share in total
<i>A: Prices for permanent care in nursing homes, per day and person<sup>1</sup></i>		
Price overall	57.26	-
Price degree 1	46.07	-
Price degree 2	60.20	-
Price degree 3	75.17	-
Price accommodation + meals	20.55	-
<i>B: Staffing in nursing homes<sup>1</sup></i>		
Total employment	59.75	100% <sup>3</sup>
Full-time employment	19.58	33%
Part-time employment	30.08	50%
Marginal employment	5.54	9%
Weekly working hours	1501.87	-
Nurses	20.84	35%
Aides	9.00	15%
Non-nursing degree	1.38	2%
Other degree	28.52	48%
<i>C: Proxies for quality of care in nursing homes<sup>1</sup></i>		
Hours-to-recipient ratio	23.84	-
Hours-to-bed-ratio	20.65	-
Full-time-to-recipient ratio	0.31	-
Full-time-to-bed ratio	0.26	-
<i>D: Recipients of formal care in nursing homes<sup>1</sup></i>		
Care recipients	70.45	100% <sup>4</sup>
Degree 1 recipients	26.11	37%
Degree 2 recipients	28.90	41%
Degree 3 recipients	14.11	20%
<i>E: Recipients of formal care by ambulatory care services<sup>2</sup></i>		
Care recipients	46.84	100%
Degree 1 recipients	25.96	55%
Degree 2 recipients	15.67	34%
Degree 3 recipients	5.21	11%

Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), own calculations.

<sup>1</sup>  $N = 62,337$  for 14,500 nursing homes.

<sup>2</sup>  $N = 72,908$  for 19,194 ambulatory care services.

<sup>3</sup> The percentage of full-time, part-time, and marginal employment does not add up to 100% since other types of employment, e.g., trainees or interns, are not included.

<sup>4</sup> The percentage of care degree 1 to 3 recipients does not add up to 100% since some nursing homes have patients with *Pflegegrad 0* or patients whose degree of impairment has not yet been determined.

Table 2: Share of cash benefit recipients across districts, 2005 – 2015

Variable	Mean <sup>2</sup>	Share in total
<i>A: Share of cash benefit recipients in total population, in percent<sup>1</sup></i>		
Cash beneficiaries	1.78	100%
Cash beneficiaries degree 1	1.09	61%
Cash beneficiaries degree 2	0.54	30%
Cash beneficiaries degree 3	0.16	9%
<i>B: Share of cash benefit recipients in population 65 years or older, in percent<sup>1</sup></i>		
Cash beneficiaries	8.69	100%
Cash beneficiaries degree 1	5.28	61%
Cash beneficiaries degree 2	2.64	30%
Cash beneficiaries degree 3	0.77	9%

Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), own calculations.

<sup>1</sup>  $N = 2,298$  German districts.

<sup>2</sup> Means are weighted by district population.

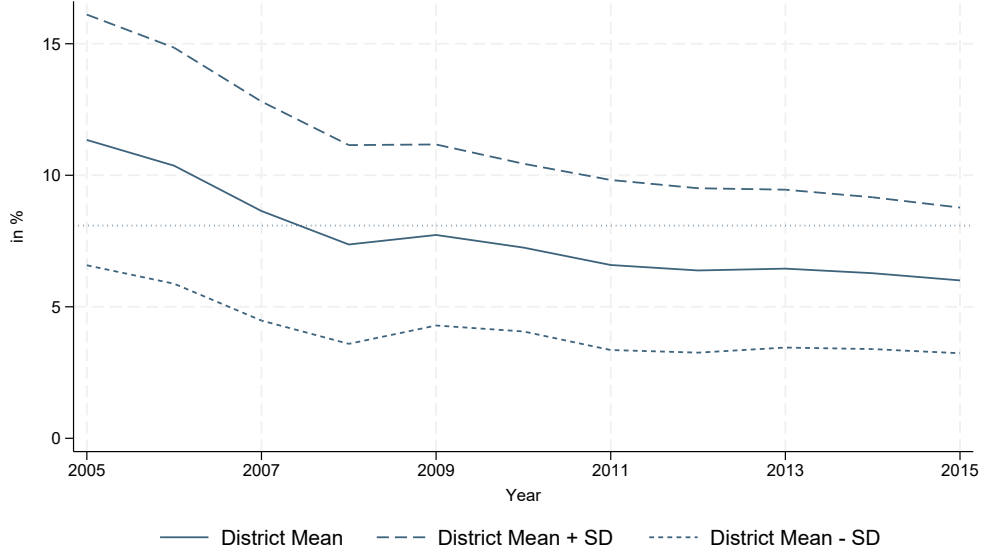


Figure 3: Mean district unemployment rate in percent over time

Source: INKAR, 2020, own calculations.

Second, the dashed lines show the yearly average unemployment rate  $\pm$  the yearly standard deviation of the unemployment rate across all districts. Across all district-year cells, the average unemployment rate is 8.1% (dotted line). To demonstrate the variation of the unemployment rate across districts, Figure 4 displays the unemployment rate in 2011 for all German districts. The graph shows that there is a higher unemployment rate in East Germany than in West Germany and there is further variation in the unemployment rate within these regions. Finally, Figure 5 shows the percentage change in the unemployment rate in German districts between 2005 and 2015. All districts show a decrease in the unemployment rate between 2005 and 2015 (compare Figure 3), however, the relative change is larger in East Germany and in Southern-East Germany than in West German districts. The three graphs show that there is sizable variation in the unemployment rate over time and across districts that we will exploit in the identification strategy, which we describe in Section 4.

### 3.4 Control variables

In our econometric analysis, we control for the demographic structure since macroeconomic conditions may be associated with long-term care outcomes through changes in the population's demography (Mommaerts and Truskinovsky, 2020). In particular, we control for the share in the population that is  $< 6$ ,  $6 - 17$ ,  $18 - 24$ ,  $25 - 29$ , and  $\geq 65$  years old (following e.g., Konetzka et al., 2018; Stevens et al., 2015; Miller et al., 2009; Mommaerts and Truskinovsky, 2020).

We include further covariates in the robustness analysis in Chapter 5: the population density

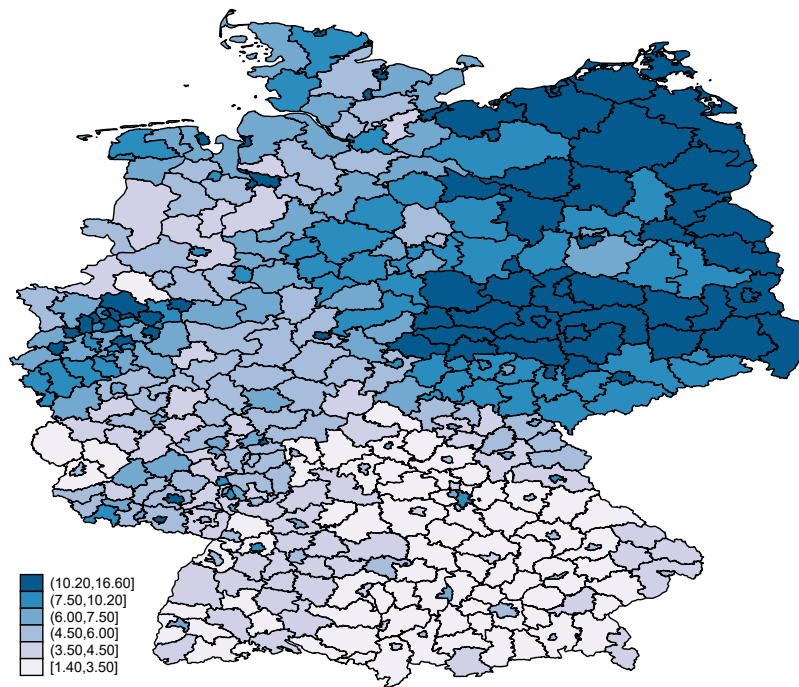


Figure 4: District unemployment rates in 2011 (in percent)

Source: INKAR, 2020, own calculations.

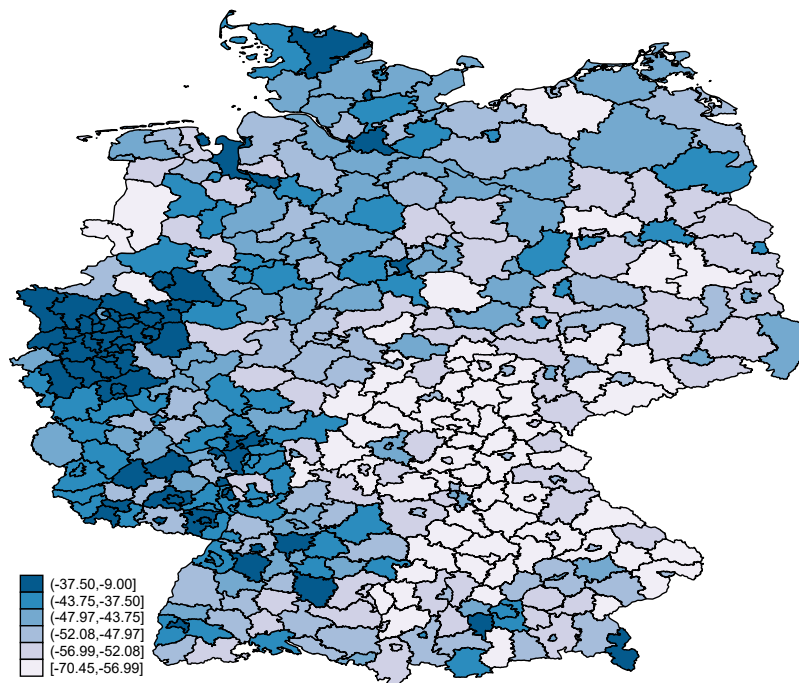


Figure 5: Percentage change in district unemployment rates between 2005 and 2015

Source: INKAR, 2020, own calculations.

(see Huang and Bowblis, 2019), the share of women in the population (see Gerdtham and Ruhm, 2006; Lin, 2009), and the share of foreigners in the population (see Antwi and Bowblis, 2018; Miller et al., 2009; Baughman and Hurdalbrink, 2020; Stevens et al., 2015).

## 4 Empirical approach

To identify the effect of the unemployment rate on the price for long-term care, we exploit the differential time trends in the unemployment rate across districts (Konetzka et al., 2018). In more detail, we use a panel data fixed effects approach and estimate the following main regression:

$$Y_{irt} = \beta U_{rt} + \tau_t + \gamma_i + \delta X_{rt} + \epsilon_{irt} \quad (1)$$

where  $Y_{irt}$  is the price for long-term care in facility  $i$  in district  $r$  and year  $t$ .  $U_{rt}$  is the local unemployment rate in percent. We follow the literature and control for time (year) fixed effects  $\tau_t$  and facility fixed effects  $\gamma_i$ .<sup>16</sup> Facility fixed effects account for any time-invariant heterogeneity across long-term care providers. Furthermore, any macroeconomic shocks to long-term care that affects all facilities uniformly are controlled for by time fixed effects. We additionally control for regional demographic information (share of age groups in the population) that change over time within districts and could affect both changes in unemployment and long-term care ( $X_{rt}$ , see Section 3.4 for details).  $\epsilon_{irt}$  denotes idiosyncratic errors. Standard errors are clustered at the regional level to account for correlation of error terms between facilities.

In order to test the robustness of our baseline results, we run several alternative specifications with additional covariates, state-specific time trends, or state-year fixed effects. These approaches control for more unobserved time-varying heterogeneity across district, however, they also absorb more variation of the unemployment rate (Costa-Font et al., 2016).

To study the effects on informal care, we adjust Equation 1 and focus on outcomes at the regional level  $Y_{rt}$  while accounting for district ( $\gamma_r$ ) and year ( $\tau_t$ ) fixed effects.

## 5 Results

In Section 5.1, we first present our findings about the effect of macroeconomic conditions on prices of long-term care in nursing homes. As discussed above, prices are likely to be affected by different factors simultaneously: Prices might be driven by staffing levels, labor costs, and the resulting quality of care. Furthermore, the demand for nursing home care and potential substitution toward ambulatory formal care or informal home care during recessions might affect the overall costs structure of nursing homes, thereby affecting the

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<sup>16</sup>See, for instance, Konetzka et al., 2018; Costa-Font et al., 2016; Baughman and Hurdalbrink, 2020; Stevens et al., 2015; Mommaerts and Truskinovsky, 2020.

Table 3: Effect of a one percentage point increase in unemployment rate on prices of permanent long-term care in German nursing homes, 2005-2015

	(1)	(2)	(3)	(4)	(5)
	overall	degree 1	degree 2	degree 3	acc. + meals
Unemployment rate	0.560*** (0.118)	0.371*** (0.101)	0.485*** (0.117)	0.597*** (0.126)	0.129*** (0.041)
Observations	62,337	62,337	62,337	62,337	62,337
Number of facilities	14,500	14,500	14,500	14,500	14,500
Mean dependent variable	57.26	46.07	60.20	75.17	20.55
Relative estimate (in %)	0.98	0.81	0.81	0.79	0.63

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variables are the prices of permanent long-term care in nursing homes, separated by long-term care degree and accommodation and meals. Overall price is a patient-weighted average of prices for care degrees 1 to 3. Prices are per person and day, in euro. Each column is a separate regression. All regressions include facility, year fixed effects, and demographic covariates: share of residents' age groups < 6, 6 - 17, 18 - 24, 25 - 29, ≥ 65. Standard errors in parentheses are clustered at the district level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

prices of long-term care in nursing homes. We will examine these different mechanisms in Section 5.2.

### 5.1 Effects on prices of formal long-term care

Table 3 displays the price effects. In addition to the main coefficient of interest ( $\hat{\beta}$  from Equation 1), we present average prices and the relative price effect in percent, i.e., the ratio between the coefficient and the mean (in percent). Next to the overall price effect, we show the price effects separately by care degree and for accommodation and meals. All specifications include facility and year fixed effects and regional demographic covariates. The results show a clear picture: an increase in the unemployment rate increases the overall price for LTC and also the prices for the different care levels and for accommodation and meals. Specifically, an increase in the unemployment rate by one percentage point raises the overall daily price for long-term care per person in nursing homes by 0.56 Euro (0.98 percent).<sup>17</sup> The daily price of care degree 1 increases by 0.37 Euro (0.81 percent), the price of degree 2 by 0.49 Euro (0.81 percent), and the price of care degree 3 by 0.60 Euro (0.79 percent). The price for accommodation and meals per day (Column 4) increases by 0.13 Euro (0.63 percent). All estimated coefficients are significantly different from zero at the one percent significance level. The absolute and relative price effects are small. Still, this finding is remarkable and important as prices for long-term care in Germany are highly regulated as discussed in Section 2.

To test the robustness of our main specification, we run several alternative specifications of Equation 1. The results are displayed in Table 4. The first column shows the baseline

<sup>17</sup>The shares in the care levels differ, see Table 1. In addition, the composition in the care levels changes with the unemployment rate, see Table 10. Therefore, the overall price effect cannot directly be inferred from the price effects of the different care degrees.

Table 4: Effect of a one percentage point increase in unemployment rate on overall price of permanent long-term care in German nursing homes, robustness, 2005-2015

	(1)	(2)	(3)	(4)	(5)
Unemployment rate	0.560*** (0.118)	0.572*** (0.134)	0.477*** (0.0700)	0.201** (0.0950)	0.615*** (0.127)
Observations	62,337	62,337	62,337	62,337	50,325
Number of facilities	14,500	14,500	14,500	14,500	10,162
Mean dependent variable	57.26	57.26	57.26	57.26	56.20
Relative estimate (in %)	0.98	1.00	0.83	0.35	1.09
Facility fixed effects	✓	✓	✓	✓	✓
Year fixed effects	✓	✓			✓
Demographic control variables	✓	✓	✓	✓	✓
Additional control variables		✓			
State-specific linear time trend			✓		
State x year fixed effects				✓	
Restricted federal states					✓

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variable is the overall price of permanent long-term care in nursing homes. Price per person and day, in Euro. The table displays the coefficients of the percentage unemployment rate, respectively. Each column is a separate regression. Demographic covariates are the share of residents' age groups < 6, 6 - 17, 18 - 24, 25 - 29, ≥ 65. Additional control variables are population density, share of female population, share of foreign population. Standard errors in parentheses are clustered at the district level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

result from Table 3 for the overall price. We use this outcome in different specifications in Columns 2 to 4. First, additional to the regional demographic covariates from the baseline specification, we use further control variables (population density, share of women, and share of foreigners; see Section 3.4 for details). In an alternative specification in Column 3, we use state-specific linear time trends instead of year fixed effects. Furthermore, we use state-year fixed effects instead of year fixed effects in Column 4. All specifications show the same pattern. The point estimate in Column 4 is, with 0.2, lower than in the main specification; however, this difference is not statistically significant. This suggests that our baseline findings from Table 3 are robust to alternative econometric specifications that, in addition, control for potential unobserved time-varying heterogeneity across districts. Finally, we test whether the exclusion of the state North Rhine-Westphalia (see Section 2.1 and 3.1) changes our results (column 5). The results are similar to the findings from the baseline specification in column 1, showing that the estimation is robust to the exclusion of this state.

Next, regarding the overall effect for all nursing homes, we explore if price effects differ between relevant subgroups. The literature shows that larger nursing homes respond stronger to macroeconomic conditions with respect to their revenues and staffing decisions (Konetzka et al., 2018). Hence, we estimate the price effects separately for larger facilities with a staffing level above the median and for smaller facilities (Table 5, Columns 1 and 2). While the effects are significant for both groups, the effect is stronger in absolute and relative terms for large nursing homes, but differences are not statistically significant. We also split

Table 5: Effect of a one percentage point increase in unemployment rate on overall price of permanent long-term care in German nursing homes, heterogeneity, 2005-2015

	(1) Small	(2) Large	(3) Low pop. density	(4) High pop. density
Unemployment rate	0.488*** (0.173)	0.648*** (0.126)	0.469*** (0.128)	0.567*** (0.207)
Observations	31,094	31,243	31,132	31,205
Number of facilities	8,961	8,564	6,556	8,185
Mean dependent variable	56.89	57.64	54.53	59.99
Relative estimate (in %)	0.86	1.12	0.86	0.95

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variable is the overall price of permanent long-term care in nursing homes, separated by the size of the nursing home and the population density, respectively. Price per person and day, in Euro. Large = staffing  $\geq$  median, small = staffing  $<$  median. Low pop. density = population density  $<$  median, high pop. density = population density  $\geq$  median. The table displays the coefficients of the percentage unemployment rate, respectively. Each column is a separate regression. All regressions include facility and year fixed effects and demographic covariates: share of residents  $< 6$ ,  $6 - 17$ ,  $18 - 24$ ,  $25 - 29$ ,  $\geq 65$ . Standard errors in parentheses are clustered at the district level, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

the sample by population density to test for effect heterogeneity between rural and urban areas (Table 5, Columns 3 and 4). In regions with a higher population density, the price effect is slightly stronger than in regions with a comparatively low population density, both in absolute and relative terms. However again, the difference is not significant.

Finally, the literature documents stronger effects of macroeconomic conditions on staffing levels and revenues for profit-oriented nursing homes than for non-profit nursing homes in the U.S. context (Konetzka et al., 2018). We estimate the baseline specification separately for private, non-profit, and public nursing homes (Table 6). We document similar price effects in private and non-profit nursing homes, where the coefficient in non-profit nursing homes is slightly larger in absolute and relative terms. In contrast, we find a considerably smaller price effect for public nursing homes which is not significant.<sup>18</sup>

## 5.2 Potential mechanisms

In the following, we explore potential mechanisms that can explain the documented positive price effects. For these analyses, we use the same specification as for the price effects (Specification 1), but with different outcome variables.

### 5.2.1 Employment and working hours in nursing homes

One potential mechanism for prices to increase when unemployment is high is that staffing levels and working hours in the nursing sector increase during recessions. As mentioned above, several studies document a positive impact of the unemployment rate on staffing

<sup>18</sup>This non-significant effect might also be driven by the much smaller sample size for public nursing homes.



Table 6: Effect of a one percentage point increase in unemployment rate on overall price of permanent long-term care in German nursing homes, by type of nursing home, 2005-2015

	(1)	(2)	(3)
	Private	Non-profit	Public
Unemployment rate	0.424*** (0.149)	0.583*** (0.141)	0.236 (0.477)
Observations	25,198	33,644	3,495
Number of facilities	6,377	8,318	1,069
Mean dependent variable	53.34	59.77	61.49
Relative estimate (in %)	0.79	0.98	0.38

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variables is the overall price of permanent long-term care in nursing homes, separated by the type of the nursing home, respectively. Overall price is a patient-weighted average of prices for degrees 1 to 3 long-term care. Price per person and day, in Euro. The table displays the coefficients of the percentage unemployment rate, respectively. Each column is a separate regression. All regressions include facility and year fixed effects and demographic covariates: share of residents < 6, 6 - 17, 18 - 24, 25 - 29,  $\geq 65$ . Standard errors in parentheses are clustered at the district level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

levels in the long-term care sector (e.g., Baughman, 2018; Stevens et al., 2015), while other studies find no overall effect nursing employment (Konetzka et al., 2018).

Overall, we do not find a significant effect on employment and staffing in nursing homes (Table 7). The effect on the extensive margin (Column 1) is small and not significant. If we separate employment by working hours, the evidence is mixed. While there is no significant effect on full-time employment (Column 2) and marginal employment (Column 4), the estimates show that part-time employment is significantly decreasing (Column 3) when unemployment rises. Overall, these effects cancel out as there is no statistically significant effect on weekly working hours (Column 5).

To analyze whether our estimated price effects are driven by a change in the composition of workers (Konetzka et al., 2018), we separate the estimations by the occupational degree of employees (Table 8). We only find a negative effect of the unemployment rate on employees with a non-nursing degree; an increase in the unemployment rate by one percentage point reduces this group by about 2%. This finding is in line with (Stevens et al., 2015), who shows that the group of non-nursing workers is more likely to be affected by the unemployment rate. However, given that this group is relatively small (on average 1.38 out of 20.84 workers) this marginally significant effect does not have practical implications for the size of overall staffing (Table 7).

### 5.2.2 Quality of care

Another potential mechanism for prices to increase with a higher unemployment rate is that the quality of care might increase (Antwi and Bowblis, 2018; Huang and Bowblis, 2019).

Table 7: Effect of a one percentage point increase in unemployment rate on employment and working hours in German nursing homes, 2005-2015

	(1)	(2)	(3)	(4)	(5)
	total	full-time	part-time	marginal	hours/week
Unemployment rate	-0.0857 (0.129)	0.0399 (0.0761)	-0.222** (0.102)	0.0615 (0.0429)	-4.367 (3.309)
Observations	62,337	62,337	62,337	62,337	62,337
Number of facilities	14,500	14,500	14,500	14,500	14,500
Mean dependent variable	59.75	19.58	30.08	5.54	1501.87
Relative estimate (in %)	-0.14	0.20	-0.74	1.11	0.29

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variables are total staffing levels in German nursing homes, separated by type of employment (full-time, part-time, marginal), and weekly working hours available to a facility, where full-time employment = 38h / week, part-time employment = 20h / week, marginal employment = 10h / week. The table displays the coefficients of the percentage unemployment rate, respectively. Each column is a separate regression. All regressions include facility and year fixed effects and demographic covariates: share of residents < 6, 6 - 17, 18 - 24, 25 - 29, ≥ 65. Standard errors in parentheses are clustered at the district level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 8: Effect of a one percentage point increase in unemployment rate on staffing in German nursing homes, by degree, 2005-2015

	(1)	(2)	(3)	(4)
	nurse	aide	non-nursing degree	other degree
Unemployment rate	0.0440 (0.0636)	-0.00337 (0.0720)	-0.0302* (0.0162)	-0.0961 (0.113)
Observations	62,337	62,337	62,337	62,337
Number of facilities	14,500	14,500	14,500	14,500
Mean dependent variable	20.84	9.00	1.38	28.52
Relative estimate (in %)	0.21	-0.03	-2.17	-0.34

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variables are total staffing levels in German nursing homes, separated by degree of employees, where nurse = *Pflegefachkraft* or equivalent, aide = *Pflegehelfskraft* or equivalent, non-nursing degree = occupational therapist or similar, other = housekeeping or similar. The table displays the coefficients of the percentage unemployment rate, respectively. Each column is a separate regression. All regressions include facility and year fixed effects and demographic covariates: share of residents < 6, 6 - 17, 18 - 24, 25 - 29, ≥ 65. Standard errors in parentheses are clustered at the district level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 9: Effect of a one percentage point increase in unemployment rate on proxies for quality of long-term care in German nursing homes, 2005-2015

	(1)	(2)	(3)	(4)
	Hours-to-recipient ratio	Hours-to-bed ratio	Full-time-to-recipient ratio	Full-time-to-bed ratio
Unemployment rate	0.101 (0.0870)	0.0562 (0.0846)	0.00257 (0.00179)	0.00162 (0.00157)
Observations	62,337	62,337	62,337	62,337
Number of facilities	14,500	14,500	14,500	14,500
Mean dependent variable	23.84	20.65	0.31	0.26
Relative estimate (in %)	0.42	0.27	0.65	0.38

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variables are proxies for the quality of long-term care in German nursing homes. Hours-to-recipient ratio = number of weekly working hours / number of recipients, where full-time employment = 38h per week, part-time employment = 20h per week, marginal employment = 10h per week, other employment is not included. Hours-to-bed ratio = number of weekly working hours / number of beds. Full-time-to-recipient ratio = number of full-time employees / number of recipients. Full-time-to-bed ratio = number of full-time employees / number of beds. The table displays the coefficients of the percentage unemployment rate, respectively. Each column is a separate regression. All regressions include facility and year fixed effects and demographic covariates: share of residents < 6, 6 - 17, 18 - 24, 25 - 29, ≥ 65. Standard errors in parentheses are clustered at the district level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Our empirical results do not confirm this finding (Table 9). We do not find any significant effect of the unemployment rate on our measures of quality, the hours-to-recipient and the hours-to-bed-ratio (Column 1 and 2). The results are very similar when we focus on the ratio of full-time employees to recipients and beds. The effects are positive, but not significant. Thus, we conclude that an increase in the staffing-driven quality of care in nursing homes does not explain the estimated price effects.

### 5.2.3 Composition and substitution

Finally, we analyze whether changes in the composition of patients in nursing homes may explain the positive effects of the unemployment rate on prices. In Table 10, we present how an increase in the unemployment rate affects the composition in nursing homes. We find no overall effect of the unemployment rate on the number of recipients of long-term care. However, we document a change in the composition of patients in nursing homes. While there are fewer patients with care degree 1 and 2 (Column 1 and 2), the number of patients with care degree 3 significantly increases when the unemployment rate rises. Thus, the results show that there are fewer recipients with only little demand for intensive care and more patients with an intensive demand for care.

One explanation for the change in the composition of patients (Table 10) is that the health status of patients in nursing homes worsens when unemployment rises. This is documented in the literature (Mommaerts and Truskinovsky, 2020; Costa-Font et al., 2016). Our data does not allow for directly testing this. Other explanations include substitution effects between care in nursing homes and ambulatory care in private homes in combination with

Table 10: Effect of a one percentage point increase in unemployment rate on recipients of long-term care in German nursing homes, 2005-2015

	(1)	(2)	(3)	(4)
	total	degree 1	degree 2	degree 3
Unemployment rate	-0.106 (0.149)	-0.163 (0.101)	-0.207** (0.0863)	0.269** (0.104)
Observations	62,337	62,337	62,337	62,337
Number of facilities	14,500	14,500	14,500	14,500
Mean dependent variable	70.45	26.11	28.9	14.44
Relative estimate (in %)	-0.14	-0.61	-0.69	1.86

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variables are recipients with formal care in nursing homes, separated by degree of impairment. The table displays the coefficients of the percentage unemployment rate, respectively. Each column is a separate regression. All regressions include facility and year fixed effects and demographic covariates: share of residents < 6, 6 - 17, 18 - 24, 25 - 29,  $\geq$  65. Standard errors in parentheses are clustered at the district level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

informal care. Previous literature shows that the supply of informal care increases when the unemployment rate is high, in particular by adult children, due to lower opportunity costs of family caregivers (Baughman and Hurdelbrink, 2018; Baughman and Hurdelbrink, 2020; Costa-Font et al., 2016; Mommaerts and Truskinovsky, 2020). Thus, the higher availability of informal care might incentivize the use of a combination of informal and formal ambulatory home care, rather than nursing home care. We will explore this in more detail in the following.

The results in Tables 11 and 12 confirm that the provision of long-term care is generally increasing. We find this increase across all care levels. Thus, the results suggest that, in addition to the overall increase in care provision due to the increase in unemployment, there is a substitution from care in nursing homes to informal and ambulatory care for degrees 1 and 2. In more detail, for ambulatory care (Table 11) there is a significant and positive effect for care levels 2 and 3. The effects is even larger when turning to informal care. Here we focus on the regional level and estimate the effect on the share of individuals receiving care in the age group 65 or older. An increase in unemployment significantly increases care provision for long-term care in all care levels. The absolute effects are stronger for the less intense care levels. However, given the low incidence of informal care provision in degree 3, the relative effects are strongest for this group.

## 6 Conclusion

In this study, we analyze how macroeconomic conditions affect the prices for institutional long-term care in Germany. Moreover, we provide empirical evidence for the mechanism of the price effect and quantify the role of potential channels driving the price effects including employment and working hours of care workers, the quality of care, the composition of care

Table 11: Effect of a one percentage point increase in unemployment rate on recipients of long-term care by German ambulatory care providers, 2005-2015

	(1)	(2)	(3)	(4)
	total	degree 1	degree 2	degree 3
Unemployment rate	0.406 (0.255)	0.112 (0.163)	0.179** (0.0858)	0.116*** (0.0374)
Observations	72,908	72,908	72,908	72,908
Number of facilities	19,194	19,194	19,194	19,194
Mean dependent variable	46.84	25.96	15.67	5.21
Relative estimate (in %)	0.87	0.43	1.14	2.23

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variables are recipients with formal care by ambulatory care services, separated by degree of impairment. The table displays the coefficients of the percentage unemployment rate, respectively. Each column is a separate regression. All regressions include facility and year fixed effects and demographic covariates: share of residents < 6, 6 - 17, 18 - 24, 25 - 29, ≥ 65. Standard errors in parentheses are clustered at the district level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 12: Effect of a one percentage point increase in unemployment rate on percentage share of cash beneficiaries in population 65 years or older, 2005-2015

	(1)	(2)	(3)	(4)
	total	degree 1	degree 2	degree 3
Unemployment rate	0.329*** (0.117)	0.156** (0.0741)	0.127*** (0.0350)	0.0464*** (0.00970)
Observations	2,298	2,298	2,298	2,298
Number of districts	383	383	383	383
Mean dependent variable	8.69	5.28	2.64	0.77
Relative estimate (in %)	3.79	2.95	4.81	6.00

<sup>1</sup> Source: Pflegestatistik 2005 - 2015 (FDZ, 2021), Destatis, 2021, INKAR, 2020, own calculations.

<sup>2</sup> Note: Dependent variables are the shares of recipients of cash benefits in the population aged 65 years or older, separated by degree of impairment. The table displays the coefficients of the percentage unemployment rate, respectively. Each column is a separate regression including district-population weights. All regressions include district and year fixed effects and demographic covariates: share of residents < 6, 6 - 17, 18 - 24, 25 - 29, ≥ 65. Standard errors in parentheses are clustered at the district level, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

dependent and substitution between formal and informal care.

We use high-quality administrative data that contain rich information on the universe of providers and recipients of long-term care in Germany. Applying a fixed effects panel regression approach and exploiting the variation in the unemployment rate across districts and over time, we find that the unemployment rate increases the prices for permanent long-term care, as well as the price for accommodation and meals in nursing homes: A one percentage point increase in the unemployment rate raises the prices for long-term care services by about one percent. The price for accommodation and meals increases by about 0.6 percent. Given that prices for long-term care in Germany are strongly regulated, this is an important result since it shows that nursing homes respond to macroeconomic conditions with price adjustments. With respect to different mechanisms that might explain such price increases during recessions, we find that employment, working hours, and quality of care in nursing homes are not affected by macroeconomic conditions. Instead, our results suggest that a higher unemployment rate increases the price for nursing homes through a change in the composition of patients. In more detail, we find that the number of patients with a low degree of impairment decreases when the unemployment rate rises, while the number of patients with high demands for labor-intensive care increases. Our empirical findings also suggest that the decrease in low-impairment care in nursing homes is driven by a substitution toward formal ambulatory and informal home care.

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