The Effect of Immigration on Prices: Evidence from Nursing Homes*

Peter Haan, Julia Schmieder, Izabela Wnuk-Soares

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Abstract

A large body of economic research has analyzed how immigration affects the labor market in host countries. However, far less is known about how it influences the prices of goods and services. We study how immigration affects prices through changes in labor supply, focusing on the nursing home sector. Leveraging sharp increases in the number of foreign-born residents in Germany following enlargements of the European Union and administrative data covering the universe of nursing homes, we show that immigration reduces the price of care services. The effects are concentrated in more competitive market segments. We find no impact on inspection-based quality measures. Evidence points to lower labor costs, driven by a compositional shift toward lower-paid foreign workers, and greater competitive pressure from informal care as the main channels.

Keywords: Immigration, labor supply, prices, nursing homes
JEL Classification: J61, F22, J30

*Peter Haan: DIW Berlin, Freie Universität Berlin, Berlin School of Economics; e-mail: phaan@diw.de. Julia Schmieder: RFBerlin; e-mail: juliaschmieder@posteo.net. Izabela Wnuk-Soares: RFBerlin, DIW Berlin; e-mail: iws@rfberlin.com.
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1 Introduction

Immigration plays a defining role in shaping OECD economies and societies. In 2024, more than 160 million people living in OECD countries were foreign-born - about 11.5% of the total population - and the number of new permanent immigrants reached 6.2 million, a historically high level (OECD, 2025). A large body of literature has analyzed how immigration affects the labor market in host countries with a focus on employment and wages of natives (Dustmann and Schönberg, 2025). However, to understand the broader implications for the host-country economy and the welfare of the native population, it is also necessary to study how immigration affects the prices of goods and services. Specifically, immigration may influence production costs, and if markets are sufficiently competitive, changes in production costs should translate into price changes. Providing evidence on such price effects is, however, challenging. First, exogenous variation in immigration is required to identify a causal relationship. Second, high-quality data on the prices of relevant goods and services are needed. Third, it is important to disentangle supply-driven effects from changes in demand, since immigrants also consume goods and services and may thereby affect prices through both channels.

In this paper, we address these challenges and quantify the price effects of immigration through changes in labor supply. We also provide evidence on the mechanisms through which immigration affects prices. For the analysis, we combine high-quality administrative data on product prices and quality with employment and earnings data from administrative social security records covering the universe of nursing homes in Germany. We leverage a sharp increase in the number of foreign-born residents between 2009 and 2019, triggered by policy changes in the early 2010s that granted labor market access to workers from the new member states of the European Union (EU-11). These reforms generated substantial spatial variation in foreign-born inflows across regions. We exploit this variation using an empirical strategy combining a shift-share instrument (Card, 2001) with a generalized difference-in-differences approach. The former addresses endogenous immigrant selection into regions, while the latter allows us to test for pre-trends and estimate dynamic treatment effects, addressing concerns about the exogeneity of the shift-share instrument highlighted in recent literature (Borusyak et al., 2022; Goldsmith-Pinkham et al., 2020; Jaeger et al., 2018).

We focus on the nursing home sector, which provides a particularly suitable setting to study the relationship between immigration and prices. First, the sector is highly labor-intensive and non-tradable, making it especially sensitive to changes in the local workforce (Burstein et al., 2020; Dustmann and Glitz, 2015). Second, its institutional environment is advantageous for empirical work: in contrast to most other industries, rich microdata exist on both prices and service quality. We draw on the German Long-Term Care (LTC) Statistics, which cover the universe of nursing homes and report detailed facility-level information on

care prices, and use official quality measures collected through standardized, unannounced inspections. Third, because the arriving immigrants do not consume long-term care services, they induce essentially no demand shocks in the nursing home market, allowing us to isolate the labor supply channel. For example, in 2009, 99.0% of foreign-born EU-11 population was younger than seventy-five, an age at which care dependency typically becomes more common.[1]. By contrast, about one in ten natives had already reached that age. Finally, population aging and the resulting rise in long-term care needs have made the nursing home industry a rapidly expanding part of the economy, while persistent labor shortages and rising care prices have become major concerns for both policymakers and consumers. Understanding potential price effects in this sector therefore has broad and growing relevance.

While the nursing home sector is subject to regulatory oversight (Geyer et al., 2025), it shares important features with other industries affected by immigration. Most importantly, despite formalized price negotiations, competition between the nursing homes persists. In particular, as documented by Kesternich et al. (2025), the degree of competition in the market varies substantially with care needs: in Germany markups are relatively low for those requiring only basic assistance and increase sharply with care intensity. We exploit this variation in our analysis, which enables us to draw broader conclusions for sectors with comparable levels of competition.

The central finding of our paper is that immigration significantly reduces prices. Specifically, an additional foreign-born woman per 100 inhabitants in 2019 (relative to 2009) reduces the price of low-intensity care services by 2.9% in the full sample, while the estimate for medium-intensity care is negative but not statistically significant, and there is no effect for high-intensity care. Excluding border regions yields more precise and larger effects, with prices decreasing by 4.5% for low-intensity care and 3.3% for medium-intensity care, while the effect for high-intensity care remains statistically indistinguishable from zero. This pattern aligns with the competitive structure of the nursing home sector noted above. The importance of competition for the estimated price effects is supported by additional evidence. When we split the sample into regions with low and high Herfindahl–Hirschman Index (HHI) values, computed based on the pre-reform distribution of nursing home residents across facilities, we find significant price effects only in areas with low HHI, where market concentration is low and competition is high.

To investigate the mechanism underlying the price effects of immigration, we analyze its impact on labor costs, which account for 70% to 80% of total nursing home expenditures (Haun, 2020). For this purpose, we use detailed data on employment and earnings in the nursing home sector from administrative social security records. We show that the overall number of care workers in nursing homes, measured in full-time equivalents, does not

[1]Own calculation based on Statistisches Bundesamt. GENESIS-Online: Tables 12411-0008 and 12521-0004. Retrieved November 2025, from http://www-genesis.destatis.de

change significantly with immigration. However, we document a sizable shift in the composition of the workforce. Immigration significantly increases the share of foreign workers by 4.5 percentage points (88.2%). At the same time, the average wage in nursing homes declines significantly with immigration. By 2019, an additional foreign-born female resident decreases the average wage in nursing homes by 3.1%. We show that, on average, the wages of incumbent workers do not change as a result of immigration. Rather, the effect on the average wage is driven by a change in the composition of the workforce toward a higher share of foreign workers, combined with the fact that foreign workers tend to have lower wages: on average, they have less work experience in Germany, are younger, and are more likely than native workers to be employed as nursing assistants rather than nurses.

These immigration-induced shifts in workforce composition toward less-experienced workers and changes in the occupational mix may affect nursing home quality, which could in turn influence prices. To investigate this potential channel, we use data from roughly 25,000 unannounced inspections and find no relationship between immigration and an overall measure of quality. Across broad categories of care, we find no effect of immigration on the quality of medical and nursing care, nutrition and hydration, social support, or organizational practices. However, immigration is associated with a modest improvement in resident satisfaction and autonomy: an additional foreign-born woman per 100 inhabitants in 2019 (relative to 2009) increases the share of nursing homes with no issues detected during the inspection in this category by 2.1 percentage points.

We then turn to the potential effects of immigration on the size of nursing homes. Larger facility size could, in principle, generate scale effects: as average nursing home size increases, fixed costs – such as administrative overhead, utilities, or building maintenance – can be spread across more residents, thereby reducing average costs per resident and potentially lowering prices. However, we find no evidence for such scale effects. Immigration does not affect the average capacity (the number of available places) or the number of occupied places in nursing homes. We also find no evidence that immigration affects market entry or exit among nursing homes.

Finally, immigration may increase the availability of privately arranged home-based care provided by non-professionals, thereby reducing the demand for care in nursing homes (Almuhaisen et al., 2024; Butcher et al., 2022). At the same time, ambulatory care providers may also benefit from a larger pool of staff due to immigration. Both effects could influence demand for nursing-home care, potentially prompting nursing homes to adjust their prices. While we find no effect of immigration on the number of individuals receiving care from professional caregivers in an ambulatory setting, we observe an increase in the uptake of informal care. Since informal care is predominantly used for individuals with lowest care requirements, the negative effect of immigration on nursing home care prices for this group may be partly explained by increased competition between nursing homes and informal

care.

This paper makes several contributions to the literature. First, it expands upon existing evidence on the effect of immigration on the prices of goods and services, which remains very scarce (see Cortés, 2023). Cortés (2008) shows that immigration to the United States reduces prices for household services such as gardening and housekeeping, likely through wage declines among lower-skilled natives and earlier immigrants. In the United Kingdom, Frattini (2008) finds that immigration lowers inflation in non-tradable services such as hairdressing and dry cleaning.[2] This paper extends this literature in two key ways. First, it uses high-quality, detailed data on prices, enabling precise estimation at a fine geographic level. Earlier studies such as Cortés (2008) and Frattini (2008) rely on CPI-based price data with small regional samples, making them more susceptible to measurement error. In particular, Cortés (2008) focuses on only 30 large cities to ensure sufficiently large samples for reliable indices. Second, the labor market opening towards the citizens of EU-11 countries provides a sharp policy change that we exploit using a generalized difference-in-differences design. This allows us to test for pre-trends and estimate dynamic treatment effects, thereby strengthening the credibility of our estimates relative to earlier work (Goldsmith-Pinkham et al., 2020).

Second, in contrast to previous literature, we identify the production-side price effect of immigration. As mentioned above, because the arriving immigrants do not consume long-term care services, they induce essentially no demand shocks in the nursing home market, allowing us to isolate the labor supply channel. More broadly, few papers isolate the demand and supply effects of immigration: Galaasen et al. (2025) disentangle the roles of demand exposure and supply exposure in the effects of immigration on native labor market outcomes, while Dustmann et al. (2017) study the effect of immigration on native labor market outcomes induced by a labor supply shock in a context where demand-side effects are constrained.

Third, we contribute to the literature by providing the first evidence that jointly identifies how immigration affects both prices and quality within the same sector, and by mapping these effects to underlying production costs. Understanding the impact of immigration on quality is important for assessing residents' welfare: even if residents benefit from lower prices due to immigration, any accompanying decline in quality could partially or fully offset these gains. Existing work documents that immigration can improve care quality. For example, Furtado and Ortega (2023) and Grabowski et al. (2023) show reductions in falls and pressure ulcers associated with stronger regional immigrant inflows, although they do

[2]Other related work includes Lach (2007), who shows that the influx of immigrants from the former Soviet Union to Israel reduced prices through higher demand elasticity and lower search costs. Evidence for housing markets is mixed: Ottaviano and Peri (2012); Saiz (2003, 2007) find rising rents, whereas Bratsberg and Raaum (2012); Monras (2020) show that low-skilled immigration can reduce housing prices by lowering construction costs.

not analyze the corresponding price responses.[3] We build on this literature by using standardized nursing home inspections that directly quantify care quality, rather than relying on downstream health outcomes.

Finally, our paper complements the recent literature on the impact of immigration on outcomes in the LTC sector. Specifically, Butcher et al. (2022) and Almuhaisen et al. (2024) document an inverse relationship between the stock of immigrants and the institutionalization of the elderly across regions in the US, driven by a higher availability in household services. Moreover, Haan and Wnuk (2024) show that immigration causes a partial displacement of native workers out of the long-term care sector in Germany, covering both residential and ambulatory services, thereby easing local labor shortages. Related evidence, discussed above in the context of quality, shows that stronger regional inflows improve clinical outcomes in nursing homes, largely through an increase in staffing (Furtado and Ortega, 2023; Grabowski et al., 2023). We enrich this literature by, on the one hand, testing the established relationships between immigration, staffing and demand for formal care using new administrative data, and on the other, being the first to quantify the effect on the prices of formal care.

The remainder of the paper is structured as follows. Section 2 outlines the institutional background of the German nursing home market and summarizes the EU Eastern enlargement, including the regulations governing access to the German labor market for the new member states. Section 3 describes the data sources and presents descriptive evidence. Section 4 details the empirical strategy. Sections 5 and 6 present the baseline results and discuss potential mechanisms. Section 7 concludes.

2 Institutional setting

This section provides the relevant institutional background for our analysis. We begin by describing the structure of the nursing home market in Germany. We then outline the timeline and implications of the opening of the German labor market following the Eastern enlargement of the EU, which we exploit in our empirical strategy.

2.1 Market for nursing homes in Germany

In 2019, 11,317 nursing homes offered permanent care in Germany, of which 9,045 specialized in this type. Within this group, non-profit and for-profit providers made up 51.3% and 43.6% of these homes, respectively, with the public sector accounting for just 5.1% (Fed-

[3] Relatedly, Castro-Pires et al. (2025) show that the Brexit-induced reduction in EU nurses worsened hospital care quality, leading to higher in-hospital mortality and more unplanned emergency readmissions.

eral Statistical Office, 2025a, b).[4] Entry into the nursing home market in Germany is not restricted. Facilities must meet certain building and staffing requirements but are otherwise free to operate. Capacity constraints are therefore less relevant in Germany than elsewhere Kesternich et al. (2025).

Each nursing home negotiates the price for its care services with state-level long-term care insurance (LTCI) funds and, in some cases, with local social assistance authorities. These agreements are legally binding and are renewed annually. Within each nursing home, prices are the same for all residents classified into the same care level. Prices are based on expected costs, including labor, which accounts for approximately 70–80% of total expenditures in these facilities (Haun, 2020) as well as occupancy rates, residents' care levels, risk allowances, and profit margins. Nursing homes are required to disclose their cost structures to the negotiating parties (see, e.g., Grant et al., 2021; Heger et al., 2025; Schmitz and Stroka, 2014). Consequently, the cost structure directly affects the price of care in nursing homes.[5] There is substantial variation in care prices both within and across regions. Nursing homes have considerable flexibility in setting prices, as negotiations generally do not impose significant constraints (Kesternich et al., 2025). Markups in German nursing homes rise with care level, as residents with greater care needs face limited substitution, allowing providers to charge higher prices (Kesternich et al., 2025).

Between 2005 and 2019, wages for care workers in German nursing homes were determined by a combination of collective agreements, statutory minimum wages, and employer discretion. Facilities bound to a collective agreement set wages according to clearly defined pay groups and experience-based steps. Facilities which are not covered by a collective agreement retained greater discretion, but were still legally bound by the sector-specific minimum wage, introduced in 2010 and gradually increased in subsequent years.[6] While the minimum wage established a legal floor, employers could pay higher salaries to attract and retain qualified staff, particularly in response to persistent labor shortages. In 2016, 45% of nursing homes remunerated their employees according to an association-level collective agreement (Verbandstarifvertrag), 18% under an in-house collective agreement (Haustarifvertrag), and 37% of nursing homes paid wages without any collective agreement coverage (Bundesministerium für Gesundheit, 2016).

Since 2009, German nursing homes have been evaluated regularly by an external institu-

[4] In the German setting, Grant et al. (2021) show that non-profit and for-profit homes are substitutes, but competition is much stronger within-type, suggesting that they provide differentiated products.

[5] For details, see Sozialgesetzbuch (SGB) – Elftes Buch (XI) – Soziale Pflegeversicherung (Artikel 1 des Gesetzes vom 26. Mai 1994, BGBl. I S. 1014) §82 Finanzierung der Pflegeeinrichtungen.

[6] The statutory care sector minimum wage in Germany, which applies to qualified nurses, nursing assistants, and care aides, amounted to 8.50 (7.50) Euro/hour in West (East) Germany in 2010 and 11.05 (10.55) Euro/hour in West (East) Germany in 2019, see http://www.iaw.edu/files/dokumente/iaw_abschlussbericht_evaluation_mindestlohnregelungen_pflege_31082011.pdf and http://www.bundesanzeiger.de/pub/publication/O5gBeJjZmKsoNQYr9aD?0.

tion, the Medical Review Board of the German Statutory Health Insurance, which is responsible for monitoring quality in these facilities. The evaluations are unannounced and conducted by trained inspectors. During these inspections, professionals assess nursing homes across a wide range of criteria, including medical and nursing care, hygiene, nutrition, social support, and documentation practices.[7] The same criteria are applied across all nursing homes, and the reporting of results is standardized. Evaluation results are displayed within the nursing homes and published online via official portals, as legally required.[8] In the following empirical analysis we will use these data to study if price effects can be explained by changed in the care quality.

Care-dependent individuals are free to choose among nursing homes and, even when restricting their search to their own district, can select from an average of 20 facilities that provide long-term residential care.[9,10] Residents pay the price of care minus, if eligible, a fixed monthly contribution from statutory LTCI, depending on their assigned care level.[11] This contribution is independent of the nursing home's price. The benefit amount increases with the care level, reflecting the higher intensity of required care. As the price of care often exceeds the LTCI benefit, residents must co-pay, sometimes up to 50% of the total price (Schmitz and Westphal, 2017). In addition, residents pay for food and accommodation as well as investment costs. Facilities may also charge for optional supplementary services. Detailed price information is publicly available for each nursing home via official portals, along with information on quality.[12]

Besides nursing homes, care-dependent individuals can receive care at home either from licensed professionals (ambulatory care) or through informal care provided by family members or others. For those receiving ambulatory care, professional nursing or assistance with daily activities is delivered at home, with expenses fully covered by LTCI if no additional services are requested. Hence, a change in the price of ambulatory care does not directly impact care-dependent individuals. Individuals opting for informal care can receive a monthly cash payment (Pflegegeld), which they can use to compensate relatives or non-professional caregivers for their assistance (Heinicke and Thomsen, 2013; Kesternich et al., 2025).

[7] These inspections are carried out by the *Medizinischer Dienst* for residents covered by statutory health insurance and by the *PKV-Prüfdienst* for those with private insurance.

[8] Herr et al. (2016) show that quality reporting has a positive effect on quality and provide further details on the inspection procedure.

[9] Schmitz and Stroka (2014) show that location and prices are important determinants of nursing home choice, while quality plays only a minor role.

[10] Care facilities may also offer other types of care (e.g., day care, short-term care), either alone or in combination. We focus on homes providing permanent (long-term) care only.

[11] Eligibility for LTCI benefits is determined through a medical assessment conducted by an authorized professional. Individuals must also have been insured in statutory LTCI for at least two of the ten years preceding the onset of care dependency. LTCI is mandatory for all residents of Germany. For an overview of the organization of long-term care in Germany, see Geyer et al. (2025).

[12] For example, see https://www.aok.de/pk/pflegeheim-in-der-naehe/uebersicht/.

In 2009, approximately 2.3 million individuals were classified as care-dependent under LTCI. Of these, 1.6 million (about two-thirds) received care at home, including 1.1 million who were solely recipients of cash benefits and around 600,000 who received support through ambulatory care services. Approximately 700,000 (31%) resided in nursing homes. By 2019, the number of care-dependent individuals had increased to 4.1 million, with 3.3 million (80%) receiving home care. Among them, 2.1 million received only cash benefits, while about 1 million received ambulatory care services. Around 800,000 (20%) lived in nursing homes. This increase in the number of care-dependent individuals, particularly among cash benefit recipients, is primarily attributed to the expanded definition of care needs introduced in 2017, which broadened eligibility for LTCI benefits, alongside the impact of demographic aging.[13]

2.2 EU Eastern enlargement and labor market access

The Eastern enlargement of the European Union proceeded in three rounds. Eight countries (EU-8)—the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia—joined the EU in May 2004.[14] Romania and Bulgaria (EU-2) acceded in January 2007, followed by Croatia in July 2013. By joining the EU, these countries became members of the European Single Market, which guarantees the free movement of goods, services, capital, and labor. However, old member states had the option to temporarily restrict access to their labor markets for dependent employment and posting of citizens from the new member states for up to seven years following accession.[15] Germany made use of this option, phasing in unrestricted labor market access in three stages: May 2011 (EU-8), January 2014 (EU-2), and July 2015 (Croatia).

From the date of *accession*, citizens of the new member states were entitled to establish businesses—that is, to work as self-employed—and to take up employment through cross-border posting in unrestricted sectors in Germany.[16] In contrast, to take up dependent employment, nationals from the new member states were still required to obtain a work permit.[18] From the date of *labor market liberalization*, nationals from the new EU member

[13] See http://www.statistischebibliothek.de/mir/receive/DEHeft_mods_00146747, last access December 2025.

[14] Cyprus and Malta also joined in 2004 but are not considered because their citizens were granted immediate access to the German labor market upon accession (European Commission, 2006).

[15] A posted worker is an employee sent by an employer located in an EU Member State to carry out a service in another Member State on a temporary basis.

[16] In Germany, the posting of workers was restricted—until labor market liberalization—to a limited number of sectors considered vulnerable to disturbances. These included construction, cleaning, and interior decoration, but not the care sector.[17]

[18] The German government gradually relaxed access conditions for specific groups of workers. From 2007, nationals from the new member states could obtain a work permit for engineering professions without being subject to the labor-market priority check. From 2009, this exemption was extended to all workers with tertiary education from these countries (OECD, 2013).

states received unrestricted access to the German labor market. Based on the fundamental principle of free movement of labor, they are entitled to look for a job, work, and reside in Germany without a work permit; remain in the country after employment has ended; and enjoy equal treatment with nationals regarding employment, remuneration, and other working conditions.[19]

3 Data and descriptive evidence

For the empirical analysis, we combine high-quality administrative data on prices and quality with employment and earnings data from administrative social security records covering the universe of nursing homes in Germany. Below, we describe the data in more detail and present descriptive statistics for the main outcomes.

3.1 Data sources

This section outlines the data sources used to measure long-term care outcomes, nursing home quality, labor costs, immigration, and regional controls.

Variables measuring long-term care outcomes

The data used to construct the LTC outcome variables come from the Long-Term Care Statistics. The official statistical authorities (the Statistical Offices of the States, in cooperation with the Federal Statistical Office) collect data on the universe of inpatient and ambulatory LTC providers, including all nursing homes in Germany, on a biennial basis. LTC providers report detailed information on their prices, capacities, and residents. All variables are measured with December 15 as the reference date. Participation in data collection is mandatory. Missing or implausible data are verified with respondents, and non-responses are minimal. Consequently, the data are considered highly reliable and of excellent quality (Statistisches Bundesamt, 2020).

In our analysis, we focus on nursing homes that offer (inpatient) permanent care, given that this type of care is the most frequent one provided in nursing homes (see Section 2). We use this microdata to build the outcome variables on a modified NUTS-3 level[20], biyearly for years 2005 to 2019. For each region-year group, we compute a regional aggregate as the simple average across nursing institutions for price variables, and as the sum across institutions for all other outcomes.

[19] See http://data.europa.eu/eli/treaty/tfeu_2008/art_45/oj, last access November 2025.

[20] We redefined the 401 NUTS-3 regions in Germany into a set of 377 regions, due to i) data privacy laws of the Federal Statistical Office, ii) joint reporting of the stock of the foreign-born population by a number of regions with a common immigration authority, iii) constructing a balanced panel of regions. For a more detailed overview, see the map in Figure A2.

The first set of outcomes relates to the remuneration of nursing homes, which includes the daily price for i) care services (including medical care), henceforth called the *price of care*, as well as ii) accommodation and meals. Prices of care are reported by care level, where higher levels reflect greater care needs, ranging from level 1 (lowest) to level 3 (highest). Due to a change in the classification of care levels in 2017, the final two values for prices (2017, 2019) have been imputed. In addition, we construct an auxiliary outcome – a care-weighted price – which aggregates prices across care levels using weights based on the national distribution of residents across care groups. The details of this calculation as well as the construction of the care-weighted price are provided in Appendix Section B. Finally, unlike the care prices, the price for accommodation and meals is common to all care levels.

The remaining outcomes are as follows. To measure the availability and take-up of care in nursing homes, we use the number of available places (regardless of their occupancy status on the reporting date) as well as the stock of permanent care recipients (i.e., nursing home residents). To measure care outside of nursing homes, we construct two indicators: i) the number of individuals in informal care who receive cash benefits, as well as ii) the number of individuals using ambulatory care (i.e., professional care at home).

Variables measuring labor costs

To measure employment and labor costs in nursing homes, we draw on supplementary administrative data from the Institute for Employment Research (IAB), which covers the universe of long-term care workers in Germany. We restrict our sample to those older than 16 and less than 67 that work in nursing homes. Using this information, we construct a nursing-home–level panel, which we then aggregate to the regional level by taking within-region means, in line with the procedure used for the Long-Term Care Statistics.[21]

We construct several measures related to employment and labor costs, beginning with the share of foreign workers employed in nursing homes. Workers are classified as foreign or native based on their nationality at first observation. In addition, we measure overall nursing home staffing, expressed in log full-time equivalents (FTE), as well as the average labor-market experience in Germany.[22] We further compile a set of wage indicators, where wages are measured as daily wages: the overall average wage and the average wage of incumbent workers (those who began working in nursing homes before 2009). All variables are measured as of June 30 in the respective year.

[21] We identify nursing-home workers using occupational codes (KldB1988: 853, 854, 861) and industry codes (WZ2008: 871, 872). Because of a change in the occupational classification, we impute missing occupational codes in 2011 and 2012. Further details are provided in Haan and Wnuk (2024).

[22] To calculate full-time equivalents, we use a value of 0.5 for all part-time employees, as the data does not contain any information on hours worked.

Variables measuring quality

To explore the impact of immigration on care quality, we utilize data from unannounced quality inspections conducted by official care oversight bodies between 2009 and 2016. We categorize the 74 time-consistent quality criteria into five broad domains: *Medical and Nursing Care; Nutrition and Hydration; Social Support and Quality of Life; Resident Satisfaction and Autonomy; and Organization and Quality Assurance*. We observe these criteria across three waves. Wave 1 contains reports submitted up to April 2011, directly before the first labor market opening (5,242 reports). Wave 2 includes reports from May 2011 to March 2013, capturing potential short-term changes in quality (9,740 reports). Wave 3 comprises reports from February 2014 to March 2016, allowing us to assess longer-term changes in quality scores (10,826 reports). Our analysis focuses on nursing homes with at least ten residents. Further details on dataset construction and harmonization are provided in Appendix C.

To obtain our outcome variables, for each combination of category, region, and wave, we calculate the share of facilities for which no deficiencies were identified during the inspection. In addition, we compute the region–wave share of facilities with no issues across all categories for wave 1 (pre–labor market opening) and waves 2 and 3 (post–labor market opening).

Variables measuring foreign-born inflow and control variables

We use the German Foreigner Statistics (*Ausländerstatistik*), an administrative dataset on all officially registered non-German residents in Germany, to observe the stock of non-German residents aged 15–65 at the NUTS-3-year level for the period 2000 to 2019. Data refer to the reference date of December 31 of each year. We use the change in the stock of foreign-born by nationality to measure inflows of immigrants across the German regions.

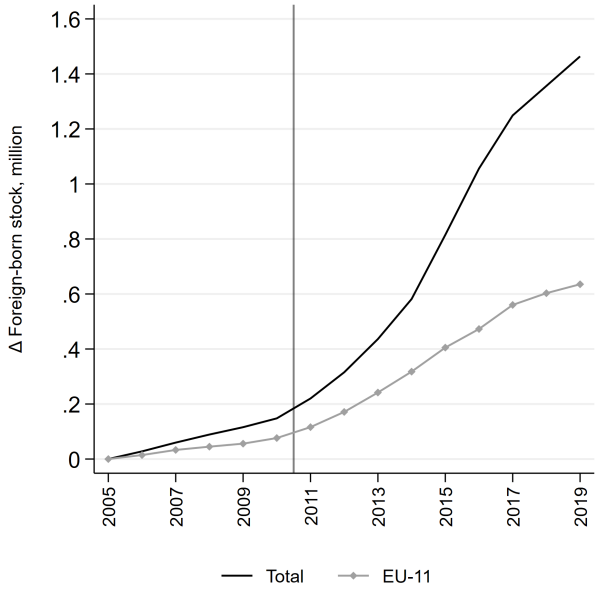
We also extract several regional demographic indicators from the *Indicators and Maps for Spatial and Urban development (INKAR)* and the *Destatis Genesis* database. In particular, we have information on the old-age-dependency rate, fertility rates, total population, and the number of inhabitants aged 75 and older.

3.2 Trends in immigration and long-term care

In the empirical analysis, we exploit variation in the stock of foreign-born individuals to identify the effects of immigration across a range of nursing home outcomes, including pricing, staffing, and capacity. To provide context for this approach, we begin by describing recent trends in immigration to Germany and then outline how key nursing home indicators have evolved over time.

We focus on female immigration, as over 80% of care workers are women.[23] Figure 1 shows the evolution of the national-level stock of foreign-born female residents since 2005. The total stock remained relatively stable until 2010, rising by about 120,000 over the five-year period, but grew substantially thereafter—by approximately 1.32 million between 2010 and 2019. Almost half (42%) of this increase reflects a rapid growth in residents from countries that joined the EU in the enlargement rounds from 2004 to 2013. As discussed in Section 2, the modest pre-2011 increase in the stock of foreign-born from the EU-11 may reflect individuals exercising their right to reside or register as self-employed after the EU Enlargement, without entering the German labor market as employees.

Figure 1: Evolution of the stock of female foreign-born since 2005



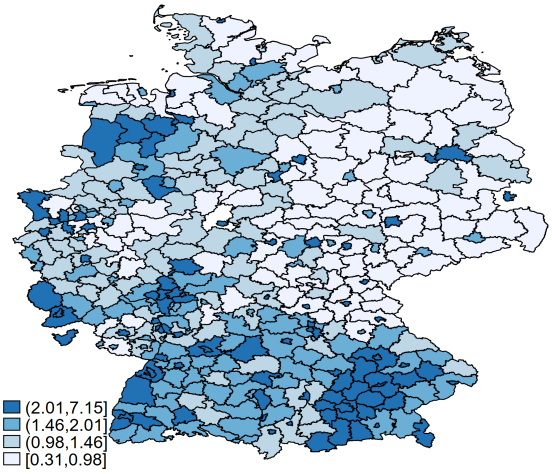
Notes: The figure plots the change in the stock of foreign-born female residents in Germany for each year from 2005 to 2019 relative to 2005. EU-11 countries include Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. Based on own calculations using the German Foreigner Statistics.

Figure 2 shows changes in the regional distribution of foreign-born females across German NUTS-3 regions, focusing on the net change in their stock between 2009 and 2019. Changes are expressed per 100 inhabitants as of 2009 and grouped into quartiles. The map reveals that the southern and western regions in Germany experienced the largest relative increases in immigrant concentration over the time period studied.

To understand how the long-term care sector evolved alongside these immigration patterns, we next examine trends in nursing home care prices, employment and wages, and ca-

[23] Our results are robust to using a treatment that includes both female and male immigration, as shown later in the paper.

Figure 2: Net change in the stock of foreign-born women, 2009-2019



Notes: The map displays the net change in the number of foreign-born females (any origin) between 2009 and 2019, measured per 100 inhabitants in 2009 and grouped into quartiles. Based on own calculations using the German Foreigner Statistics and the INKAR database. For increases in the net stock of foreign-born females from EU-11 versus other origins, see Figure A1.

pacity. Table 1 reports the average values of the main outcomes of interest for four example years. First, prices increased steadily over time. Depending on the care level, care prices rose by around 5–6% between 2005–2009 and 2009–2013. From 2013–2017, the increase was substantially larger, ranging from 12.8% (care level 3) to 27.1% (care level 2). Room-and-board prices followed a similar pattern, rising by about 5–6% between 2005–2009 and 2009–2013, and 10.6% between 2013–2017. Second, the price increase may be partly related to changes in labor costs. Average wages changed little between 2005–2009 and increased moderately by 5.5% between 2009–2013. From 2013–2017, wages rose substantially by 11.2%. The substantial increase may reflect the introduction of the federal minimum wage in 2015, which could have affected wages of non-care staff, as well as sector-specific minimum wage increases for care staff in 2017. The total number of care workers in full-time equivalents increased by around 30% between 2005 and 2017. The share of foreign workers remained almost unchanged between 2005 and 2009, and more than doubled between 2009 and 2017. Third, analogous to the increase in care workers, nursing-home capacity and utilization also increased steadily, with average regional capacity and the take-up of nursing home care rising by 20% and 23%, respectively, between 2005 and 2017. Notably, throughout the entire period, nursing homes operated below capacity on average, potentially indicating that staffing was the limiting factor.

Table 1: Descriptive statistics of nursing home outcomes

Variable	2005	2009	2013	2017
Daily price in nursing homes in euros:				
Price of care, care-level weighted	52.41	54.57	55.93	66.21
	(5.74)	(6.16)	(5.62)	(7.09)
Price of care, care level 1	42.29	44.66	46.70	54.45
	(5.80)	(6.10)	(5.61)	(7.15)
Price of care, care level 2	55.07	58.00	60.90	77.42
	(6.29)	(6.79)	(6.36)	(7.21)
Price of care, care level 3	68.84	72.26	76.14	85.88
	(6.56)	(7.31)	(7.49)	(7.13)
Price of room and board	18.52	19.44	20.60	22.78
	(3.40)	(3.72)	(4.06)	(4.45)
Worker characteristics in nursing homes:				
Stock of FTE workers	760.76	827.79	913.31	987.20
	(784.59)	(858.13)	(943.68)	(1021.02)
Share of foreign workers	0.047	0.051	0.067	0.106
	(0.046)	(0.047)	(0.057)	(0.079)
Average daily wage	54.97	54.74	57.74	64.22
	(6.18)	(6.10)	(6.54)	(6.55)
Average daily wage of incumbent workers	54.97	54.74	65.94	75.07
	(6.18)	(6.10)	(7.01)	(7.37)
Regional stock - nursing homes:				
Nursing homes	20.24	22.13	22.85	24.17
	(20.37)	(21.34)	(21.58)	(22.34)
Available places in nursing homes	1,537	1,678	1,728	1,845
	(1,845)	(1,970)	(1,991)	(2,073)
Nursing home care recipients	1,351	1,444	1,510	1,664
	(1,614)	(1,636)	(1,722)	(1,851)
			377	

Notes: The depicted variables are constructed by first aggregating nursing home data within each region-year cell: price, employment and wage variables are averaged across facilities, while the other outcomes are summed (see Section 3). For this table, we take the average of these variables across regions for the years 2005, 2009, 2013, and 2017. Standard deviations are reported in parentheses in the row below each mean. Based on own calculations.

4 Empirical strategy

To causally estimate the effect of immigration on prices and availability of LTC services, we combine a generalized difference-in-difference model with an instrumental variable approach. In particular, we exploit a sharp increase in the stock of (female) foreign-born after 2010 as a continuous measure of exposure to treatment. To isolate the exogenous variation in this treatment, we use a shift-share instrument, exploiting historical settlement patterns of EU-11 residents in Germany. We explain this procedure in detail below.

In our analysis, we estimate the following equation separately for each year $t = \{2005, 2007, ..., 2019\}$:

$$\Delta log\ y_{r,t} = \alpha_t + \beta \Delta F_r + \omega X_{r,2009} + \epsilon_{r,t} \quad (1)$$

$\Delta log\ y_{r,t}$ represents the difference in the natural logarithm of a given outcome in region *r*; we take these differences between the final pre-shock year 2009 and year t. ΔF_r is the change in the stock of foreign-born females – regardless of their origin – residing in region *r* between the pre-shock year 2009 and 2019, the final year of our data, divided by the local population in 2009 x 100. $X_{r,2009}$ represents a vector of controls that we fix at their 2009 level. The controls include the regional size of the nursing market (ratio of facilities to residents above the age of 75), the relative size of the population above the age of 75, as well as the old-age dependency rate.[24] By including $X_{r,2009}$, we compare the changes in outcomes in regions with similar pre-treatment characteristics related to care provision, but that had a differential exposure to the immigration shock. We estimate the model in first differences and therefore control for time-invariant unobserved characteristics of the regions.

The structure of the model has two particularly desirable features. First, for the years $t = \{2005, 2007\}$, we can explicitly test for pre-trends. Second, for years $t = \{2011, ..., 2019\}$, the series of β coefficients help us to quantify a potentially dynamic impact of the immigration shock. Relatedly, similarly to, e.g., Amior and Stuhler (2023); Delgado-Prieto (2024); Dustmann et al. (2017), we opt for a time-invariant treatment. With a time-varying specification, it is difficult to distinguish between dynamic effects and changes driven by variation in treatment intensity. Moreover, a time-invariant treatment renders the pre-trend estimates more transparent and directly comparable to the post-treatment results.

When estimated with OLS, equation (1) likely yields biased results as both the change in long-term care outcomes and foreign settlement patterns are plausibly correlated with unobserved characteristics of the regions. To isolate exogenous variation in ΔF_r, we employ a shift-share instrument (Card, 2001), relying on the tendency of newly arriving foreigners to settle in areas which are inhabited by previous generations of co-national immigrants. To explicitly exploit the variation in foreign-born residents generated by the Eastern enlargements of the European Union, we build the instrument using *only* the inflows from the EU-11 countries. We construct our instrument for the change in the stock of female foreign-born in region *r* (ΔF_r), which we label ΔM_r, by assigning the country-specific change in the stock of foreign-born females on the national level[25] ($\Delta S_{c,-r}$) across the German regions according to the aggregate historical immigrant shares ($s_{c,r,2000}$):

[24] In Section 5, we show that our results are not driven by a particular choice of $X_{r,2009}$ by employing other regional-level variable sets.

[25] We follow the literature and exclude the inflow to region *r* from the national inflow when calculating the change in the national-level stock. In principle, this alleviates the threat that the results reflect any particular region is driving national-level inflows of foreign-born females into Germany. This leave-one-out adjustment makes little difference to the empirical results shown in the paper.

$$\Delta M_r = \frac{100}{pop_{r,2009}} \sum_c s_{c,r,2000} \, \Delta S_{c,-r}. \tag{2}$$

Here, the subscript c denotes the country of origin—Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. Finally, as with the raw treatment ΔF_r, we use the total 2009-2019 change in the predicted immigration shock from the EU-11 and normalize it by the local population in 2009 x 100.

We use the spatial variation in foreign-born settlement as in the year 2000, which is eleven years prior to the first labor market opening, and three years before the citizens of the first group of the new member states voted for EU accession. As such, the correlation between the local labor demand during our analysis period and the initial distribution of immigrants used to construct our instrument is plausibly limited. Importantly, before 2009, the stock of foreign-born remained essentially unchanged (see Fig. 1), reducing the likelihood of dynamic spillovers of pre-2009 labor supply shocks (Jaeger et al., 2018).

For the first stage, we estimate the following equation:

$$\Delta F_r = \gamma + \psi \Delta M_r + \rho X_{r,2009} + \eta_r \tag{3}$$

Both the treatment and the instrument are time-invariant, capturing differences in exposure based on changes between 2009 and 2019. As a result, the first-stage relationship is common across all years.

Recent literature has emphasized that shift-share designs rely on one of two potential identifying assumptions: the exogeneity of shocks (Borusyak et al., 2022) or the exogeneity of shares (Goldsmith-Pinkham et al., 2020). Although we exploit a sharp increase in the foreign population driven by policy changes, the number of shocks in our setting is relatively small—limited to eleven sending countries. This makes it difficult to credibly apply the exogeneity-of-shocks assumption, leading us to instead rely on the exogeneity-of-shares assumption.

Goldsmith-Pinkham et al. (2020) reformulate the shift-share design as a *pooled exposure* framework, where the shares capture differential exposure to a set of common shocks. In our context, these shares are the historical foreign-born shares $s_{c,r,2000}$ (scaled by the region's 2009 population). The key identifying assumption is that the past settlement patterns affect changes in LTC outcomes only through their impact on subsequent increases in the foreign-born population, and not through other channels. One way to assess the plausibility of this assumption is to test for differential trends in the outcomes prior to the labor market openings. In addition to testing pre-trends using the overall instrument, we examine pre-trends for origin-specific instruments—focusing on those countries that contribute most to the identifying variation. This check gives us evidence that the null pre-trends holds not

only *on average* across the origin countries, but also for each (major) country separately. To identify these key origins, we follow Goldsmith-Pinkham et al. (2020) and calculate Rotemberg weights, which we report in Section 5.1.[26]

Poland and the Czech Republic, the two EU-11 countries that share a border with Germany, joined the Schengen Area in 2007, eliminating border controls and allowing daily crossings without passport checks. This facilitated commuting in border regions, enabling workers employed in Germany to live in their home country and commute, rather than settle and register in Germany. To the extent that unobserved factors that drive cross-border commuting patterns align with historical settlement distributions, our shift-share instrument may pick up the effects of increases in commuting (besides the effects of immigration), potentially violating the exclusion restriction. Therefore, we construct an alternative sample that excludes the 24 German regions along the borders with Poland and the Czech Republic.

5 Results

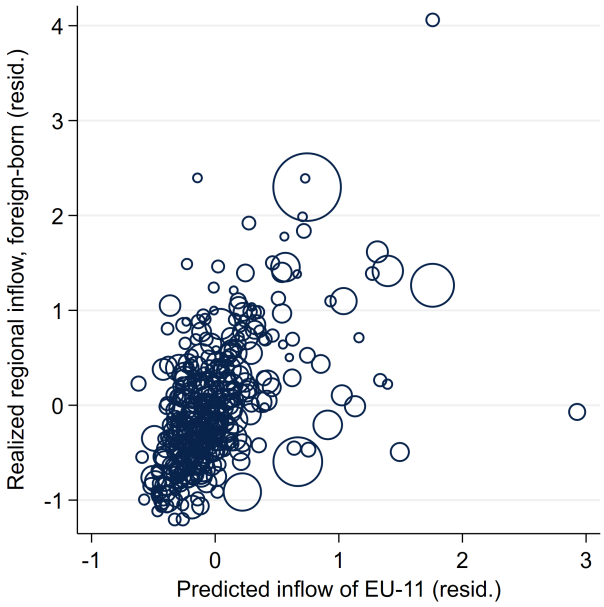
In this section, we present the main empirical findings. We first show that our proposed instrument, capturing predicted immigration from the EU-11 countries, is highly relevant for explaining regional changes in the foreign-born population. We then examine the effects of immigration on prices, accounting for the role of competition across market segments and regions. Finally, we conduct a series of robustness checks to assess the sensitivity of our results.

5.1 First-stage results

Figure 3 plots the relationship between our proposed shift-share instrument, the predicted immigration from the EU-11, and the residual change in the overall foreign-born female population, after accounting for baseline controls. To illustrate the contribution of larger versus smaller regions, the size of each dot is scaled by the population of the corresponding region in 2009.

[26] Since the treatment is time-invariant, we calculate the Rotemberg weights using a cross-section of the data rather than the full regional panel. We also include the baseline controls $X_{r,2009}$.

Figure 3: Relationship between predicted and realized change in stock of foreign-born women



Notes: The figure plots the relationship between residual ΔF_r and residual ΔM_r, calculated from separate regressions of ΔM_r and ΔF_r on controls $X_{r,2009}$. Both variables refer to the change between from 2009 to 2019. The size of the points is proportional to the regional population stock as of 2009.

Figure 3 shows a clear positive relationship between the predicted and realized change in the stock of foreign-born women. Importantly, the relationship appears to be driven both by smaller and larger regions, decreasing the probability that the instrument value is reflecting differences in the economic conditions across the regions. This, in turn, strengthens the assumption that the instrument is orthogonal to unobservable shocks that may differ by market size.

Table 2 reports the first-stage results of estimating equation (3) using the instrument as defined in equation (2). Because both the treatment and the instrument are time-invariant, the first stage is identical across years. In column (1), we regress the change in the stock of foreign-born women on the instrument and the set of control variables. The predicted change in the EU-11 immigrant population between 2009 and 2019 strongly and positively predicts the change in the foreign-born population over the same time period. For the specification that excludes all regions bordering Poland or the Czech Republic (column 2), the first-stage relationship between the instrument and the endogenous variable becomes substantially stronger. This suggests that historical settlement patterns are less predictive of immigration changes in border regions than in the rest of Germany. To assess the robustness of the first-stage relationship, we re-estimate the first stage with all regions while consecu-

Table 2: First-stage regression results

	Realized change in stock of foreign-born women (ΔF_r)			
	Main	Main excl. border regions	No Top 1	No Top 10
	(1)	(2)	(3)	(4)
Predicted change in stock (ΔM_r)	0.905***	1.085***	0.884***	0.896***
	(0.175)	(0.140)	(0.174)	(0.195)
N	377	353	376	367
K-P F-stat.	26.637	60.190	25.975	20.987
R^2	0.440	0.476	0.437	0.424

Notes: Table shows the first-stage results of estimating equation (3) using the instrument as defined in equation (2) and the controls. Column (1) includes all regions. Column (2) removes all regions on the border with Poland or Czech Republic. Column (3) includes all regions except Berlin. Column (4) additionally removes Hamburg, Hannover region, Cologne, Munich, Bremen and Bremerhaven, Düsseldorf, Recklinghausen, Frankfurt am Main, and the combined region of Merzig-Wadern and Saarlouis. The sample restrictions are based on 2009 population levels. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

tively excluding regions with the largest populations. The results removing the most populous region (Berlin) and the ten most populous regions, presented in columns (3) and (4), are remarkably stable across the samples.

Furthermore, as discussed in Section 4, we compute Rotemberg weights to assess the contribution of each of the eleven origin countries to the identifying variation. We report the results in Table 3; they are nearly identical when border regions are excluded (Table A1). First, all origins receive positive weights (α_c). Furthermore, the weights are almost perfectly explained by the size of national-level inflows—the correlation between α_c and ΔS_c is 0.978. Finally, three countries of origin - Romania, Bulgaria and Poland - receive a large share (78.8%) of the weight in the estimator and therefore have the highest potential to bias our results. Therefore, in the following we will also present results separately just using the variation from these countries.

Table 3: Summary of Rotemberg weights

Origin	α_c	ΔS_c	F_c
Romania	0.338	201165	15.177
Bulgaria	0.234	98625	6.703
Poland	0.216	141695	5.413
Hungary	0.087	52110	30.093
Croatia	0.073	42240	20.408
Slovakia	0.018	11365	36.695
Lithuania	0.015	13465	19.736
Latvia	0.013	9740	8.706
Czech Republic	0.006	7545	4.287
Estonia	0.001	1250	18.989
Slovenia	0.000	250	17.133

Notes: Table reports Rotemberg weights (α_c), the aggregate change in the stock of foreign-born between 2009-2019 (ΔS_c), and the first-stage F-statistic (F_c) by country of origin c. Estimation uses the Stata package *bartik_weight*, provided in Goldsmith-Pinkham et al. (2020), and is based on the sample of all regions. We report the results excluding border regions in Table A1.

5.2 Effect of immigration on prices of care

We now turn to the second-stage results, beginning with the impact of an increase in the number of foreign-born female residents on nursing home prices. The second-stage estimates for the main specifications with the full sample of regions and the sample excluding regions along the German border with Poland and the Czech Republic are graphically illustrated in Figure 4. All panels in the figure show that the rise in the local stock of foreign-born female residents between 2009 and 2019 does not impact the price of care and the price of room and board in nursing homes prior to 2009. Moreover, although the estimates are somewhat noisier, we observe no meaningful pre-trends when using instruments based solely on Romania, Bulgaria, and Poland, the countries with the largest Rotemberg weights, as shown in Figure A4. These findings support our identification assumption that past settlement patterns of the foreign-born EU-11 population affect changes in prices only through their impact on subsequent increases in the foreign-born population.

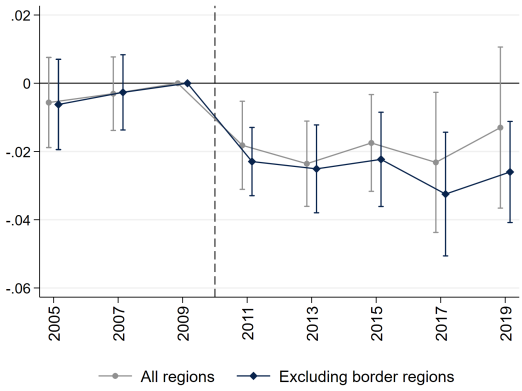
Focusing on Panels (a) to (d), we observe that from 2011 onward, immigration reduces the price of care in nursing homes. By 2013, an increase of one foreign-born woman per 100 residents leads to a statistically significant reduction in care prices across all care levels. For the care-level–weighted price, the effect remains roughly constant in magnitude from 2013 to 2019. Care levels 1 and 2 exhibit similar patterns, with coefficients becoming slightly larger in absolute terms over time; effects also tend to be larger for care level 1. In contrast, the price effect for care level 3 rebounds, approaches zero over time, and is not statistically significantly different from zero in 2019. As shown in Panel (e), we find no effect of immi-

gration on the price of food and accommodation.

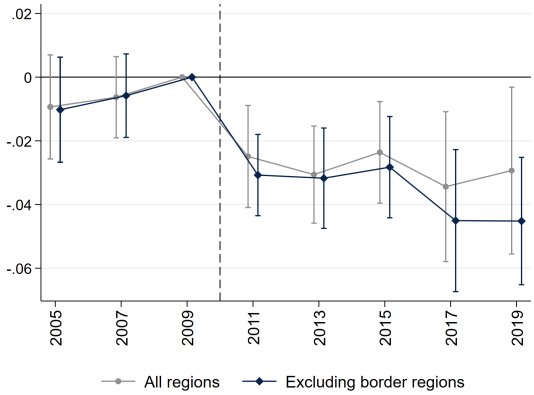
Table 4 reports the second-stage IV estimates, where the dependent variable is the change in log prices between 2009 and 2019. Panel (a) presents the main specification for the full sample of regions, and Panel (b) reports the corresponding estimates excluding border regions.[27] By 2019, an increase in the stock of foreign-born females per 100 inhabitants (as of 2009) reduces the price of low-intensity care by 2.9%. This effect is statistically significant at the 5% level. The magnitude of the effect declines in absolute terms with increasing care intensity and is not statistically different from zero for the higher care levels. As noted above, excluding border regions strengthens the first stage and therefore yields more precise second-stage estimates in Panel (b). The coefficients are also larger. By 2019, an increase in the stock of foreign-born females per 100 inhabitants reduces the price of low-intensity care by 4.5% and of medium-intensity care by 3.3%. We find no effect on high-intensity care. As a result, the care level–weighted price decreases by 2.6%. All effects are statistically significant at the 1% level.

[27] For completeness, columns (2) and (3) of Table A2 provide the full set of results for these two specifications for all years.

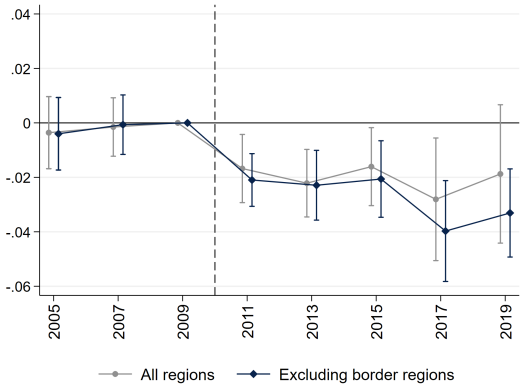
Figure 4: Effect of immigration on price of care and price of room/board



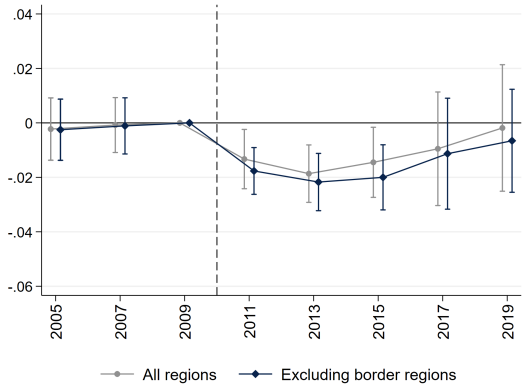
(a) Care-level weighted



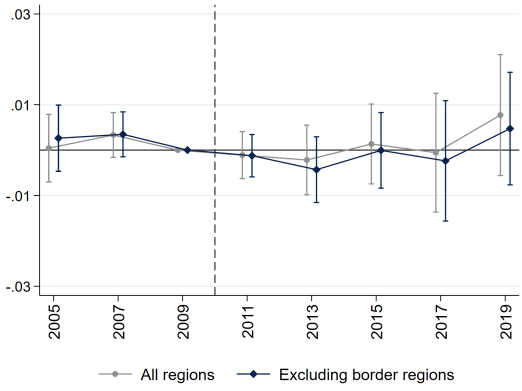
(b) Low care level (care level 1)



(c) Medium care level (care level 2)



(d) High care level (care level 3)



(e) Room and board

Notes: The figure displays the estimated effects of immigration on the price of care and their 95% confidence intervals, obtained from the second stage of equation (1), based on a sample of 377 regions (353 regions, when excluding border regions). The outcome variable is defined the change in the log price of care from 2009 to t. The treatment variable is the instrumented change in the stock of foreign-born females per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019. For corresponding OLS estimates and results from alternative specifications, see Table A2.

Table 4: Effect of immigration on log prices of nursing homes, 2009-2019

	Δ Log price care-weighted		Δ Log price low care		Δ Log price medium care		Δ Log price high care		Δ Log price room & board	
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)	OLS (7)	IV (8)	OLS (9)	IV (10)
Panel A: All regions										
ΔF_r	–0.015***	–0.013	–0.026***	–0.029**	–0.019***	–0.019	–0.004	–0.002	0.000	0.008
	(0.005)	(0.012)	(0.006)	(0.013)	(0.005)	(0.013)	(0.006)	(0.012)	(0.003)	(0.007)
N	377	377	377	377	377	377	377	377	377	377
R^2	0.100	0.099	0.138	0.137	0.157	0.157	0.086	0.086	0.067	0.058
$\overline{y}_{2009}$	54.569	54.569	44.660	44.660	58.003	58.003	72.263	72.263	19.445	19.445
Panel B: Excluding border regions										
ΔF_r		–0.026***		–0.045***		–0.033***		–0.007		0.005
		(0.008)		(0.010)		(0.008)		(0.010)		(0.006)
N		353		353		353		353		353
R^2		0.060		0.102		0.103		0.078		0.085
$\overline{y}_{2009}$										

Notes: Table presents results from estimating a version of equation (1) in which the dependent variable is the change in the log of the price between 2009 and 2019. ΔF_r denotes the change in the stock of foreign-born females per 100 inhabitants (as of 2009) between 2009 and 2019. In columns labeled *IV*, ΔF_r is instrumented using the instrument as defined in equation (2). Panel (A) includes all regions, while Panel (B) excludes regions on the German border with Poland and Czech Republic. $\overline{y}_{2009}$ refers to the mean dependent variable in baseline year 2009 in levels. The models control for regional size of the nursing market, share of the population above the age of 75, and old-age dependency rate. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The pattern of results across care levels aligns with the competitive structure of the nursing home sector: estimated markups suggest that competition is strongest for low-intensity care (Kesternich et al., 2025). The importance of competition for these price effects is further supported by additional evidence. When we split the sample into regions with low and high Herfindahl–Hirschman Index (HHI) values, we find significant price effects only in areas with low HHI, where market concentration is low and competition is high.

These price effects arise through the labor supply channel of immigration. Since immigrants typically do not consume long-term care services, they generate essentially no demand shocks in the nursing home market. For instance, in 2009, 99.0% of the foreign-born EU-11 population was younger than seventy-five, an age at which care dependency generally becomes more common. By contrast, roughly one in ten native residents had already reached that age. Although labor market liberalization substantially increased the number of working-age foreign-born individuals from EU-11 countries, elderly immigrants continued to constitute less than 1% of the immigrant population by 2019.[28]

Our estimated effects are broadly in line with the limited existing evidence on how immigration influences prices. Cortés (2008), for instance, shows that a 10% increase in the share of low-skilled migrants in the U.S. labor force reduces the price of household services by approximately 2%. In comparison, our findings suggest a somewhat smaller effect— a

[28]Figure A3 shows the cumulative age distributions of foreign-born individuals in Germany across years, separately for all foreign-born and for the EU-11 foreign-born population.

0.8% (low care level) to 0.5% (medium care level) price decline for each 10% increase in the share of foreign-born women in the labor force. In the specification excluding border regions, the price decline resulting from a 10% increase in foreign-born women in the labor force is slightly more pronounced, ranging from 0.8% for the care-weighted price, 1.0% for care level 2, to 1.3% for care level 1. Hence, the effect is closer, but still smaller than the results reported by Cortés (2008). Given that care prices in Germany are not fully determined by market forces, a more muted response is not surprising.

In Table A2, we present our main results in column (2) and (3) along with robustness checks in columns (4) to (5). First, the findings—including the insignificant pre-trends—remain stable when we vary the set of regional-level controls included in $X_{r,2009}$. In particular, we test the sensitivity of results to alternative measures of the demographic baseline, replacing the old-age dependency rate and the share of the population aged 75+ with the fertility rate (column 4). The treatment and instrumental variables in our main specification capture the change in the stock of foreign-born women, as most care workers are female and this is therefore the relevant treatment in our setting. If we instead use the change in the stock of all foreign-born individuals, regardless of gender, the pattern of effects remains the same, but the coefficient is roughly half as large (column 5). This is consistent with the fact that the average change in the alternative treatment is about 2.5 times as large: While the stock of foreign-born women increases between 2009 and 2019 on average by 1.55 per 100 inhabitants (based on the 2009 population), the stock of all foreign-born individuals increases over the same period on average by 4.04 per 100 inhabitants. At the same time, male immigrants do not affect care prices because they hardly work as care workers. Therefore, the halving of the coefficient is plausible.

6 Mechanisms

Our analysis has shown that the arrival of immigrant workers decreases the price of care in nursing homes, particularly so for low and medium care levels. In the next section, we explore a number of potential mechanisms, focusing on changes in labor costs, nursing home quality, scale effects, and substitution between different types of care.

6.1 Labor costs

Given that labor costs account for the majority of expenditures in nursing homes (see Section 2), a natural starting point for investigating the mechanism behind the effect of immigration on prices is the role of staffing costs. If markets are sufficiently competitive, a reduction in labor costs per worker should lead to lower prices. For this purpose, we use detailed data on employment and earnings in the nursing home sector from administrative

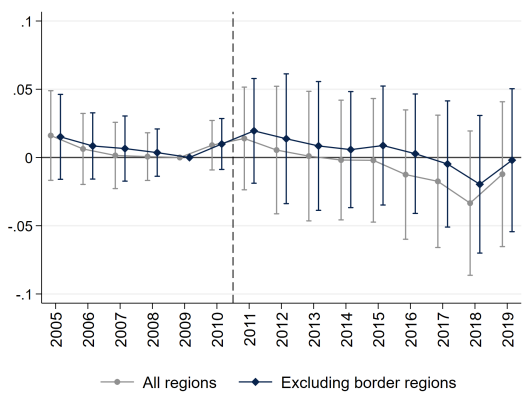
social security records and approximate labor cost per worker using average wages.

The results are presented in Figure 5, for the full sample of regions and for a specification excluding border regions. We first show that the increase in the number of foreign-born women does not affect employment and wages in nursing homes prior to the labor market openings. Panel (a) indicates that the overall number of care workers in nursing homes, measured in full-time equivalents, does not significantly change with immigration. This stands in contrast to prior work documenting positive effects of immigration on NH staffing, including total employment of nurse professionals (Furtado and Ortega, 2023) and hours per nursing home resident (Grabowski et al., 2023).[29] However, there is a sizable shift in the composition of the workforce: Panel (b) documents that the average share of foreign workers rose sharply following the 2011 policy change. By 2019, an additional foreign-born female per 100 residents increases the average share of foreign workers in nursing homes by 4.5 percentage points in the full sample of regions and by 4.9 percentage points when border regions are excluded. This change in the composition is related to a change in wages. Panel (c) documents the causal effect of migration on average wages after 2011. By 2019, an increase of one foreign-born female per 100 residents reduces the average wage in the nursing home sector by 3.1% in the full sample and by 3.5% in the specification excluding border regions. Importantly, Panel (d) shows no impact on the wages of incumbent workers, defined as those employed in nursing homes prior to the reform. This finding implies that the pure wage effect of immigration - that is, the effect on incumbent workers' wages (Dustmann et al., 2025) - is zero.[30]

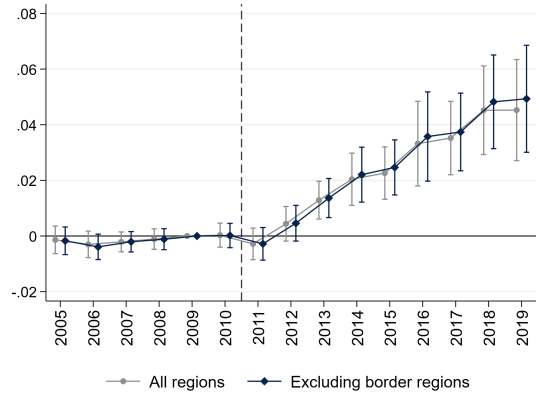
[29] In particular, Furtado and Ortega (2023) document an increase of 21 nurse professionals per a 1,000-person increase in immigration. They further attribute part of this increase to a crowding-in of native workers. Grabowski et al. (2023) show that an increase of one immigrant per resident raises hours worked per resident by 0.009 for nursing assistants and by 0.002 for registered nurses.

[30] Excluding regions that share a border with Poland or the Czech Republic, the effects are very similar (column 3 in Table A3). As further shown in the table, these findings are also robust to using a different set of control variables (column 4) as well as an alternative treatment and instrument definition including all genders (column 5).

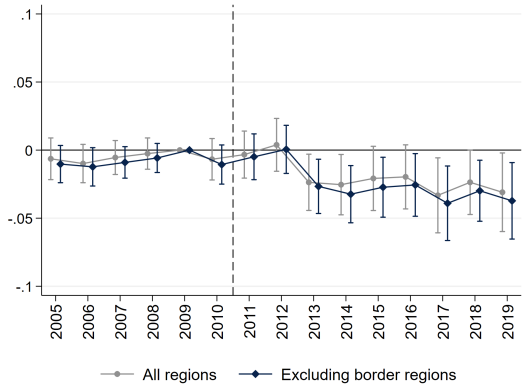
Figure 5: Effect of immigration on employment and wages in nursing homes



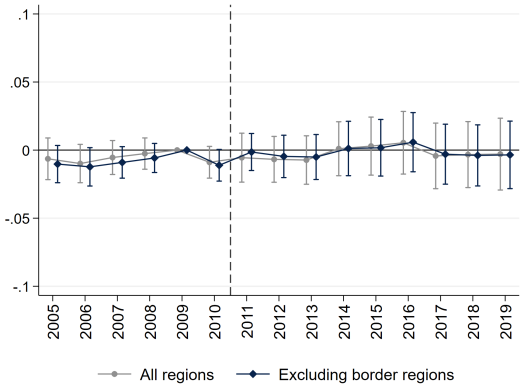
(a) Log total number of workers (in FTE)



(b) Share of foreign workers



(c) Log average wage



(d) Log average wage of incumbent workers

Notes: The figure displays the estimated effects of immigration on the total number of care workers (in full-time equivalents), the average share of foreign workers, the average wage and the average wage of incumbents workers, along with their 95% confidence intervals, obtained from the second stage of equation (1), estimated separately for each year from 2005 to 2019 based on a sample of 377 regions (353 regions, when excluding border regions). The outcomes are defined as differences relative to 2009. The treatment variable is the instrumented change in the stock of foreign-born females per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019. For corresponding OLS estimates and results from alternative specifications, see Table A3.

Rather, the effect on the average wage is driven by a change in the composition of the workforce toward a higher share of foreign workers, combined with the fact that foreign workers earn lower wages on average than native workers. Table 5 shows that foreign workers earn about 6.4 euros less per day than native workers, despite being more likely to work full-time (45.6% compared to 40.1%). Why are average wages for foreign workers lower, even though most nursing home wages are determined by collective bargaining agreements (see Section 2). Several factors may contribute. First, differences in recognized qualifications and responsibilities: foreign workers are substantially more likely to be employed as

nursing assistants (51.5%) rather than registered nurses, compared to natives (34.4%). Second, differences in labor market experience in Germany might play a role: native workers have on average 22.0 years of experience, more than twice that of foreign workers. Third, age differences might also matter, although they are less pronounced than the difference in experience. This suggests that foreign workers may have accumulated work experience outside Germany, which is likely not taken into account when determining experience-based wage levels.

Table 5: Characteristics of Foreign and Native Workers, 2011-2019

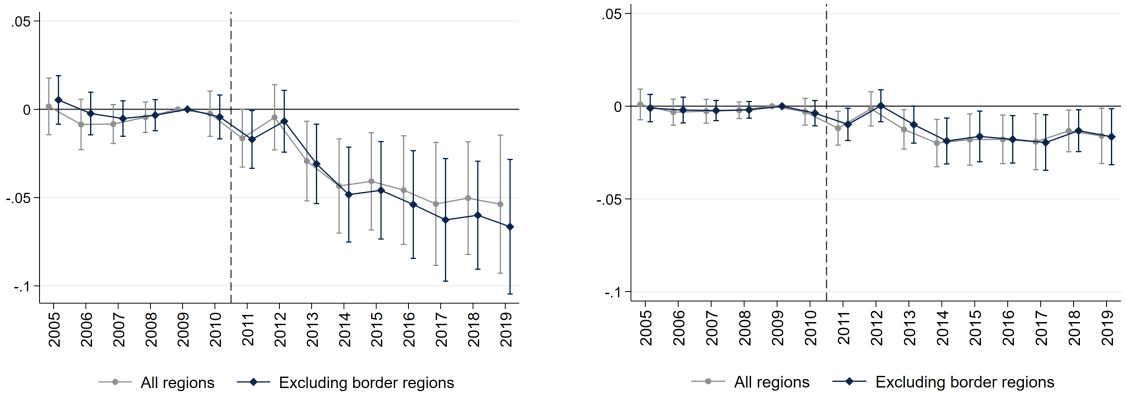
Characteristic	Native	Foreign
Average daily wage (in euros)	62.300	55.907
Share full-time (%)	40.074	45.594
Share assistant (%)	34.446	51.551
Average labor market experience (yrs)	22.022	10.895
Average age (yrs)	42.413	38.734

Notes: Values report pooled averages for all long-term care workers observed between 2011 and 2019, separately for native and foreign-born workers. Labor market experience measures the number of years since the worker's first job in Germany. Based on 151,704 distinct foreign and 943,314 native workers (employed across the full sample of regions).

Figure 6 shows the effect of immigration on the composition of care workers in nursing homes. By 2019, an additional foreign-born female per 100 residents decreases average labor market experience by 7.9% and the average age of care workers by 1.5%. [31]

[31] We cannot estimate our model for the outcome "share of assistants," since the required information on qualification levels is only available following the introduction of the Classification of Occupations 2010, i.e., from 2012 onward.

Figure 6: Effect of immigration on the composition of the nursing home workforce



(a) Log average labor market experience

(b) Log average age

Notes: The figure displays the estimated effects of immigration on the the average labor market experience and the average age of care workers in nursing homes, along with their 95% confidence intervals, obtained from the second stage of equation (1), estimated separately for each year from 2005 to 2019 based on a sample of 377 regions (353 regions, when excluding border regions). The outcomes are defined as differences relative to 2009. The treatment variable is the instrumented change in the stock of foreign-born females per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019. For corresponding OLS estimates and results from alternative specifications, see Table A4.

Overall, we find evidence that the observed effects on prices can be plausibly explained by an increase in the share of foreign workers employed in nursing homes, who earn lower wages on average, thereby reducing average labor costs per worker. The magnitude of the average wage effect is comparable to that of the average price effect, which is plausible given that wages account for 70–80% of total costs.

6.2 Nursing home quality

The arrival of foreign workers could, in principle, affect the quality of care in nursing homes, which may in turn influence pricing. While Furtado and Ortega (2023) and Grabowski et al. (2023) find that stronger regional immigration inflows improve care quality through higher staffing levels, we observe no change in overall staffing.[32] Instead, there is a shift in staff composition toward a higher share of foreign care workers, who are more likely to work as nursing assistants, have less work experience in Germany, and are younger than native workers. This could suggest potential quality differences. However, foreign workers may be equally qualified despite being lower paid. Many may hold professional qualifications

[32] Furtado and Ortega (2023) and Grabowski et al. (2023) use health outcomes of nursing home residents, whereas we rely on quality inspections. An alternative measure would be excess mortality among the elderly, but available death statistics do not allow deaths in nursing homes to be separately identified. Ultimately, nursing-home inspections provide a direct measure of care quality, while health outcomes - including mortality - capture downstream consequences of quality changes.

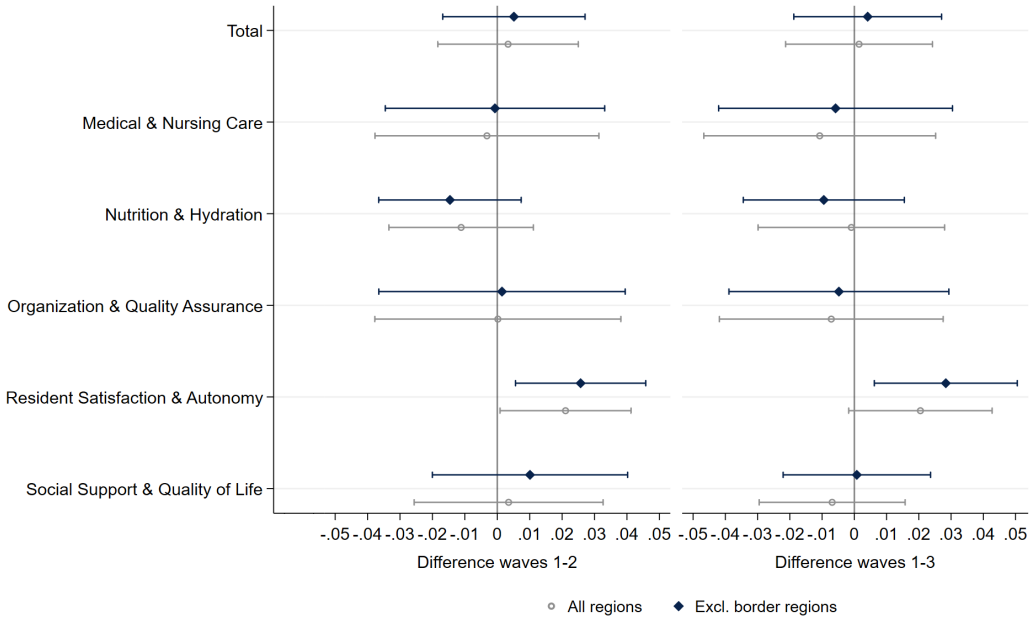
or degrees not recognized in Germany, which limit their ability to work as nurses, and we only observe work experience in Germany, while experience abroad is not captured.

To assess whether quality deterioration serves as a mechanism for the observed price effects, we draw on the inspection-based quality measures described in Section 3 and re-estimate equation (1) using the (instrumented) time-invariant treatment and baseline controls. As discussed in Section 3, the quality measures are available in three waves. To match this structure, we adapt the baseline specification to the lower frequency of the data and compare the change in the share of nursing homes with no issues identified during inspection between waves 2 and 3 (post–labor market opening) and the pre-reform baseline in wave 1.[33] Analogous to the previous analyses, identifying a causal effect requires assuming that past settlement patterns affect the change in nursing-home quality only through their impact on subsequent increases in the foreign-born population, and not through any other channels. Unlike for the other outcomes, however, the standardized quality inspections were introduced only in 2009, which prevents us from assessing the plausibility of this assumption by examining pre-trends in the outcome prior to the labor market openings.

Figure 7 reports the main results for the full sample of regions and for a specification excluding border regions. Across both samples, we find no effect of immigration on the share of facilities for which no issues were identified in *Medical and Nursing Care, Nutrition and Hydration, Social Support and Quality of Life,* or *Organization and Quality Assurance*. By contrast, in the longer-term, immigration is associated with a modest improvement in resident satisfaction and autonomy: an additional foreign-born female resident per 100 residents increases the share of facilities receiving a full score in this domain by 2.1 percentage points in the full sample, and by 2.8 percentage points when border regions are excluded. As shown in Table A5, these effects are robust to alternative control sets (column 4), an alternative treatment and instrument definition that includes both genders (column 5), and an alternative harmonization assumption (column 6).

[33] More precisely, we estimate the following equation separately for each wave $w = \{2, 3\}$: $\Delta share_{r,w} = \alpha_w + \beta \Delta F_r + \omega X_{r,2009} + \epsilon_{r,w}$, where $\Delta share_{r,w}$ represents the difference in the share of nursing homes with no issues identified during inspection in region *r*; we take these differences between waves $w = \{2, 3\}$ (post–labor market opening) and the pre-reform baseline in wave 1.

Figure 7: Impact of immigration on nursing home quality over short- and long-term horizon



Notes: The figure displays the estimated effects of immigration on the share of nursing homes for which no issues were found across five quality categories, as well as an over all categories, along with 95% confidence intervals. Estimates compare changes in these shares in wave 2 (2011–2013) and wave 3 (2014–2016) compared to wave 1 (pre-2011) using two regional samples: all regions (N=369) and a sample excluding regions bordering Poland and the Czech Republic (N=347). For data sources and variable construction, see Appendix C; for robustness checks and alternative specifications, see Table A5.

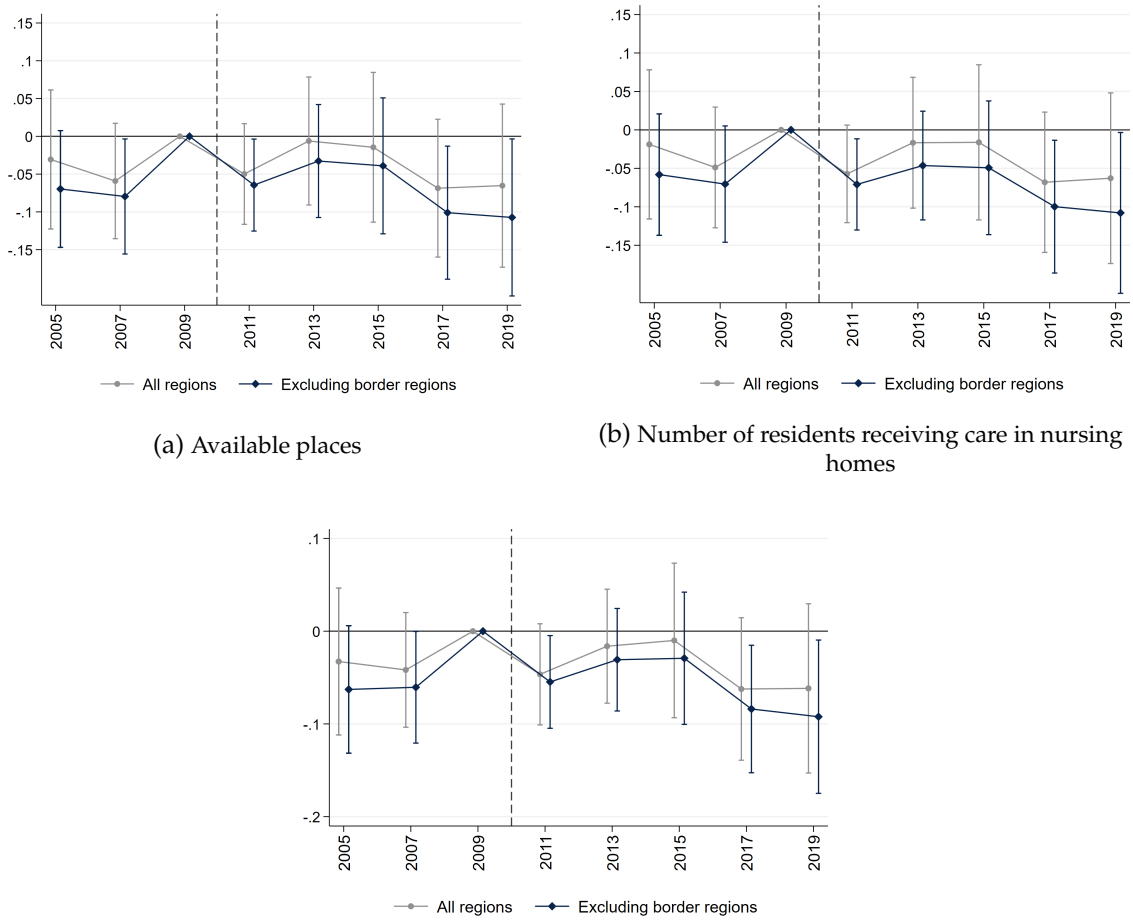
6.3 Scale effects

Another potential channel contributing to the decrease in the price of care is the presence of scale effects. If immigration leads to an increase in the number of residents per nursing home, fixed costs, such as administrative overhead, utilities, or building maintenance, are shared by a larger number of recipients. This would lower the average cost per resident, which might translate in lower prices. While we do not directly observe fixed costs, we can investigate whether immigration increases the average capacity and take-up in nursing homes, which would enable scale effects.

To this end, we assess the impact of immigration on nursing home capacity and the take-up of nursing home care. As illustrated in Panel (a) of Figure 8, the number of available places in nursing homes does not change with increased immigration after 2011, and no significant pre-trends are detected prior to that. Similarly, we find no effect on the take-up of nursing home care in Panel (b). Nevertheless, the average capacity and take-up could have changed if immigration affected the number of nursing homes. Panel (c) shows that this was not the case; consequently, the average size of nursing homes remains unchanged. In sum, we find no evidence that scale effects play a role in price reductions. We also do not

find evidence that immigration affects market entry or exit among nursing homes.

Figure 8: Effect of immigration on home capacity and take-up



(a) Available places

(b) Number of residents receiving care in nursing homes

(c) Number of nursing homes

Notes: The figure displays the estimated effects on nursing home care availability and take-up, along with 95% confidence intervals, obtained from the second stage of equation (1), based on a sample of 377 regions (353 regions, when excluding border regions). The outcomes are defined as log differences relative to 2009. The treatment variable is the instrumented change in the stock of foreign-born females per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019.

6.4 Substitution effects

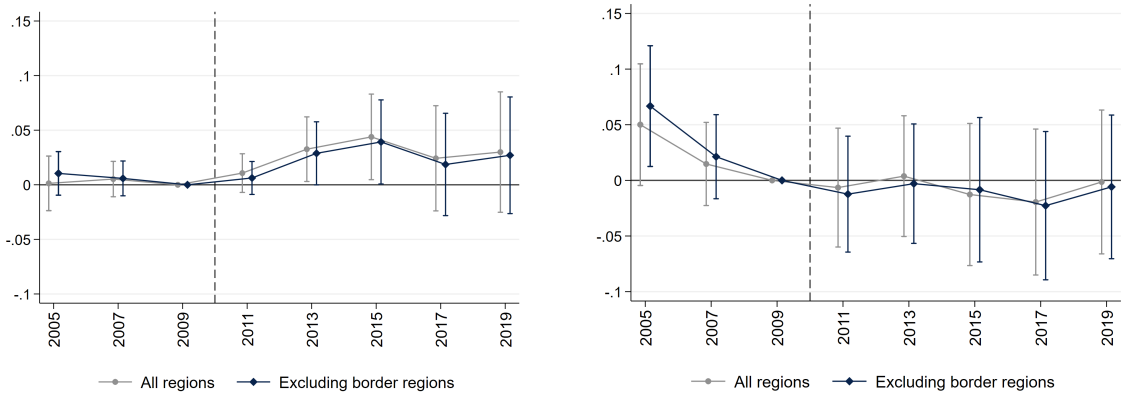
We also examine whether inflows of foreign-born individuals affect the take-up of other types of care. With an increase in the number of immigrant workers available to provide home-based care on an informal basis, receiving the cash benefit and arranging care privately may have become more attractive. Although individuals from new EU member states could already provide privately arranged care as self-employed workers or posted workers upon accession, labor market openings may have facilitated immigration. For in-

stance, a spouse's new employment opportunity after 2011 may have enabled their partner to relocate and begin providing this type of care. For ambulatory services provided by professional caregivers, greater staff availability may have allowed providers to expand their capacity, enabling more individuals to access ambulatory care. Both effects could influence the demand for care in nursing homes, which could lead to price adjustments.

Figure 9 presents the results. We find a significant positive effect on the take-up of informal care. By 2015, an additional foreign-born female resident per 100 residents increases the number of informal care recipients by 4.4% (see column 10 in Table A6). The effect diminishes somewhat over time, and by 2019 it is no longer statistically significant. This positive effect aligns with findings from the United States, where the availability of immigrants has been shown to increase reliance on privately arranged home-based care (Almuhaisen et al., 2024; Butcher et al., 2022). Furthermore, we find no effect of immigration on the stock of individuals receiving care from professional caregivers at home.[34] Since informal care is predominantly used for individuals with low care requirements, the negative effect of immigration on prices for this care level may be partly explained by increased competition between nursing homes and informal care provision. Interestingly, the number of informal care recipients increased despite no simultaneous decrease in the other care types—nursing home and ambulatory care—suggesting that families were more likely to apply for LTCI benefits to finance privately arranged care that would otherwise have been provided by family members, given the increased availability of formal care services.

[34]To our knowledge, there is little prior work examining the effects of immigration on the take-up of ambulatory care.

Figure 9: Effect of immigration on other types of care



(a) Stock of informal care recipients

(b) Stock of ambulatory care recipients

Notes: The figure displays the estimated effect of immigration on the take-up of care outside of nursing homes, along with 95% confidence intervals, obtained from the second stage of equation (1), based on a sample of 377 regions (353 regions, when excluding border regions). The outcomes are defined as log differences relative to 2009. The treatment variable is the instrumented change in the stock of foreign-born females per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019.

7 Conclusion

This paper provides novel evidence on the effects of immigration on prices, focusing on the nursing home sector. To this end, we exploit policy changes in the early 2010s that granted labor market access to workers from the new member states of the European Union. Unlike many sectors where immigrants simultaneously generate both demand and supply shocks, the demographic profile of the EU-11 inflows - predominantly working-age individuals with negligible care needs - allows us to isolate the labor supply channel and, consequently, identify the production-side effects of immigration.

We show that an inflow of foreign-born women reduces the price of care services, particularly for low-intensity care, while leaving quality unaffected. The decline in prices appears to be driven by a compositional shift in the nursing home workforce toward foreign-born workers, who are generally younger, less experienced, and more likely to occupy lower-wage positions. We find no evidence of scale effects through changes in nursing home capacity. Complementary analysis indicates that immigration increases the uptake of informal care for individuals with low care needs, potentially amplifying competitive pressures on nursing homes and contributing to the observed price declines.

Our findings also shed light on the interaction between market structure and the effects of immigration on prices. Price reductions are largest in low-intensity care and in regions

with low market concentration, consistent with the theory that cost savings are more likely to be passed through in competitive markets.

Overall, our results have broader implications for policy and future research. They highlight that immigration can lower prices by increasing labor supply without imposing measurable costs in terms of quality, demonstrating an important mechanism through which immigration can enhance welfare in host-country economies. Understanding potential price effects in the nursing home sector is increasingly important, as population aging and the resulting rise in long-term care needs may exacerbate labor shortages and drive up care prices.

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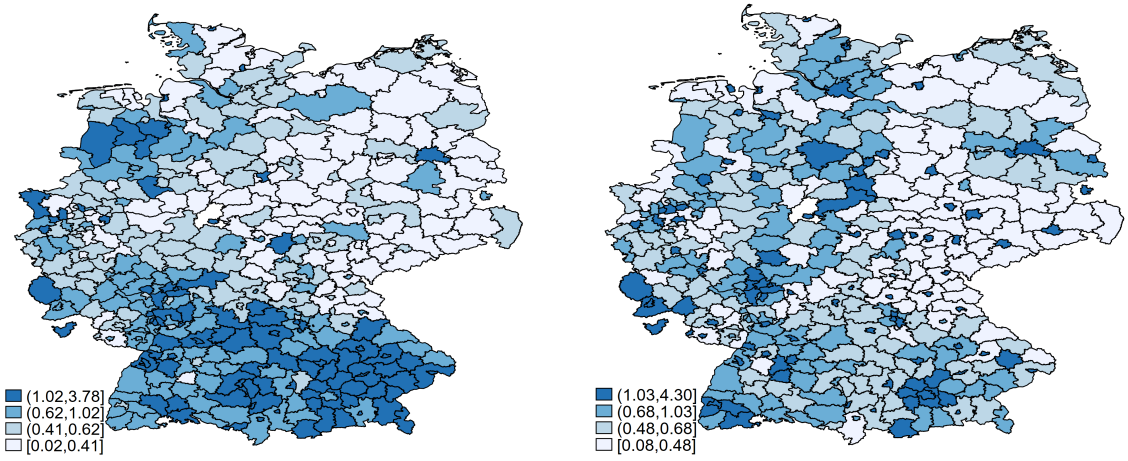
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Appendix

A Additional tables and figures

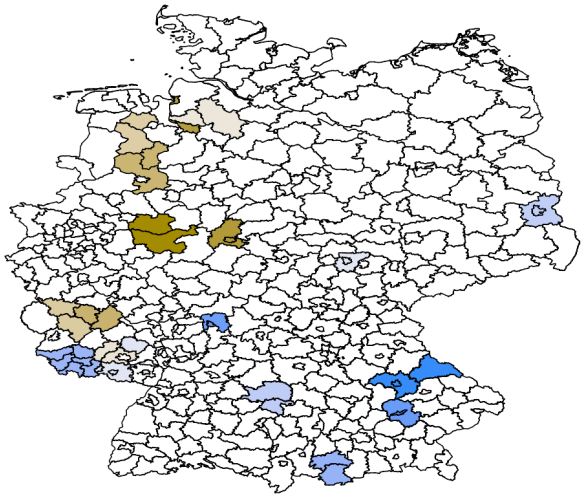
Figure A1: Net change in foreign inflows, 2005-2019



(a) EU-11 (b) Other origins

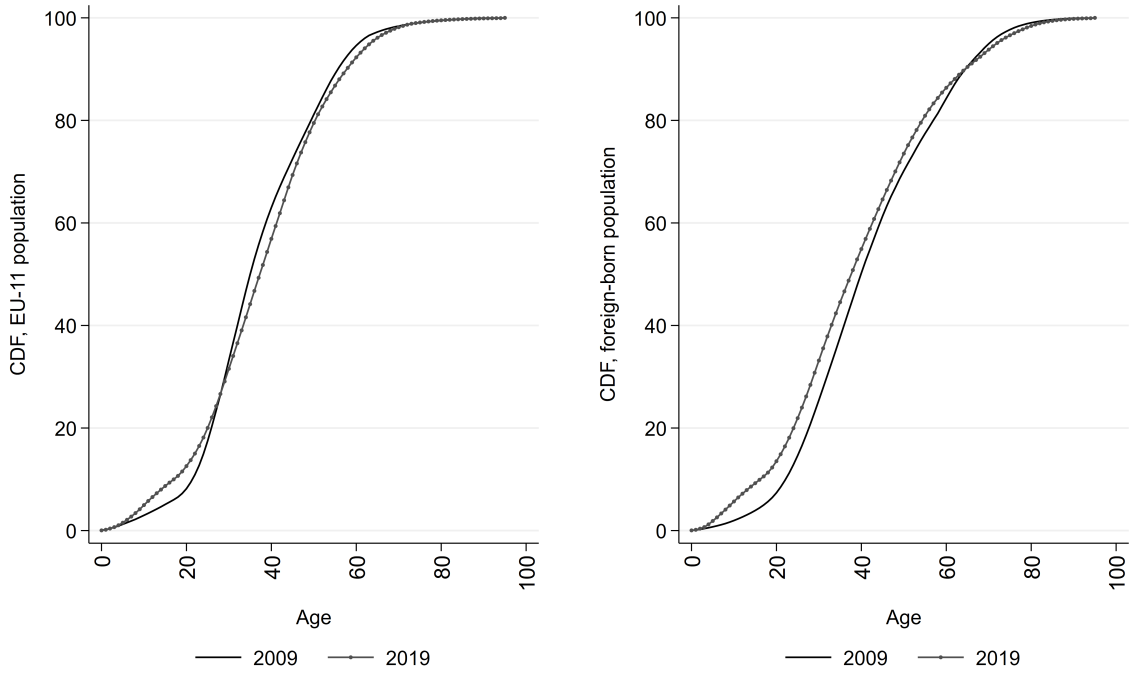
Notes: The maps display the net change in the number of foreign-born females between 2009 and 2019, measured per 100 inhabitants in 2009 and grouped into quartiles. Panel (a) refers to individuals with an EU-11 nationality; Panel (b) refers to migrants from all other origins. Based on own calculations using the German Foreigner Statistics and the INKAR database.

Figure A2: Location and assignment of the combined NUTS-3 regions



Notes: To comply with data privacy regulations, account for joint reporting practices and balance the panel, 42 NUTS-3 regions were combined into 18 larger units. White areas correspond to regions that retained their original boundaries.

Figure A3: Age distribution by origin

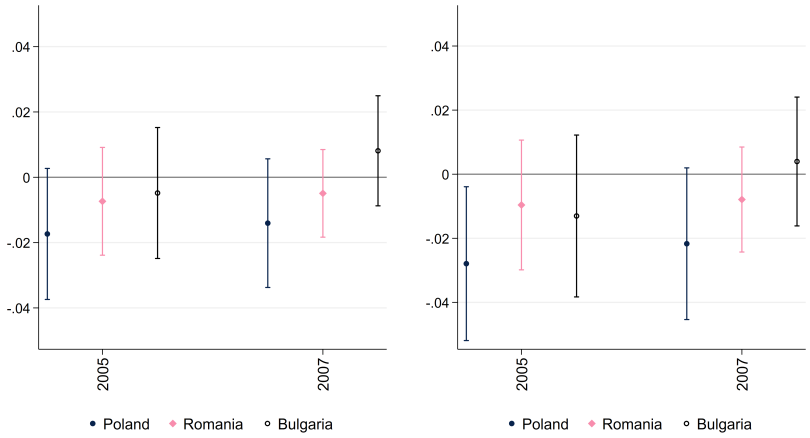


(a) EU-11

(b) All origins

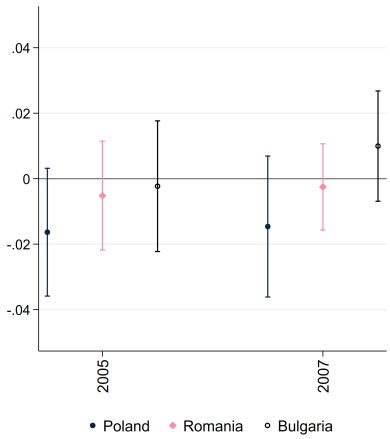
Notes: Own calculation based on Statistisches Bundesamt. GENESIS-Online: Table 12521-0004. Retrieved November 2025, from http://www-genesis.destatis.de/datenbank/online/url/61f40121.

Figure A4: Pre-trend estimates for instruments with highest Rotemberg weights

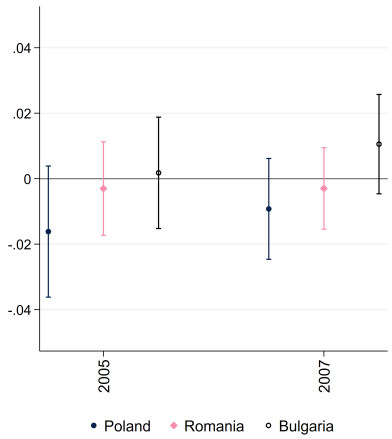


(a) Care-weighted price

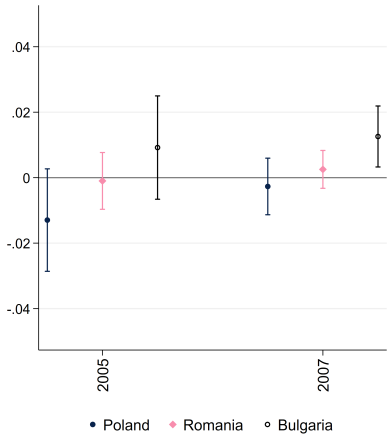
(b) Price of care, care level 1



(c) Price of care, care level 2



(d) Price of care, care level 3



(e) Price of room and board

Notes: Figures plot second-stage coefficients and 95% confidence intervals from estimating equation (1) using shift-share instruments corresponding to the origins with the highest Rotemberg weights: Poland, Romania, and Bulgaria.

Table A1: Summary of Rotemberg weights (excl. border regions)

Origin	α_c	ΔS_c	F_c
Romania	0.339	196,680	28.489
Bulgaria	0.234	96,405	20.031
Poland	0.215	135,420	20.880
Hungary	0.087	50,325	28.791
Croatia	0.072	41,370	19.431
Slovakia	0.018	10,570	35.121
Lithuania	0.014	13,235	17.073
Latvia	0.012	9,570	7.541
Czech Republic	0.008	5,230	15.961
Estonia	0.001	1,215	16.535
Slovenia	0.000	230	17.109

Notes: The table reports Rotemberg weights (α_c), the aggregate change in the stock of foreign-born individuals between 2009 and 2019 (ΔS_c), and the first-stage F-statistic (F_c) by country of origin c. Estimation uses the Stata package *bartik_weight* provided by Goldsmith-Pinkham et al. (2020) and is based on the sample excluding regions bordering Poland or the Czech Republic.

Table A2: Effect of immigration on nursing home prices, full results

			IV			
		OLS	Main	Main excl. border regions	Alternative controls	Both genders
		(1)	(2)	(3)	(4)	(5)
Δ Log price, care-weighted	2005	–0.002	–0.006	–0.006	–0.009	–0.002
		(0.004)	(0.007)	(0.007)	(0.006)	(0.003)
	2007	–0.001	–0.003	–0.003	–0.008*	–0.001
		(0.004)	(0.005)	(0.006)	(0.005)	(0.002)
	2011	–0.009**	–0.018***	–0.023***	–0.018***	–0.008***
		(0.004)	(0.007)	(0.005)	(0.006)	(0.003)
	2013	–0.012***	–0.024***	–0.025***	–0.026***	–0.010***
		(0.004)	(0.006)	(0.007)	(0.006)	(0.003)
	2015	–0.010**	–0.017**	–0.022***	–0.016**	–0.007**
		(0.004)	(0.007)	(0.007)	(0.006)	(0.003)
	2017	–0.015***	–0.023**	–0.032***	–0.028***	–0.010**
		(0.005)	(0.010)	(0.009)	(0.009)	(0.004)
	2019	–0.015***	–0.013	–0.026***	–0.021*	–0.006
		(0.005)	(0.012)	(0.008)	(0.011)	(0.005)
Δ Log price, low care	2005	–0.003	–0.009	–0.010	–0.012	–0.004
		(0.006)	(0.008)	(0.008)	(0.007)	(0.004)
	2007	–0.001	–0.006	–0.006	–0.011*	–0.003
		(0.004)	(0.007)	(0.007)	(0.006)	(0.003)
	2011	–0.011**	–0.025***	–0.031***	–0.024***	–0.011***
		(0.004)	(0.008)	(0.007)	(0.007)	(0.003)
	2013	–0.014***	–0.031***	–0.032***	–0.035***	–0.013***
		(0.005)	(0.008)	(0.008)	(0.007)	(0.003)
	2015	–0.012**	–0.024***	–0.028***	–0.022***	–0.010***
		(0.005)	(0.008)	(0.008)	(0.007)	(0.004)
	2017	–0.023***	–0.034***	–0.045***	–0.034***	–0.014***
		(0.007)	(0.012)	(0.011)	(0.010)	(0.005)
	2019	–0.026***	–0.029**	–0.045***	–0.037***	–0.013**
		(0.006)	(0.013)	(0.010)	(0.012)	(0.006)
Δ Log price, medium care	2005	–0.001	–0.004	–0.004	–0.007	–0.001
		(0.004)	(0.007)	(0.007)	(0.006)	(0.003)
	2007	–0.000	–0.002	–0.001	–0.007	–0.001
		(0.003)	(0.005)	(0.006)	(0.005)	(0.002)
	2011	–0.008**	–0.017***	–0.021***	–0.017***	–0.007***
		(0.003)	(0.006)	(0.005)	(0.005)	(0.003)
	2013	–0.012***	–0.022***	–0.023***	–0.025***	–0.009***
		(0.004)	(0.006)	(0.007)	(0.006)	(0.003)
	2015	–0.010**	–0.016**	–0.021***	–0.015**	–0.007**
		(0.004)	(0.007)	(0.007)	(0.007)	(0.003)
	2017	–0.020***	–0.028**	–0.040***	–0.037***	–0.012**
		(0.005)	(0.011)	(0.009)	(0.010)	(0.005)
	2019	–0.019***	–0.019	–0.033***	–0.031***	–0.008
		(0.005)	(0.013)	(0.008)	(0.012)	(0.005)

Notes: The table reports estimates of Equation (1) under various specifications. Column (1) presents OLS results with baseline controls. Column (2) shows second-stage IV results with the same controls (also shown in Fig. 4). Column (3) excludes regions on the German border with Poland and the Czech Republic. Column (4) uses an alternative control set: fertility rate and ratio of facilities to elderly above 75. Column 5 builds the treatment and the instrument using both genders. Regressions are based on 377 regions, except for column 3, which uses 353 regions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A2: Effect of immigration on nursing home prices, full results (continued)

			IV			
		OLS	Main	Main excl. border regions	Alternative controls	Both genders
		(1)	(2)	(3)	(4)	(5)
Δ Log price, high care	2005	0.000	–0.002	–0.003	–0.006	–0.001
		(0.004)	(0.006)	(0.006)	(0.005)	(0.002)
	2007	–0.001	–0.001	–0.001	–0.005	–0.000
		(0.003)	(0.005)	(0.005)	(0.005)	(0.002)
	2011	–0.007**	–0.013**	–0.018***	–0.013***	–0.006**
		(0.003)	(0.006)	(0.004)	(0.005)	(0.002)
	2013	–0.011***	–0.019***	–0.022***	–0.019***	–0.008***
		(0.003)	(0.005)	(0.005)	(0.005)	(0.002)
	2015	–0.010***	–0.014**	–0.020***	–0.013**	–0.006**
		(0.004)	(0.007)	(0.006)	(0.006)	(0.003)
	2017	–0.004	–0.010	–0.011	–0.016*	–0.004
		(0.006)	(0.011)	(0.010)	(0.009)	(0.004)
	2019	–0.004	–0.002	–0.007	–0.011	–0.001
		(0.006)	(0.012)	(0.010)	(0.011)	(0.005)
Δ Log price of room and board	2005	0.000	0.000	0.003	–0.003	0.000
		(0.002)	(0.004)	(0.004)	(0.003)	(0.002)
	2007	0.000	0.003	0.003	–0.001	0.001
		(0.002)	(0.003)	(0.003)	(0.002)	(0.001)
	2011	–0.003**	–0.001	–0.001	0.001	–0.000
		(0.002)	(0.003)	(0.002)	(0.002)	(0.001)
	2013	–0.003	–0.002	–0.004	0.000	–0.001
		(0.003)	(0.004)	(0.004)	(0.004)	(0.002)
	2015	–0.001	0.001	–0.000	0.005	0.001
		(0.002)	(0.004)	(0.004)	(0.004)	(0.002)
	2017	–0.001	–0.001	–0.002	0.004	0.000
		(0.004)	(0.007)	(0.007)	(0.006)	(0.003)
	2019	0.000	0.008	0.005	0.013**	0.004
		(0.003)	(0.007)	(0.006)	(0.006)	(0.003)

Notes: The table reports estimates of equation (1) under various specifications. Column (1) presents OLS results with baseline controls. Column (2) shows second-stage IV results with the same controls (also shown in Figure 4). Column (3) excludes regions on the German border with Poland and the Czech Republic. Column (4) uses an alternative control set: fertility rate and ratio of facilities to elderly above 75. Column (5) builds the treatment and the instrument using both genders. Regressions are based on 377 regions, except for column (3), which uses 353 regions. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A3: Effect of immigration on employment and wages, full results

			IV			
		OLS	Main	Main excl. border regions	Alternative controls	Both genders
		(1)	(2)	(3)	(4)	(5)
Δ Log FTE staff	2005	–0.007	0.016	0.023	0.015	0.007
		(0.010)	(0.017)	(0.014)	(0.016)	(0.007)
	2006	–0.004	0.006	0.011	0.008	0.003
		(0.009)	(0.013)	(0.011)	(0.012)	(0.006)
	2007	–0.001	0.001	0.007	0.007	0.001
		(0.008)	(0.012)	(0.010)	(0.012)	(0.005)
	2008	–0.008	0.001	0.003	0.004	0.001
		(0.006)	(0.009)	(0.008)	(0.009)	(0.004)
	2010	–0.003	0.009	0.007	0.010	0.004
		(0.006)	(0.009)	(0.009)	(0.010)	(0.004)
	2011	–0.007	0.014	0.017	0.020	0.006
		(0.009)	(0.019)	(0.019)	(0.020)	(0.008)
	2012	–0.012	0.005	0.016	0.014	0.003
		(0.013)	(0.024)	(0.023)	(0.024)	(0.010)
	2013	–0.006	0.001	0.007	0.008	0.001
		(0.011)	(0.024)	(0.023)	(0.024)	(0.010)
	2014	0.003	–0.002	–0.001	0.006	–0.000
		(0.011)	(0.022)	(0.023)	(0.022)	(0.009)
	2015	0.007	–0.002	–0.003	0.009	–0.000
		(0.011)	(0.023)	(0.023)	(0.022)	(0.010)
	2016	0.006	–0.013	–0.015	0.003	–0.005
		(0.012)	(0.024)	(0.025)	(0.022)	(0.010)
	2017	–0.003	–0.017	–0.020	–0.005	–0.007
		(0.012)	(0.025)	(0.025)	(0.024)	(0.010)
	2018	–0.008	–0.033	–0.035	–0.020	–0.013
		(0.013)	(0.027)	(0.028)	(0.026)	(0.011)
	2019	0.004	–0.012	–0.015	–0.002	–0.005
		(0.013)	(0.027)	(0.028)	(0.027)	(0.011)
Δ Share of foreign workers	2005	–0.000	–0.001	–0.003	–0.002	–0.001
		(0.001)	(0.003)	(0.002)	(0.003)	(0.001)
	2006	–0.000	–0.003	–0.004*	–0.004*	–0.001
		(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
	2007	–0.000	–0.002	–0.003*	–0.002	–0.001
		(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
	2008	0.001	–0.001	–0.002	–0.001	–0.001
		(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
	2010	0.001	0.000	0.000	0.000	0.000
		(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
	2011	–0.000	–0.003	–0.002	–0.003	–0.001
		(0.001)	(0.003)	(0.003)	(0.003)	(0.001)
	2012	0.002	0.004	0.004	0.005	0.002
		(0.002)	(0.003)	(0.003)	(0.003)	(0.001)
	2013	0.005***	0.013***	0.012***	0.014***	0.005***
		(0.002)	(0.003)	(0.003)	(0.004)	(0.001)
	2014	0.010***	0.020***	0.020***	0.022***	0.009***
		(0.002)	(0.005)	(0.004)	(0.005)	(0.002)
	2015	0.013***	0.023***	0.023***	0.025***	0.010***
		(0.003)	(0.005)	(0.004)	(0.005)	(0.002)
	2016	0.017***	0.033***	0.034***	0.036***	0.014***
		(0.003)	(0.008)	(0.007)	(0.008)	(0.003)
	2017	0.022***	0.035***	0.037***	0.037***	0.015***
		(0.003)	(0.007)	(0.006)	(0.007)	(0.003)
	2018	0.027***	0.045***	0.047***	0.048***	0.019***
		(0.004)	(0.008)	(0.008)	(0.009)	(0.003)
	2019	0.029***	0.045***	0.049***	0.049***	0.019***
		(0.005)	(0.009)	(0.009)	(0.010)	(0.004)

Notes: See notes of Table A2 for details. *** p<0.01, ** p<0.05, * p<0.1.

Table A3: Effect of immigration on employment and wages, full results (continued)

			IV			
		OLS	Main	Main excl. border regions	Alternative controls	Both genders
		(1)	(2)	(3)	(4)	(5)
Δ Log mean wage	2005	–0.002	–0.006	–0.011*	–0.010	–0.003
		(0.004)	(0.008)	(0.006)	(0.007)	(0.003)
	2006	–0.006	–0.010	–0.013**	–0.012*	–0.004
		(0.004)	(0.007)	(0.006)	(0.007)	(0.003)
	2007	–0.001	–0.005	–0.011*	–0.009	–0.003
		(0.004)	(0.006)	(0.005)	(0.006)	(0.003)
	2008	–0.000	–0.003	–0.006	–0.006	–0.001
		(0.003)	(0.006)	(0.005)	(0.005)	(0.002)
	2010	–0.003	–0.007	–0.005	–0.011	–0.003
		(0.004)	(0.008)	(0.007)	(0.007)	(0.003)
	2011	–0.007	–0.003	–0.002	–0.005	–0.002
		(0.005)	(0.009)	(0.008)	(0.009)	(0.004)
	2012	–0.003	0.004	0.002	0.001	0.001
		(0.005)	(0.010)	(0.009)	(0.009)	(0.004)
	2013	–0.011*	–0.024**	–0.022**	–0.027***	–0.010**
		(0.006)	(0.011)	(0.009)	(0.010)	(0.004)
	2014	–0.009	–0.025**	–0.023**	–0.032***	–0.011**
		(0.006)	(0.011)	(0.010)	(0.011)	(0.005)
	2015	–0.011*	–0.021*	–0.023**	–0.027**	–0.009*
		(0.006)	(0.012)	(0.011)	(0.011)	(0.005)
	2016	–0.011*	–0.020	–0.025**	–0.026**	–0.009*
		(0.007)	(0.012)	(0.011)	(0.012)	(0.005)
	2017	–0.016**	–0.033**	–0.038***	–0.039***	–0.014**
		(0.007)	(0.014)	(0.013)	(0.014)	(0.006)
	2018	–0.019***	–0.024*	–0.031***	–0.030***	–0.010**
		(0.006)	(0.012)	(0.011)	(0.011)	(0.005)
	2019	–0.019***	–0.031**	–0.035***	–0.037***	–0.013**
		(0.007)	(0.015)	(0.013)	(0.014)	(0.006)
Δ Log mean wage, incumbents	2005	–0.002	–0.006	–0.011*	–0.010	–0.003
		(0.004)	(0.008)	(0.006)	(0.007)	(0.003)
	2006	–0.006	–0.010	–0.013**	–0.012*	–0.004
		(0.004)	(0.007)	(0.006)	(0.007)	(0.003)
	2007	–0.001	–0.005	–0.011*	–0.009	–0.003
		(0.004)	(0.006)	(0.005)	(0.006)	(0.003)
	2008	–0.000	–0.003	–0.006	–0.006	–0.001
		(0.003)	(0.006)	(0.005)	(0.005)	(0.002)
	2010	–0.005	–0.009	–0.008	–0.011*	–0.004
		(0.004)	(0.006)	(0.005)	(0.006)	(0.002)
	2011	–0.002	–0.006	–0.002	–0.001	–0.002
		(0.004)	(0.009)	(0.008)	(0.007)	(0.004)
	2012	–0.003	–0.007	–0.004	–0.005	–0.003
		(0.004)	(0.009)	(0.008)	(0.008)	(0.004)
	2013	–0.004	–0.007	–0.003	–0.005	–0.003
		(0.005)	(0.009)	(0.008)	(0.008)	(0.004)
	2014	–0.000	0.001	0.006	0.001	0.001
		(0.006)	(0.010)	(0.009)	(0.010)	(0.004)
	2015	–0.001	0.003	0.006	0.002	0.001
		(0.006)	(0.011)	(0.010)	(0.011)	(0.005)
	2016	–0.004	0.005	0.007	0.006	0.002
		(0.006)	(0.012)	(0.010)	(0.011)	(0.005)
	2017	–0.011*	–0.004	–0.004	–0.003	–0.002
		(0.006)	(0.012)	(0.011)	(0.011)	(0.005)
	2018	–0.011*	–0.003	–0.006	–0.004	–0.001
		(0.006)	(0.012)	(0.011)	(0.011)	(0.005)
	2019	–0.014**	–0.003	–0.008	–0.004	–0.001
		(0.007)	(0.013)	(0.012)	(0.013)	(0.006)

Notes: See notes of Table A2 for details. *** p<0.01, ** p<0.05, * p<0.1.

Table A4: Effect of immigration on the workforce composition in nursing homes, full results

			IV			
		OLS	Main	Main excl. border regions	Alternative controls	Both genders
		(1)	(2)	(3)	(4)	(5)
Δ Log average LM experience	2005	0.015***	0.002	0.014*	0.005	0.001
		(0.005)	(0.008)	(0.008)	(0.007)	(0.003)
	2006	0.007*	–0.009	–0.000	–0.002	–0.003
		(0.004)	(0.007)	(0.007)	(0.006)	(0.003)
	2007	0.003	–0.008	–0.002	–0.005	–0.003
		(0.004)	(0.006)	(0.005)	(0.005)	(0.002)
	2008	–0.002	–0.004	–0.000	–0.003	–0.002
		(0.003)	(0.004)	(0.004)	(0.004)	(0.002)
	2010	0.001	–0.003	–0.002	–0.004	–0.001
		(0.004)	(0.007)	(0.006)	(0.006)	(0.003)
	2011	–0.009*	–0.016**	–0.019**	–0.017**	–0.007**
		(0.005)	(0.008)	(0.008)	(0.008)	(0.003)
	2012	–0.004	–0.005	–0.012	–0.007	–0.002
		(0.005)	(0.009)	(0.009)	(0.009)	(0.004)
	2013	–0.015**	–0.029**	–0.037***	–0.031***	–0.013***
		(0.006)	(0.012)	(0.011)	(0.011)	(0.005)
	2014	–0.021***	–0.043***	–0.057***	–0.048***	–0.019***
		(0.006)	(0.014)	(0.014)	(0.014)	(0.006)
	2015	–0.026***	–0.041***	–0.060***	–0.046***	–0.018***
		(0.007)	(0.014)	(0.014)	(0.014)	(0.006)
	2016	–0.028***	–0.046***	–0.068***	–0.054***	–0.020***
		(0.008)	(0.016)	(0.016)	(0.016)	(0.006)
	2017	–0.031***	–0.054***	–0.077***	–0.063***	–0.024***
		(0.008)	(0.018)	(0.018)	(0.018)	(0.007)
	2018	–0.037***	–0.050***	–0.075***	–0.060***	–0.022***
		(0.008)	(0.016)	(0.016)	(0.016)	(0.007)
	2019	–0.042***	–0.054***	–0.079***	–0.066***	–0.024***
		(0.009)	(0.020)	(0.019)	(0.019)	(0.008)
Δ Log mean age	2005	0.002	0.001	–0.000	–0.001	0.000
		(0.002)	(0.004)	(0.004)	(0.004)	(0.002)
	2006	–0.001	–0.003	–0.004	–0.002	–0.001
		(0.002)	(0.004)	(0.003)	(0.004)	(0.002)
	2007	–0.001	–0.003	–0.003	–0.002	–0.001
		(0.002)	(0.003)	(0.003)	(0.003)	(0.001)
	2008	–0.002	–0.002	–0.001	–0.002	–0.001
		(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
	2010	0.000	–0.003	–0.000	–0.004	–0.001
		(0.002)	(0.004)	(0.003)	(0.003)	(0.002)
	2011	–0.005**	–0.012**	–0.010**	–0.010**	–0.005***
		(0.002)	(0.005)	(0.005)	(0.004)	(0.002)
	2012	–0.001	–0.001	–0.001	0.000	–0.001
		(0.003)	(0.005)	(0.005)	(0.004)	(0.002)
	2013	–0.005*	–0.013**	–0.011**	–0.010*	–0.005**
		(0.003)	(0.005)	(0.005)	(0.005)	(0.002)
	2014	–0.008***	–0.020***	–0.020***	–0.019***	–0.008***
		(0.003)	(0.006)	(0.006)	(0.006)	(0.003)
	2015	–0.009***	–0.018**	–0.020***	–0.016**	–0.008***
		(0.003)	(0.007)	(0.007)	(0.007)	(0.003)
	2016	–0.009***	–0.018***	–0.020***	–0.018***	–0.008***
		(0.003)	(0.007)	(0.006)	(0.007)	(0.003)
	2017	–0.008**	–0.019**	–0.021***	–0.020**	–0.008**
		(0.003)	(0.008)	(0.007)	(0.008)	(0.003)
	2018	–0.008**	–0.013**	–0.014***	–0.013**	–0.006**
		(0.003)	(0.006)	(0.005)	(0.006)	(0.002)
	2019	–0.010***	–0.016**	–0.015**	–0.016**	–0.007**
		(0.003)	(0.008)	(0.007)	(0.008)	(0.003)

Notes: See notes of Table A2 for details. *** p<0.01, ** p<0.05, * p<0.1.

Table A5: Effect of immigration on nursing home quality

		IV				
	OLS	Main	Main excl. border regions	Alternative controls	Both genders	Different cutoff
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Difference waves 1-2						
Total	0.003	0.003	0.005	0.001	0.001	
	(0.006)	(0.011)	(0.011)	(0.010)	(0.005)	
Medical & Nursing Care	0.001	–0.003	–0.001	–0.011	–0.002	
	(0.009)	(0.018)	(0.017)	(0.015)	(0.007)	
Nutrition & Hydration	–0.007	–0.011	–0.015	–0.012	–0.005	
	(0.006)	(0.011)	(0.011)	(0.010)	(0.005)	
Organization & Quality Assurance	–0.000	0.000	0.001	–0.002	–0.000	
	(0.009)	(0.019)	(0.019)	(0.017)	(0.008)	
Resident Satisfaction & Autonomy	0.015***	0.021**	0.026**	0.024***	0.009**	
	(0.006)	(0.010)	(0.010)	(0.009)	(0.004)	
Social Support & Quality of Life	–0.004	0.004	0.010	0.002	0.001	
	(0.005)	(0.015)	(0.015)	(0.013)	(0.006)	
Panel B: Difference waves 1-3						
Total	0.010	0.001	0.004	–0.001	0.000	–0.002
	(0.007)	(0.012)	(0.012)	(0.010)	(0.005)	(0.012)
Medical & Nursing Care	0.013	–0.011	–0.006	–0.017	–0.006	–0.016
	(0.011)	(0.018)	(0.019)	(0.016)	(0.008)	(0.019)
Nutrition & Hydration	0.001	–0.001	–0.009	–0.006	–0.001	–0.008
	(0.008)	(0.015)	(0.013)	(0.013)	(0.006)	(0.015)
Organization & Quality Assurance	0.006	–0.007	–0.005	–0.011	–0.004	–0.009
	(0.011)	(0.018)	(0.017)	(0.015)	(0.007)	(0.018)
Resident Satisfaction & Autonomy	0.017**	0.021*	0.028**	0.024**	0.009*	0.021*
	(0.007)	(0.011)	(0.011)	(0.010)	(0.005)	(0.011)
Social Support & Quality of Life	–0.004	–0.007	0.001	–0.006	–0.003	–0.007
	(0.005)	(0.012)	(0.012)	(0.010)	(0.005)	(0.012)

Notes: The table reports estimates of a modified Eq. (1) (see footnote 33) under various specifications. Column (1) presents OLS results with baseline controls. Column (2) shows second-stage IV results with the same controls (also shown in Figure 4). Column (3) excludes regions on the German border with Poland and the Czech Republic. Column (4) uses an alternative control set: fertility rate and ratio of facilities to elderly above 75. Column (5) builds the treatment and the instrument using both genders. In Columns (1)–(5), we treat a grade of 1.0 in waves 1 and 2 as equivalent to the criterion being satisfied for 100% of residents in wave 3. In Column (6), we lower this threshold to at least 85%. Based on a balanced panel of 369 regions, except for column (3), which uses 347 regions. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A6: Effect of immigration on outcomes related to availability and use of care, full results

	Δ Log number facilities		Δ Log places available		Δ Log NH residents		Δ Log outpatient care recipients		Δ Log informal care recipients	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2005	–0.008	–0.033	–0.013	–0.031	–0.003	–0.019	0.033**	0.050*	0.010	0.001
	(0.018)	(0.040)	(0.020)	(0.047)	(0.021)	(0.049)	(0.016)	(0.028)	(0.007)	(0.013)
2007	–0.007	–0.042	–0.015	–0.059	–0.009	–0.049	0.012	0.015	0.002	0.005
	(0.015)	(0.032)	(0.018)	(0.039)	(0.019)	(0.040)	(0.010)	(0.019)	(0.005)	(0.008)
2011	–0.032**	–0.047*	–0.026*	–0.050	–0.030**	–0.057*	–0.018	–0.006	0.005	0.011
	(0.013)	(0.028)	(0.013)	(0.034)	(0.013)	(0.032)	(0.011)	(0.027)	(0.005)	(0.009)
2013	–0.001	–0.016	0.011	–0.006	0.000	–0.017	–0.017	0.004	0.016*	0.033**
	(0.016)	(0.031)	(0.020)	(0.043)	(0.018)	(0.043)	(0.013)	(0.028)	(0.008)	(0.015)
2015	0.017	–0.010	0.032	–0.014	0.022	–0.016	–0.022	–0.013	0.027**	0.044**
	(0.017)	(0.043)	(0.021)	(0.051)	(0.020)	(0.051)	(0.015)	(0.033)	(0.011)	(0.020)
2017	–0.001	–0.062	0.015	–0.069	0.018	–0.068	–0.029*	–0.019	0.026*	0.024
	(0.018)	(0.039)	(0.021)	(0.047)	(0.021)	(0.047)	(0.016)	(0.033)	(0.014)	(0.025)
2019	–0.008	–0.062	0.011	–0.065	0.011	–0.063	–0.032*	–0.001	0.036**	0.030
	(0.022)	(0.047)	(0.027)	(0.055)	(0.026)	(0.057)	(0.018)	(0.033)	(0.016)	(0.028)

Notes: The table reports estimates of Equation (1). Column (1) presents OLS results with baseline controls. Column (2) shows second-stage IV results with the same controls, where the immigration treatment is instrumented with a shift-share instrument depicted in equation (2). Regressions are based on 377 regions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

B Harmonizing Care Prices Over Time

The classification of care levels/degrees changed between 2015 and 2017, shifting from three care levels to five care grades (Table B7). As a result, detailed care prices are not directly comparable over the full period. To address this, we use two approaches. First, we collapse the level-specific prices into a single aggregate measure, the *care-weighted price*. Second, we construct a harmonized series of prices by care level using an imputation method. Both procedures are described below.

Table B7: Mapping from Care Levels to Care Grades

Care Level until 2015	Care Grade from 2017
Not yet assigned	1
Care Level 0 Care Level 1	2
Care Level 1 with high impairment Care Level 2	3
Care Level 2 with high impairment Care Level 3	4
Care Level 3 with high impairment Care Level 3 Hardship	5

Construction of the care-weighted price

We first calculate, for each care level and year, the total number of residents at the national level. From these counts, we derive the within-year resident shares by care level, resulting in three shares until 2015 and five shares from 2017 onward. Using these shares as weights, we then compute a weighted average of the level-specific prices. The resulting aggregate measure, which we refer to as the *care-weighted price*, provides a single, time-consistent price series.

Price imputation procedure

We assume that the prices in the new classification are weighted averages of the prices under the old system (according to the diagram), where the weights are relative proportions of the care groups:

$$
\begin{aligned}
p_{5,2} &= \alpha_5 p_{3,1} + (1-\alpha_5) p_{3H,1} \\
p_{4,2} &= \alpha_4 p_{2,1} + (1-\alpha_4) p_{3,1} \\
p_{3,2} &= \alpha_3 p_{1,1} + (1-\alpha_3) p_{2,1} \\
p_{2,2} &= \alpha_2 p_{1,1} + (1-\alpha_2) p_{0,1}
\end{aligned}
$$

Note that we do not use the new price of grade 1 care ($p_{1,2}$) in our imputation procedure. High impairment does not entail any additional payment. Furthermore, $p_{0,1}$ and $p_{3H,1}$ are not observed in our data. We assume that α_5 = 1, which is close to the empirical alpha of over 0.9. For the years 2017-2019, we then impute prices at the *facility* level according to the following procedure:

$$
\begin{aligned}
&\Rightarrow \hat{p}_{3,1} = p_{5,2} \\
&\Rightarrow \hat{p}_{2,1} = \frac{p_{4,2} - p_{5,2}(1-\alpha_4)}{\alpha_4} \\
&\Rightarrow \hat{p}_{1,1} = \frac{p_{3,2} - \hat{p}_{2,1}(1-\alpha_3)}{\alpha_3}
\end{aligned}
$$

if both prices are non-missing. If only one of the prices is known and the other missing - which happens when the facility does not offer a given care level - we set the imputed price equal to the known price. For years 2005-2015, no imputation is needed, so $\hat{p}_{L,1} = p_{L,1}$.

The α parameters are calculated using the counts of dependents $d_{l,0}$ and $d_{l,1}$ at the *national* level, where $d_{l,0}$ denotes dependents in care level l and $d_{l,1}$ denotes those in care level l with high impairment.[35] The dummy for high impairment is only available for years 2013 and 2015. For these years, we can therefore compute α_3 and α_4 directly.

$$
\begin{aligned}
\alpha_3 &= \frac{d_{1,1}}{d_{1,1} + d_{2,0}} \\
\alpha_4 &= \frac{d_{2,1}}{d_{2,1} + d_{3,0}}
\end{aligned}
$$

For 2017 and 2019, we assume that α_3 and α_4 follow a linear trend between 2013 and 2015 and extend this trend forward. Concretely, we (1) compute α_3 and α_4 in 2013 and 2015, (2) derive their biannual change over this interval, and (3) use this change to extrapolate the

[35] This way, we allow the regional variation in imputed prices to be driven by changes in the underlying prices, rather than by changes in the composition of dependents on the regional level.

values for 2017 and 2019. In practice, the 2017 values equal the 2015 levels plus one biannual increment, while the 2019 values add two increments.

C Quality reports data

To evaluate the impact of immigration on the quality of care in nursing homes, we rely on quality report data for checks performed between 2009 and 2016. Nursing homes are controlled – in a regular and unexpected way – since 2009, with the results of these checks accessible online in a form of grades to a set of over seventy questions. As historical scores are not readily available, we rely on two sources to build a panel of scores: first, data collected by Herr et al. (2016) for years 2009-2013 (henceforth HNR), as well as data shared by one of Germany's largest health insurers AOK through the online care-home comparison tool Correctiv (henceforth AOK), for years 2014-2016. Due to questionnaire reform starting in 2014, the two data sources feature a somewhat different questionnaire as well as scores system. The below gives details of the sample selection and harmonization of the two sources.

Sample definition

HNR restricts their dataset to fully-inpatient homes with at least 10 residents that require general care, i.e. excluding facilities specialized in particular conditions, such as dementia, or strokes. We perform the same sample restrictions in the AOK data to make it comparable over time. We label reports between 2009-03-02 and 2011-04-28 as wave 1; wave 2 encompasses reports between 2011-05-02 and 2013-03-11; wave 3 contains reports between 2014-02-05 and 2016-03-21. In wave 3, if two or more exams have been performed over the period of data collection, to avoid multiple-counting of facilities, we take the last observed examination and drop the rest.

Assigning facilities to regions

In line with the baseline analysis, we build a regional-level panel dataset. The data from HNR readily contains the information on the region in which a facility is located. For the AOK data, we assign the region according to i) latitude and longitude coordinates of the supplied facility address, using the open-source geo-locator Nominatim, ii) assigning region to a post-code – if facility cannot be geo-located in step i), iii) manual assignment into regions if previous steps do not yield a unique NUTS-3 region.

Harmonizing and categorizing questions

Until 2014, the questionnaire contained 82 questions, while there were 77 questions in years 2014-2016. 34 questions are found phrased exactly the same in both questionnaires. Another

40 questions are matched manually and rely on a slight sentence rephrasing.[36] Unmatched questions are discarded. Following this procedure leaves us with 74 questions.

To make the results more tractable, in the next step, we categorize these questions into 5 broad categories. We rely on ChatGPT 4o to perform the categorization. The category definitions, together with examples, are depicted in Table C1.

Table C1: Categories of quality assessment

Category	Description	Example Questions
Medical & Nursing Care	Covers clinical processes including risk management, medication, wound care, fall prevention, and dementia-specific treatment planning.	Is the implementation of treatment and nursing measures in line with medical instructions? Is the provision of medication in line with the doctor's orders? Is active communication with the physician comprehensible if needed?
Nutrition & Hydration	Focuses on assessment and support for nutrition and fluid intake, dietary preferences, meal presentation, and related care routines.	Are individual nutritional resources and risks recorded? Are the necessary measures taken when there are restrictions on independent fluid intake? Are the meals and drinks presented in a way that considers residents' abilities?
Organization & Quality Assurance	Includes facility-level processes like documentation, staff training, room layout, cleanliness, and use of orientation aids.	Are the employees regularly trained in first aid and emergency measures? Are rooms and furnishings clean and appropriately designed? Does the care facility have a complaints management system?
Resident Satisfaction & Autonomy	Covers resident feedback, personal preferences, privacy, hygiene, dignity, and self-determination in daily routines.	Is it possible for residents to design their daily routines individually? Is privacy respected in intimate care situations? Can residents express their wishes and have them taken into account?
Social Support & Quality of Life	Involves social integration, family/community engagement, onboarding, group/individual activities, and emotional support.	Are suitable group activities offered as part of social care? Are relatives or persons of trust adequately involved in care? Are there activities to maintain contact with the local community?

[36] An example match is as follows: "Sind Ort und Zeitpunkt der Entstehung der chronischen Wunde/des Dekubitus *dokumentiert*?" is matched with "Sind Ort und Zeitpunkt der Entstehung der chronischen Wunde/des Dekubitus *nachvollziehbar*?" (Are the location and time of the chronic wound/pressure ulcer *documented* versus *traced*?).

Outcomes

Until 2014, only final grades (for each question) are available. These grades are based on the German schooling grade system, where 1.0 is the best possible grade, and 5.0 is the worst. After 2014, rather than the final grades, reports include the number of nursing home residents for which a given criterion was satisfied or otherwise. We follow HNR and construct a regional-level proportion of facilities that get a perfect score (2009-2013: grade of 1.0; 2014-2016: 100% of those surveyed fulfilled the criterion). We use this proportion as the outcome in a first-difference model, where the difference is taken over both a shorter time horizon (between waves 1 and 2) and a longer time horizon (between waves 1 and 3) .