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

Peter Haan, Julia Schmieder, Izabela Wnuk-Soares

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Abstract

We study how immigration affects prices through changes in labor supply. Using policy-driven increases in immigration to Germany and administrative data covering the universe of nursing homes, we find that one additional foreign-born woman per 100 residents reduces nursing-home care prices by 2.6 percent. The price effects are concentrated in more competitive markets. Examining potential mechanisms, we find that immigration lowers labor costs as nursing homes shift toward lower-paid foreign-born workers. We find no evidence of declines in inspection-based measures of quality or of scale effects. Finally, immigration increases the use of informal care, potentially strengthening competitive pressure from the broader care market.

Keywords: Immigration, labor supply, prices, nursing homes
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*Peter Haan: DIW Berlin, Freie Universität Berlin, Berlin School of Economics; e-mail: phaan@diw.de. Julia Schmieder: Otto von Guericke University Magdeburg, RFBerlin; e-mail: julia.schmieder@ovgu.de. Izabela Wnuk-Soares: RFBerlin, DIW Berlin; e-mail: iws@rfberlin.com.
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1 Introduction

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). Yet, these inflows may also affect the prices of goods and services, which directly shape the cost of consumption and, hence, real income. Such price responses may be particularly pronounced in non-tradable, labor-intensive services that rely heavily on immigrant workers.

Immigration may affect prices through two channels. It may influence production through a change in labor supply, and in sufficiently competitive markets, such changes should translate into price adjustments. At the same time, immigrants consume goods and services, potentially affecting prices through changes in local demand. Disentangling these two responses is empirically challenging. Credible evidence on the effect of immigration on prices through the supply side therefore requires exogenous variation in immigration, detailed price data, and, crucially, a setting in which supply-driven effects can be separated from demand-side changes (Galaasen et al., 2025).

In this paper, we quantify the effect of immigration on prices in the nursing home sector, exploiting a period of policy-driven inflows to Germany. A unique feature of our setting is that the arriving immigrants are overwhelmingly of working age and therefore generate essentially no direct demand for nursing home care. This allows us to isolate the supply-side channel through which immigration affects prices. The setting is suitable for our analysis for at least two other reasons. First, nursing home care is non-tradable and highly labor-intensive. Second, its importance is growing as population aging increases private and public expenditure on long-term care across advanced economies.

Our analysis combines high-quality administrative data on facility-level prices and standardized quality inspections with employment and earnings records covering the universe of nursing homes. For identification, 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, which we exploit in a research design 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 con-

cerns 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).

Nursing homes in Germany operate in a market environment that shares key features with other industries exposed to immigration. As mentioned, the sector is labor-intensive and non-tradable, making production costs highly responsive to changes in the local workforce (Burstein et al., 2020; Dustmann and Glitz, 2015). Entry into the market is unrestricted. The care providers are predominantly private for-profit or non-profit organizations, with the public sector accounting for only a small share.[1] Despite formalized price negotiations, providers retain considerable discretion in setting prices, resulting in substantial price variation within and across regions. As a consequence, competition plays an important role in shaping prices, and its intensity varies across market segments and regions. We exploit this variation to examine how competition shapes the price response to immigration.

The central finding of our paper is that immigration significantly reduces care prices. By 2019, an additional foreign-born woman per 100 inhabitants in 2019 (relative to 2009) reduces the price of care services by 2.6%.[2] The price effects decrease with care intensity, consistent with stronger competition in lower-care segments (Kesternich et al., 2025). The price of low-intensity care services decreases by 4.5% and that of medium-intensity care by 3.3%, while the effect for high-intensity care is not significant. In addition, we show that price effects are larger in initially less concentrated markets, as measured by the pre-reform Herfindahl–Hirschman Index of resident shares across facilities. Our results are robust across alternative regional samples, sets of control variables, and treatment definitions.

To interpret these findings, we develop a conceptual framework that distinguishes two channels through which immigration may affect nursing home prices. First, immigration may change nursing homes' production costs. Second, it may alter the broader market for long-term care by changing households' access to alternatives to residential care. Market competition shapes both channels: it determines the extent to which lower production costs are passed through into prices and may amplify the price pressure generated by improved alternatives to nursing home care.

Within the production-cost channel, we first examine labor costs, which account for a large share of nursing home expenditures. Using administrative employment and earnings records for the universe of nursing home workers, we show that immigration does

[1] In 2019, 3,949 institutions were for-profit, 4,641 were non-profit, and 455 were public (Federal Statistical Office, 2025a). Average profit margins are approximately 7.3% (IBISWorld, 2025).

[2] We focus on female immigration as our main treatment because more than 80% of care workers are women. Results are robust to using overall immigration as the treatment.

not affect the total sectoral employment, measured in full-time equivalents. However, it substantially changes the composition of the workforce: by 2019, an increase of one foreign-born woman per 100 inhabitants relative to 2009 reduces total native employment by up to 11.7% and raises the average share of foreign workers by 4.9 percentage points. Over the same period, it also reduces the average nursing home wage by 3.7%. The decline in average wages reflects compositional changes toward a higher share of foreign workers, who, on average, earn lower wages than natives due to occupational sorting into lower-paid assistant positions and lower accumulated experience in Germany.

We next consider quality provision and facility scale as additional margins within the production-cost channel. Using data from about 25,000 unannounced inspections, we find no relationship between immigration and an overall measure of quality provision or its main components. Immigration also affects neither capacity nor occupancy and has no effect on provider entry or exit. These results provide no evidence that lower prices reflect reductions in measured quality provision or cost savings from changes in facility scale.

Finally, we turn to the broader care-market channel by testing whether immigration affects demand for nursing home care through increased availability of home-based alternatives (Almuhaisen et al., 2024; Butcher et al., 2022). While we find no effect of immigration on the stock of individuals receiving care from professional caregivers in an ambulatory setting, we observe an increase in the take-up of informal care by up to 3.9% in 2015. Since informal care is predominantly used for individuals with the lowest care requirements, the estimated 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 contributes to at least two strands of literature. We quantify how immigration affects nursing home care prices, and thereby we provide the first causal estimate of a price effect of immigration that isolates the supply-side channel. Understanding the determinants of nursing home prices is increasingly important as population aging drives rapid growth in long-term care spending.[3] Empirical evidence on the effect of immigration on prices more broadly remains scarce (see Cortés, 2023, for a review). Most notably, 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 hairdress-

[3]Long-term care spending has risen to around 2.1% of GDP on average across developed countries, increasing by roughly 60% as a share of GDP between 2000 and 2019 (Gruber et al., 2025)

ing and dry cleaning.[4] In these settings, however, the arriving immigrants also consume the goods and services in question, making it difficult to isolate how immigration affects prices through the supply side.

Our focus on the nursing home sector allows us to overcome this challenge. The arriving immigrants are overwhelmingly of working age and therefore do not consume nursing care services, allowing us to identify the supply-side price effect. In 2009, 99.0% of the foreign-born EU-11 population in Germany was younger than seventy-five, an age at which care dependency generally becomes more common. By contrast, about one in ten natives had already reached that age. While the labor market opening substantially increased the number of working-age foreign-born from EU-11 countries, elderly immigrants continued to represent less than 1% of the immigrant population by 2019.[5] More broadly, few studies isolate the demand and supply channels of immigration: Galaasen et al. (2025) disentangle the roles of demand and supply exposures in the effects of immigration on native labor market outcomes, while Dustmann et al. (2017) study the effect of immigration on native wages induced by a labor supply shock in a context where demand-side effects are constrained. In addition, we provide the first evidence on how market structure shapes the price response to immigration, showing that price effects are concentrated in more competitive market segments.[6]

We also contribute to the broader literature on how changes in wages and labor inputs affect consumer prices and the quality of goods and services. A growing body of research examines this question in the context of minimum wage policies across various sectors, documenting that increases in minimum wages translate into higher prices in restaurants (Aaronson, 2001; Aaronson et al., 2008), retail (Leung, 2021; Renkin et al., 2022), and the manufacturing sector (Harasztosi and Lindner, 2019), as well as into improvements in the quality of child care (Brown and Herbst, 2023) and nursing home care (Ruffini, 2024). We instead study immigration-driven changes in the supply and composition of labor inputs. A related literature studies the effect of immigration on healthcare quality (Castro-Pires et al., 2025; Dodini et al., 2025; Furtado and Ortega, 2026; Grabowski et al., 2026a,

[4]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.

[5]Own calculation based on Statistisches Bundesamt (2025).

[6]We also advance the literature on immigration and prices methodologically. Our administrative data allow precise estimation at a fine geographic level, unlike earlier studies based on CPI indices from small regional samples. We exploit the sharp EU-11 labor market opening in a generalized difference-in-differences design, which permits pre-trend tests and estimation of dynamic effects, strengthening the credibility of our estimates relative to earlier cross-sectional shift-share designs.

b).[7] In contrast to these studies, our setting allows us to *jointly* identify the effects of immigration on prices, inspection-based quality provision, and key production-cost margins. We show that immigration shifts workforce composition toward lower-paid foreign workers, reduces average wages, and lowers prices without detectable declines in quality provision—a pattern consistent with cost pass-through in a labor-intensive service sector.

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 develops the conceptual framework. Section 4 describes the data sources and presents descriptive evidence. Section 5 details the empirical strategy. Sections 6 and 7 present the baseline results and discuss potential mechanisms. Section 8 concludes.

2 Institutional setting

This section provides the relevant institutional background for our analysis. We begin by describing the key features of the nursing home market in Germany, with additional details provided in Appendix A. 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

The German nursing home sector is characterized by regulated but flexible price setting, a labor market shaped by wage-setting institutions and occupational licensing, and competition both within the sector and from alternative forms of care. Entry into the nursing home market is not restricted. The market is dominated by privately owned providers, while publicly owned facilities account for only a small share. Facilities must meet certain building standards and comply with qualification and staffing requirements, but are otherwise free to operate.

Each nursing home negotiates the overall price for its care services with state-level long-term care (LTC) insurance funds and, in some cases, with local social assistance authorities. These agreements are legally binding and are renewed annually. Negotiations are based on *expected* costs, which providers are required to disclose, and include com-

[7] See also Butcher et al. (2022) and Almuhaisen et al. (2024) on the relationship between immigration and elderly institutionalization.

pensation for entrepreneurial risk (see, e.g., Grant et al., 2021; Heger et al., 2025; Schmitz and Stroka, 2014). Labor is the largest cost component, accounting for approximately 70–80% of total expenditures (Haun, 2020). Negotiated prices also take into account the rates of comparable providers. Despite the formalized process, nursing homes retain considerable flexibility in negotiated prices, resulting in substantial variation in care prices both within and across regions. In 2009, the median daily price was €53.76, while the 10th and 90th percentiles were €43.84 and €64.72, respectively.[8]

During our study period, wages for care workers in German nursing homes were determined by a combination of collective agreements, statutory minimum wages, and employer discretion. Facilities covered by collective agreements set wages according to predefined pay groups and experience, while other facilities had greater discretion subject to the sector-specific minimum wage, introduced in 2010. Pay levels vary by occupation. Nursing is a licensed occupation requiring a recognized professional qualification, whereas nursing assistants and aides (hereafter "assistants") do not face the same licensing requirements and receive lower wages than registered nurses. The process for recognizing qualifications obtained abroad is complex and costly. Foreign-trained nurses whose qualifications are not recognized in Germany may therefore work in lower-paid assistant positions.

Care-dependent individuals are free to choose among nursing homes, with an average of about 20 facilities providing residential care within a district. For their choice, they can access detailed information about *all* nursing homes via official online portals, including prices and evaluation results from unannounced checks. Following an assessment of care needs, individuals are assigned a care level that determines a fixed monthly benefit. This benefit is independent of the nursing home's (negotiated) price and residents pay the remaining difference out of pocket. In addition to the price of care, residents pay separately for accommodation and meals, as well as investment costs and any optional supplementary services.

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 at home, expenses are fully covered by LTC insurance. 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 (Geyer et al., 2025; Heinicke and Thomsen, 2013; Kesternich et al., 2025). These alternative arrangements represent potential substitutes for residen-

[8]Descriptive statistics rely on prices constructed by weighting facility-level average daily prices by the national distribution of care recipients across care levels; see Section 4 for details of the weighting.

tial nursing home care and are quantitatively important: in 2009, around two-thirds of care-dependent individuals received care at home.

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.[9] 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, the 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.[10] 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 be self-employed—and to take up employment through cross-border posting in unrestricted sectors in Germany.[11] In contrast, to take up dependent employment, nationals from the new member states were still required to obtain a work permit.[12] From the date of *labor market liberalization*, nationals from the new EU member 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 (European Union, 2008). Care workers were generally not exempt from transitional restrictions on dependent employment, which motivates treating the period prior to 2011 as pre-reform in our analysis.

[9]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).

[10]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.

[11]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; see Deutscher Bundestag, Wissenschaftliche Dienste (2020).

[12]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).

3 Conceptual framework

This section develops a conceptual framework that links immigration, labor market adjustments, prices, quality, and other margins in the German nursing home sector. We abstract from demand effects arising from immigrants' own consumption of care services, which are negligible in our setting because the inflow consists overwhelmingly of working-age individuals (see Figure B3), and focus exclusively on supply-side channels.

A key feature of the framework is the distinction between a narrow nursing home *production-cost* channel, operating through nursing home inputs and input prices, and a broader *care-market* channel, operating through the supply of alternative care arrangements.

3.1 Price formation and the two supply-side channels

As described in Section 2.1, nursing home prices are not determined through a standard competitive-market equilibrium but through a regulated negotiation process. However, this institutional setting does not eliminate competitive forces: providers compete with other nursing homes and alternative forms of care, retain discretion over their operations and negotiated prices, and respond to cost and market conditions. Price formation is therefore best understood as regulated bargaining embedded in a competitive market environment. Below, we discuss how the competitive structure affects prices.

Let P_{ir} denote the daily price of care charged by nursing home i in region r:

$$\ln P_{ir} = \phi(\ln c_{ir}, \Omega_{ir}), \tag{1}$$

where c_{ir} denotes the *expected* production cost per resident-day, and Ω_{ir} captures institutional and market-specific factors affecting the price-setting process, such as regulatory constraints and competitive conditions. Since prices are based on expected costs (see Section 2), the timing of price adjustments need not coincide with changes in realized costs and other observed cost-related variables. We therefore omit a time index here and return to the time dimension when discussing results (see Section 7).

The total effect of immigration exposure, denoted by M_r, on nursing home prices can be decomposed into a production-cost component and a broader care-market component:

$$\frac{d \ln P_{ir}}{dM_r} = \underbrace{\frac{\partial \ln P_{ir}}{\partial \ln c_{ir}} \frac{d \ln c_{ir}}{dM_r}}_{\text{nursing home production-cost channel}} + \underbrace{\mu_{ir}}_{\text{broader care-market channel}}, \tag{2}$$

evaluated at the prevailing institutional and market conditions Ω_{ir}. μ_{ir} denotes the marginal effect of immigration exposure on nursing home prices operating through changes in the broader market for long-term care. We discuss the mechanisms underlying each component in turn.

3.2 Nursing home production-cost channel

The expected production cost per resident-day in nursing home i can be written as:

$$c_{ir} = \mathcal{C}\left(w_{ir}, \ell_{ir}, k_{ir}, q_{ir}, Y_{ir}\right), \tag{3}$$

where w_{ir} denotes wages, ℓ_{ir} and k_{ir} denote labor and non-labor inputs per resident-day, respectively, q_{ir} denotes the quality provision, and Y_{ir} denotes the scale of production. We view quality provision as a facility choice that determines the intensity with which labor and non-labor inputs are used in producing care.

Since labor costs account for the largest share of nursing home expenditures, changes in expected labor costs represent a central channel through which immigration may affect prices. In a competitive labor market, an increase in labor supply would reduce wages and lower production costs. Because wage adjustment in the German nursing home sector—as in most other sectors—is constrained by collective bargaining agreements and statutory minimum wages, immigration may affect labor costs through both changes in wages and workforce composition. Differences in credential recognition, language requirements, and experience acquired in Germany may lead foreign-trained workers to enter lower-paid assistant positions rather than fully recognized nursing occupations. This channel motivates examining whether immigration affects employment, worker composition, and average labor costs in nursing homes.

We also examine quality provision and production scale as additional adjustment margins through which immigration may affect production costs. We do not observe non-labor inputs directly and therefore cannot assess this margin empirically.

3.3 Broader care-market channel

Immigration may also affect nursing home prices through changes in the availability of alternative care arrangements, such as privately arranged care at home (see Section 2.1). In particular, it may increase the availability of home-based care by expanding the workforce in ambulatory care and increasing the supply of caregivers employed informally in private households.

Greater availability of these alternatives improves households' outside options, potentially reducing demand for nursing home services and increasing competitive pressure on providers.[13] Unlike the production-cost channel, it operates through substitution across care arrangements and may affect prices even without changes in nursing homes' production costs. We assess this channel by estimating the effect of immigration on the take-up of residential, ambulatory, and informal care.

3.4 Role of competition in the price response

The extent to which cost changes translate into prices can be summarized by the proportional cost pass-through parameter:

$$\frac{\partial \ln P_{ir}}{\partial \ln c_{ir}} = \theta_{ir}\left(\Omega_{ir}\right). \tag{4}$$

A value of $\theta_{ir} = 1$ indicates full proportional pass-through: a one-percent reduction in expected unit costs is reflected in a one-percent reduction in prices. However, cost reductions need not be fully reflected in prices if providers retain part of the savings as profits.

The pass-through may depend on the competitive environment faced by providers (included in Ω_{ir}). Competition among nursing homes may strengthen the transmission of lower costs into negotiated prices by affecting cost projections, risk premia, and comparisons with other providers. Competition from alternative care arrangements may affect prices in two ways. It may lead to a stronger pass-through of reductions in nursing home costs at lower care levels, where informal care is a closer substitute for nursing home care; it may also reduce prices directly by improving households' outside options via immigration, even if nursing homes' own production costs do not change. Accordingly, price effects may be larger in less concentrated markets and at lower care levels. We examine both patterns empirically.[14]

[13] Although this channel may affect the demand faced by nursing homes, it is supply-side in origin because it arises from immigrants' provision rather than consumption of care services.

[14] Differences in effects across care levels may reflect differences in (i) immigration-induced cost reductions, (ii) cost pass-through, (iii) the direct broader care-market effect, or a combination of these mechanisms. We therefore do not attribute this heterogeneity exclusively to either the production-cost channel or the broader care-market channel.

4 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.

4.1 Data sources

This section outlines the data sources used to measure long-term care outcomes, labor costs, nursing home quality provision, 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 specialize in (inpatient) permanent care, given that this type of care is the most frequent one provided in nursing homes (see Section 2). We use these microdata to build the outcome variables at a modified NUTS-3 level[15], biennially for years 2005 to 2019. For each region–year group, we compute the regional aggregates as simple averages across nursing homes. The first set of outcomes relates to the remuneration of nursing homes, which includes the daily price for care services (including medical care), henceforth called the *price of care*, as well as accommodation and meals. Prices of care are reported by care level, where higher levels reflect greater care needs, ranging from level 1 (low) to level 3 (high). Due to a change in the classification of care levels in 2017, the final two values for prices (for the years 2017 and

[15]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) the construction of a balanced panel of regions. For a more detailed overview, see the map in Figure B1.

2019) have been imputed. This imputation does not affect the care-level-specific price effects *before 2017*. We construct the outcome variable *average price of care* using prices by care level, aggregating across care levels with weights based on the national distribution of residents across care groups. Importantly, this headline price outcome does not rely on the imputation *in any year*. The details of this calculation as well as the construction of the average price are provided in Appendix Section C. Finally, unlike the care prices, the price for accommodation and meals is common to all care levels.

The remaining outcomes are as follows. We measure average *capacity* using the number of available places—regardless of occupancy on the reporting date—and average *occupancy* using the stock of permanent care recipients (nursing home residents). To quantify care take-up outside of nursing homes, we construct two regional-level indicators: the number of individuals in informal care who receive cash benefits and the stock 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 administrative data from the Institute for Employment Research, which covers the universe of long-term care workers in Germany. We restrict our sample to those older than 16 and younger than 67 who 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. We identify care workers in nursing homes using occupational and industry codes.[16] For 2011 and 2012, we rely on imputed occupational codes, as information is temporarily incomplete due to the transition to a new occupational classification.[17] Therefore, results on labor market outcomes for these years should be interpreted with caution; the estimates for the remaining years are unaffected.

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 and native nursing home staffing, expressed in log full-time equivalents (FTE), as well as

[16]Specifically, care workers are defined as individuals employed in occupations coded 853, 854, and 861 in the German Classification of Occupations 1988 (KldB 1988). Nursing homes are identified using codes 871 and 873 from the Classification of Economic Activities 2008 (WZ 2008).

[17]The imputation is based on the method developed in Haan and Wnuk (2024). Missing occupational codes are filled using the first non-missing lag or lead, conditional on both observations referring to employment episodes with the same employer, first using earlier information and then later reports. For further details, see Haan and Wnuk (2024).

the average labor market experience in Germany.[18] We further measure the log average daily wage in nursing homes. All variables are measured as of June 30 in the respective year.

Variables measuring quality provision

To explore the impact of immigration on quality provision, we utilize data from regular, unannounced quality inspections conducted by official care oversight bodies between 2009 and 2016. The inspections follow standardized procedures and assess whether facilities implement a broad range of medical, organizational, and care practices. We categorize the 74 time-consistent 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 provision (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). This part of our analysis focuses on facilities with at least ten residents. Further details on dataset construction and harmonization are provided in Appendix D.

To obtain our outcome variables, for each combination of category, region, and wave, we calculate the share of facility–criterion assessments for which no deficiencies were identified during the inspection. In addition, we compute an overall region-wave measure by pooling facility–criterion assessments across all categories for wave 1 (pre-labor market opening) and waves 2 and 3 (post-labor market opening). The reporting format for the quality criteria changes over time: until 2014, criteria are reported as final grades, whereas from 2014 onward reports indicate whether each criterion was fulfilled for the residents assessed. Given this change, we define the deficiency-free outcome using the most stringent threshold available in each period—a grade of 1.0 before 2014 and 100% fulfillment after 2014—and assess the robustness of our results to alternative thresholds.

Variables measuring foreign-born inflow and control variables

We use the German Foreigner Statistics (*Ausländerstatistik*), an administrative dataset on all officially registered foreign nationals living in Germany, to observe the stock of foreign-

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

born residents aged 15–65 at the NUTS-3-year level by nationality from 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, overall and by nationality, to measure inflows of immigrants across the German regions.[19]

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 ratio, fertility rates, GDP per capita, unemployment rates, female share of the unemployed, total population, and the number of inhabitants aged 75 and older.

4.2 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, capacity and occupancy. 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.

In the main analysis, we focus on female immigration, as over 80% of care workers are women.[20] Panel (a) of Figure 1 shows the evolution of the national-level stock of foreign-born women residing in Germany relative to its 2005 level.[21] 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.

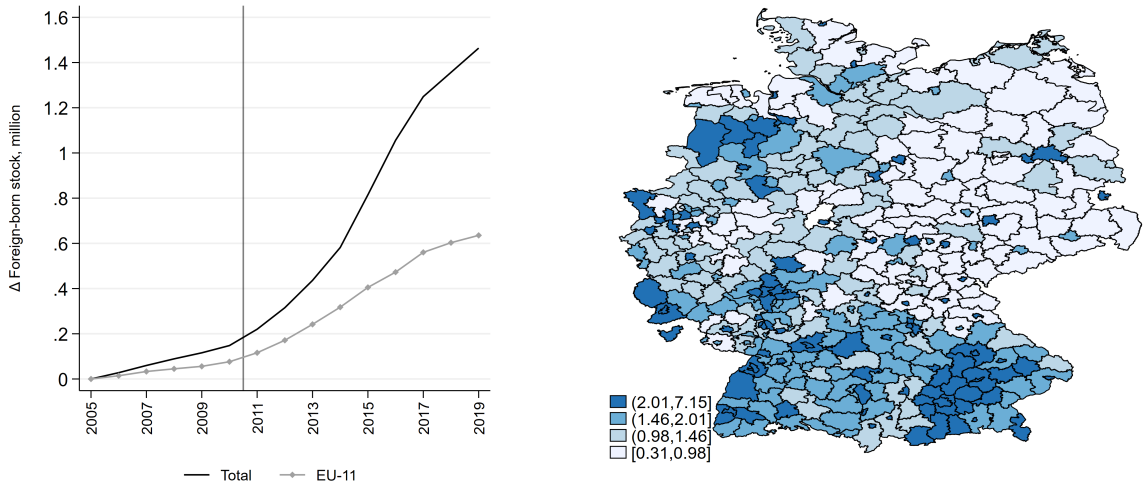
Panel (b) of Figure 1 shows changes in the regional distribution of foreign-born women across German NUTS-3 regions, focusing on the net change in their stock between 2009 and 2019. Changes are expressed per 100 inhabitants as of 2009 and grouped into quartiles. The map reveals that the southern and western regions in Germany experienced the largest relative increases in immigrant concentration over the time period studied.

[19] We use a special tabulation of the German Foreigner Statistics in which counts by nationality are further restricted to foreign nationals *born abroad*.

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

[21] In absolute terms, the stock of foreign-born women increased from 2.15 million to 3.62 million between 2005 and 2019.

Figure 1: Immigration of foreign-born women to Germany



(a) Aggregate evolution, 2005–2019

(b) Net change per 100 inhabitants, 2009–2019

Notes: Panel (a) 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. Panel (b) displays the net change in the number of foreign-born women (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 maps illustrating changes in the net stock of foreign-born women from EU-11 versus other origins, see Figure B2.

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 capacity. Table 1 reports the average values of the main outcomes of interest for four selected years.[22] First, prices increased steadily over time. Depending on the care level, care prices rose by around 5–6% in each of the two periods, 2005–2009 and 2009–2013. Between 2013 and 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 and 2009, and between 2009 and 2013, and 10.6% between 2013 and 2017. Second, the price increase may be partly related to changes in labor costs. Average wages changed little between 2005 and 2009 and increased moderately by 5.5% between 2009 and 2013. From 2013 to 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 equiv-

[22] We report descriptive statistics of nursing home quality separately in Table B2. Over time, the average regional share of facility–criterion assessments with no quality issues found increased from 70.6% to 85.7%; across categories, this share is consistently lowest for *Medical and Nursing Care* and highest for *Social Support and Quality of Life*.

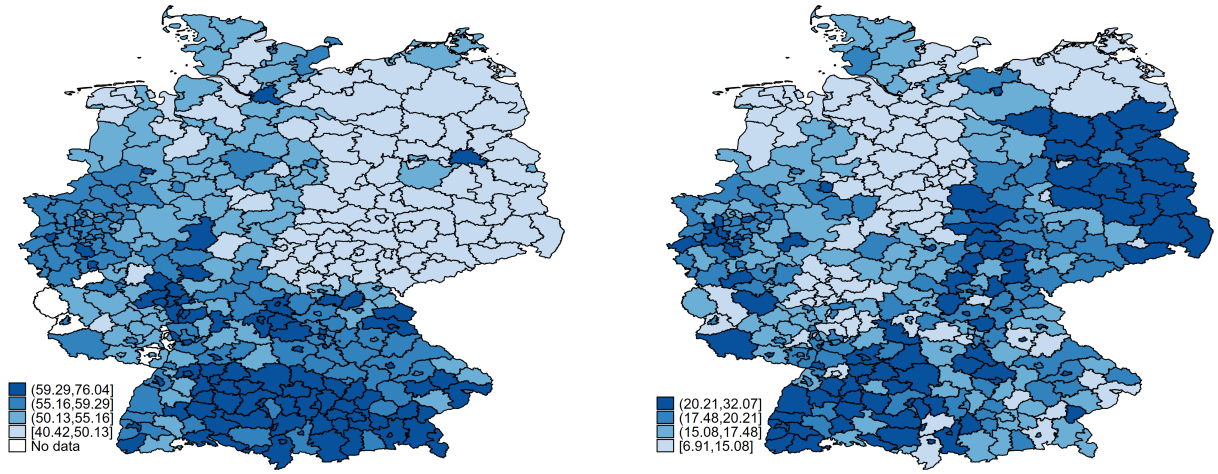
Table 1: Descriptive statistics of nursing home outcomes

Variable	2005	2009	2013	2017
Daily price in nursing homes in euros:				
Average price of care	52.41	54.57	55.93	66.21
	(5.74)	(6.16)	(5.62)	(7.09)
Price of care, care level 1 (low)	42.29	44.66	46.70	54.45
	(5.80)	(6.10)	(5.61)	(7.15)
Price of care, care level 2 (medium)	55.07	58.00	60.90	77.42
	(6.29)	(6.79)	(6.36)	(7.21)
Price of care, care level 3 (high)	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)
Stock of FTE native workers	712.24	773.30	834.55	850.84
	(719.45)	(786.73)	(842.02)	(850.37)
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)
Capacity and occupancy of nursing homes:				
Facility capacity	77.57	76.82	76.39	77.19
	(19.26)	(19.10)	(18.03)	(16.41)
Facility occupancy	68.15	65.73	65.68	69.20
	(17.93)	(16.72)	(15.63)	(14.42)
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	1537.20	1677.75	1727.55	1845.32
	(1844.65)	(1970.48)	(1991.38)	(2073.11)
Nursing home care recipients	1350.93	1443.63	1509.54	1663.97
	(1614.05)	(1635.50)	(1721.83)	(1850.69)
Number of regions		377		

Notes: The depicted variables are constructed by first aggregating nursing home data within each region-year cell: price, facility capacity and occupancy, share of foreign workers as well as wage variables are averaged across facilities, while the other outcomes are summed (see Section 4). For this table, we take the unweighted mean of these variables across regions for the years 2005, 2009, 2013, and 2017. Table B1 reports analogous statistics excluding regions bordering Poland and the Czech Republic. Standard deviations are reported in parentheses in the row below each mean. Based on own calculations.

alents increased by around 30% between 2005 and 2017, compared with a 20% increase in native FTE employment. The share of foreign workers remained almost unchanged between 2005 and 2009, and more than doubled between 2009 and 2017. Third, while average nursing home capacity and occupancy per facility have stagnated, regional stocks of available beds and residents have increased. Between 2005 and 2017, average regional capacity and occupancy rose by 20% and 23%, respectively, driven by an increase in the number of nursing homes. Notably, throughout the entire period, nursing homes operated below capacity on average, potentially reflecting staffing regulation (see Section 2) as a binding constraint.

Figure 2: Regional variation in the average price of care



(a) Level, 2009

(b) Changes, 2009–2019

Notes: Panel (a) maps the daily price of care in nursing homes in euros in 2009 across the modified NUTS-3 regions. Panel (b) maps the average change in the daily price between 2009 and 2019, in euros. Both maps display values by quartiles. Regions labeled *No data* have an insufficient number of nursing homes to display price levels due to anonymization; this restriction applies only to the maps in Figure 2 and does not affect the empirical analysis.

Finally, Figure 2 shows substantial regional variation in the average price of care, measured in euros. Panel (a) indicates higher price levels in southern and western Germany and lower prices in eastern Germany, closely aligned with regional differences in the cost of living. Panel (b) presents cumulative price changes between 2009 and 2019 and reveals considerable heterogeneity, with the largest increases occurring in eastern regions as well as in parts of southern Germany.

5 Empirical strategy

To causally estimate the effect of immigration on prices and the other outcome variables, we combine a generalized difference-in-differences model with an instrumental variable approach. In particular, we exploit a sharp increase in the stock of foreign-born (women) 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 observation year t between 2005 and 2019:

$$\Delta \ln y_{r,t} = \alpha_t + \beta_t \Delta F_r + \omega_t X_{r,2009} + \epsilon_{r,t} \tag{5}$$

$\Delta \ln y_{r,t}$ 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 women—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, $\times$ 100. Thus, β_t measures the approximate percentage change in the outcome between 2009 and year t associated with a one-percentage-point increase in the foreign-born female population (relative to the 2009 population) between 2009 and 2019. $X_{r,2009}$ represents a vector of controls that we fix at their 2009 level. The controls include the regional size of the nursing home 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 ratio.[23] 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.[24]

The structure of the model has two particularly desirable features. First, for the years $t \in [2005, 2007]$, we can explicitly test for pre-trends. Second, for years $t \in [2011, 2019]$, the series of β_t coefficients helps us to quantify a potentially dynamic impact of the immigration shock. Following Amior and Stuhler (2023), Delgado-Prieto (2024), Dustmann et al. (2017), and Garin and Silvério (2024), we opt for a time-invariant treatment.[25] With a time-varying specification, it is difficult to distinguish between dynamic evolution of outcomes and changes in measured treatment intensity. By holding treatment fixed, our specification isolates the evolution of outcomes across regions with different total exposure to the immigration shock and makes the pre-trend estimates more transparent and

[23]In Section 6, we show that our results are not driven by a particular choice of $X_{r,2009}$ by employing other regional-level variable sets.

[24]Our baseline specification gives equal weight to each region and therefore estimates the effect for the average region. In Section 6, we show that the results are similar when regions are weighted by their population aged 75 and older, giving greater weight to areas with larger potential demand for nursing home care.

[25]These studies examine settings in which treatment begins or changes sharply following a relatively stable pre-period, allowing the same measure of total exposure to be used to trace outcomes over time. Dustmann et al. (2017) study a commuting policy that generated a sudden inflow of Czech workers into German regions near the Czech border, while Delgado-Prieto (2024) examines the rapid inflow of Venezuelan migrants into Colombia after 2015. Amior and Stuhler (2023) study the post-1988 immigration wave to West Germany, constructing regional exposure from several national inflows and historical settlement patterns of multiple origin groups. Outside the immigration context, Garin and Silvério (2024) construct firm-specific exposure to the sharp decline in foreign demand during the Great Recession using Portuguese exporters' pre-recession product–destination composition.

directly comparable to the post-treatment results.

When estimated with OLS, equation (5) likely yields biased results as both the change in long-term care outcomes and foreign settlement patterns are plausibly correlated with unobserved time-varying 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 foreign-born women in region *r* (ΔF_r), which we label ΔZ_r, by assigning the country-specific change in the stock of foreign-born women on the national level[26] ($\Delta S_{c,-r}$) across the German regions according to the aggregate historical immigrant shares ($s_{c,r,2000}$):

$$\Delta Z_r = \frac{100}{pop_{r,2009}} \sum_c s_{c,r,2000} \, \Delta S_{c,-r}. \tag{6}$$

Here, the subscript c denotes the country of origin—Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. The settlement share $s_{c,r,2000}$ is region r's share of Germany's total foreign-born population from origin country c in 2000. 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 ($\times$ 100).

We use 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 Figure 1a), 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:

$$\Delta F_r = \gamma + \psi \Delta Z_r + \rho X_{r,2009} + \eta_r \tag{7}$$

Both the treatment and the instrument are time-invariant, capturing differences in expo-

[26] 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 the influence of any particular region on the national-level inflows of foreign-born women into Germany. This leave-one-out adjustment makes little difference to the empirical results shown in the paper.

sure based on changes between 2009 and 2019. As a result, the first-stage relationship is common across all years. Accordingly, the IV estimates should be interpreted as the effect of immigration induced by historical EU-11 settlement networks and the subsequent labor market openings.[27]

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). In our setting, we rely on the latter condition and interpret the shift-share design as a *pooled exposure* framework, where the shares capture differential exposure to a set of common shocks.[28] In our context, exposure is based on 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.[29] One way to assess the plausibility of this assumption is to test for differential trends in the outcomes prior to the labor market openings. Persistent confounders—such as long-run regional growth dynamics or differential labor market trajectories correlated with settlement patterns—would have influenced outcomes already before the labor market openings, and would therefore appear as differential trends in the pre-reform period. 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 provides evidence that the null pre-trends hold 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 6.1.[30]

[27] As discussed in Section 6, the results are qualitatively similar when the endogenous treatment variable is defined using only the change in the stock of foreign-born women from EU-11 countries. We use changes in the total foreign-born stock as our preferred treatment because it captures the broader local labor-supply response associated with the policy-induced EU-11 inflows, while the instrument isolates the component of this change driven by historical EU-11 settlement patterns and the labor-market openings.

[28] An alternative interpretation would treat the national origin-specific inflows as quasi-experimental shocks. Such an interpretation requires not only that these shocks be plausibly exogenous, but also that the instrument combine a sufficiently large number of independent shock realizations (Borusyak et al., 2022). Our instrument is based on eleven origin countries whose inflows are economically related through the EU expansion and common labor market openings. While introducing time-varying origin-specific inflows would create additional origin-year observations, it would not necessarily provide additional independent shocks because inflows from the same origin are likely to be serially related over our relatively short analysis period.

[29] This assumption does not require historical immigration to have had no effect on LTC outcomes. Rather, it requires regions with different historical settlement patterns to have followed similar counterfactual trends in the absence of the later immigration shock.

[30] Since the treatment is time-invariant, we calculate the Rotemberg weights using a cross-section of the

A final identification concern relates to the measurement and impact of cross-border commuting. 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. Our main sample therefore excludes the 24 regions along the borders with Poland and the Czech Republic. We further show that the results are robust across alternative specifications, notably analyses that use the full sample of regions.

6 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. We also test the sensitivity of our results to the choice of controls and the definition of the treatment.

6.1 First-stage results

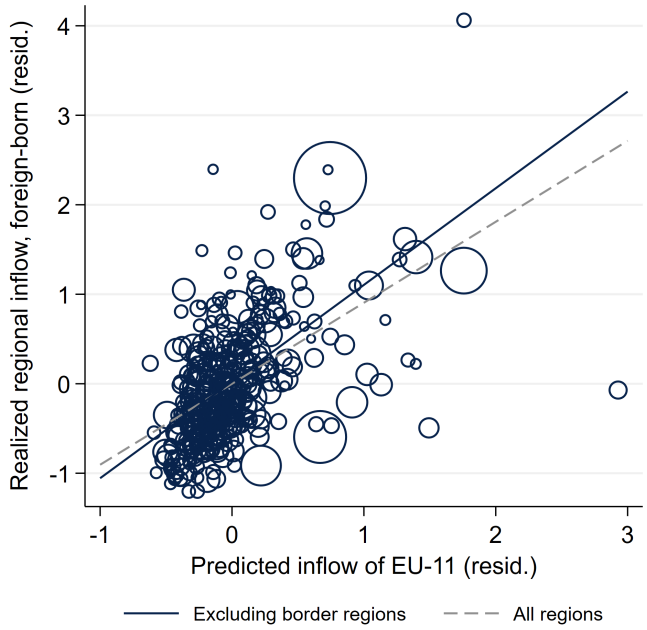
Figure 3 plots the relationship between our proposed shift-share instrument, the predicted immigration from the EU-11, and the residual change in the overall foreign-born female population, after accounting for baseline controls. To illustrate the contribution of larger versus smaller regions, the size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

The figure 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 by both smaller and larger regions, suggesting that it is not driven by the economic conditions that vary systematically with market size.

Table 2 reports the first-stage results of estimating equation (7) using the instrument as defined in equation (6). Because both the treatment and the instrument are time-invariant,

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

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 using our main sample (excluding border regions). 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. When all regions are included as a robustness check (column (2)), the first-stage relationship remains positive but is weaker, suggesting that historical settlement patterns are less predictive of immigration changes in border regions than in the rest of Germany. To further assess the robustness of the first-stage relationship, we re-estimate the first stage with all regions while consecutively 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 5, 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 all regions are included (Table B3). First, all origins receive positive weights (α_c). Furthermore, the weights are almost per-

Table 2: First-stage regression results

	Main (1)	All regions (2)	No Top 1 (3)	No Top 10 (4)
Predicted change in stock (ΔZ_r)	1.084***	0.904***	0.884***	0.895***
	(0.140)	(0.175)	(0.174)	(0.195)
N	353	377	376	367
K-P F-stat.	60.043	26.584	25.924	20.950
R^2	0.476	0.440	0.437	0.424

Notes: Table shows the first-stage results of estimating equation (7) using the instrument as defined in equation (6) and the controls. Column (1) uses the main sample that excludes regions bordering Poland and the Czech Republic. Column (2) includes all regions. 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.

Table 3: Summary of Rotemberg weights

Origin	α_c	ΔS_c	F-stat$_c$
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

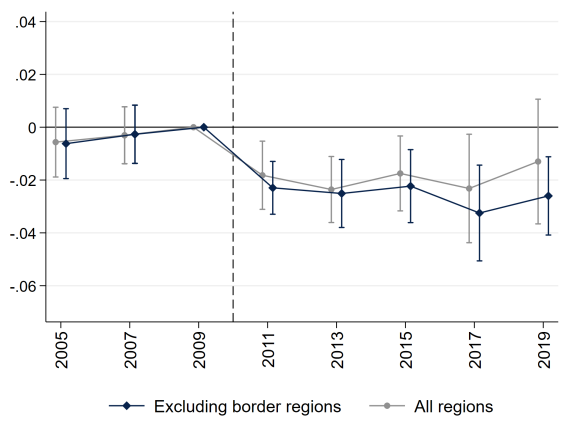
Notes: The table reports Rotemberg weights (α_c), the aggregate change in the stock of foreign-born individuals between 2009 and 2019 (ΔS_c), and the first-stage F-statistic (F-stat$_c$) by country of origin c. Estimation uses the Stata package *bartik_weight* provided by Goldsmith-Pinkham et al. (2020) and is based on the sample excluding regions bordering Poland or the Czech Republic. For the weights including all regions, see Table B3.

fectly explained by the size of national-level inflows—the correlation between α_c and ΔS_c is 0.982. 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. In what follows, we also present separate pre-trend estimates using only the variation from these countries.

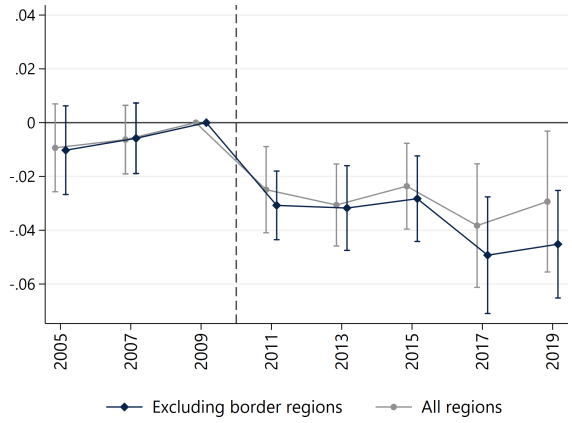
6.2 Effect of immigration on prices of care

We now turn to the second-stage results on nursing home prices. Figure 4 presents the baseline estimates excluding regions bordering Poland and the Czech Republic. For comparison, the figure also reports estimates for the full sample, which serve as a robustness check.

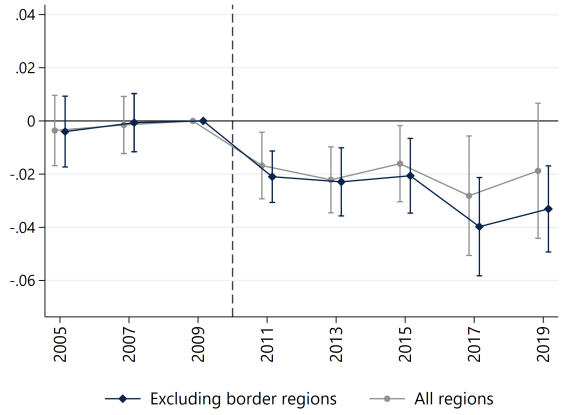
Figure 4: Effect of immigration on price of care and price of room/board



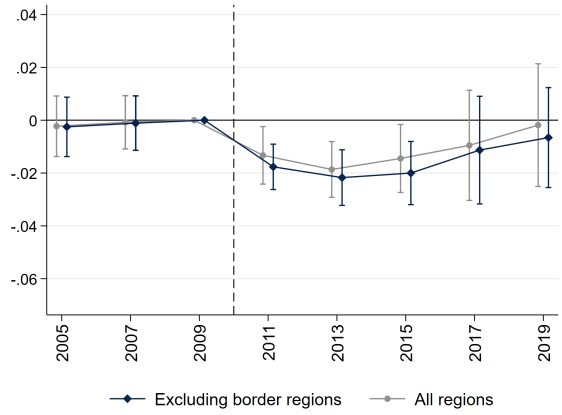
(a) Average price of care



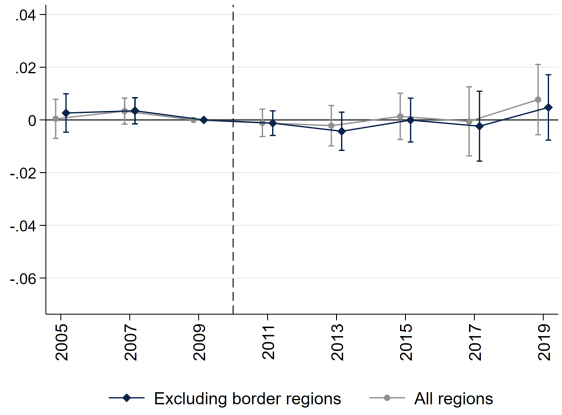
(b) Price of care, care level 1 (low)



(c) Price of care, care level 2 (medium)



(d) Price of care, care level 3 (high)



(e) Room and board

Notes: The figure displays the estimated effects of immigration on nursing home prices and their 95% confidence intervals, obtained from the second stage of equation (5), based on a sample of 353 regions (377 regions, when including border regions). The outcome variable is defined as the change in the log price from 2009 to t. The treatment variable is the instrumented change in the stock of foreign-born women per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019. The estimates shown in the figure are reported in Table B6, along with the corresponding OLS estimates and results from alternative specifications.

Our estimates capture the supply-side effects of immigration rather than demand generated by immigrants' own consumption of nursing-home care. Since immigrants typically do not consume long-term care services, they generate essentially no shift in demand in the nursing home market. For instance, in 2009, 99.0% of the foreign-born EU-11 population in Germany 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 (see Figure B3).

Across all panels, we find no evidence of differential price trends prior to 2009: the rise in the relative size of the local stock of foreign-born women between 2009 and 2019 does not impact prices of nursing care before the reform period. While estimates are somewhat noisier when using instruments based solely on Romania, Bulgaria, and Poland—the countries with the largest Rotemberg weights—we likewise observe no meaningful pre-trends (Figure B4).[31] Taken together, these findings support our identification assumption that historical settlement patterns of the foreign-born EU-11 population affect price changes only through subsequent increases in the foreign-born population. In particular, they suggest that an increase in work arrangements before labor market liberalization—namely cross-border posting and self-employment—that could have been geographically related to later immigration exposure did not influence the outcomes of interest before 2011.

Turning to the post-reform price effects, Panels (a) to (d) show that immigration reduces the price of care in nursing homes. By 2019, an increase of one foreign-born woman per 100 inhabitants statistically significantly reduces the price of care services by 2.6%. Price responses differ across care intensities. For the low care level, we find the largest effect, with a significant decrease of 4.5% by 2019. The coefficients become slightly larger in absolute terms over the post-reform period; however, they are not significantly different from each other. The price effect for the medium care level follows a similar pattern over time but has a smaller magnitude, with a price reduction of 3.3% in 2019. The point estimates for the high care level are even smaller and significant only in some years. They tend to decline in absolute terms after 2015; yet differences over the post-reform period are not statistically significant. As shown in Panel (e), we find no effect of immigration

[31] In addition, Table B4 reports joint tests of the null hypothesis that all pre-2009 coefficients are equal to zero for each of our main outcomes under the baseline specification. We do not reject this null for any outcome except the log stock of ambulatory care recipients.

on the price of food and accommodation throughout the post-reform period. Focusing on the sample that includes border regions as a robustness check leads to less precise estimates, but the estimated magnitudes remain comparable.

The corresponding OLS estimates, reported in Table B6, are qualitatively similar but less negative, with magnitudes ranging from about one-third to two-thirds of those of the IV estimates. This pattern is consistent with endogenous immigrant settlement attenuating the OLS relationship. For example, if immigrants tend to settle disproportionately in regions experiencing stronger demand or cost pressures in the care sector, these factors would tend to increase nursing home prices, offsetting part of the price-reducing effect of immigration.

The pattern of results across care levels aligns with the competitive structure of the nursing home sector. Existing evidence suggests that markups are lower for low-intensity care, implying stronger competition (Kesternich et al., 2025). Consistent with this, we estimate larger price responses for lower care levels than for more intensive care.[32]

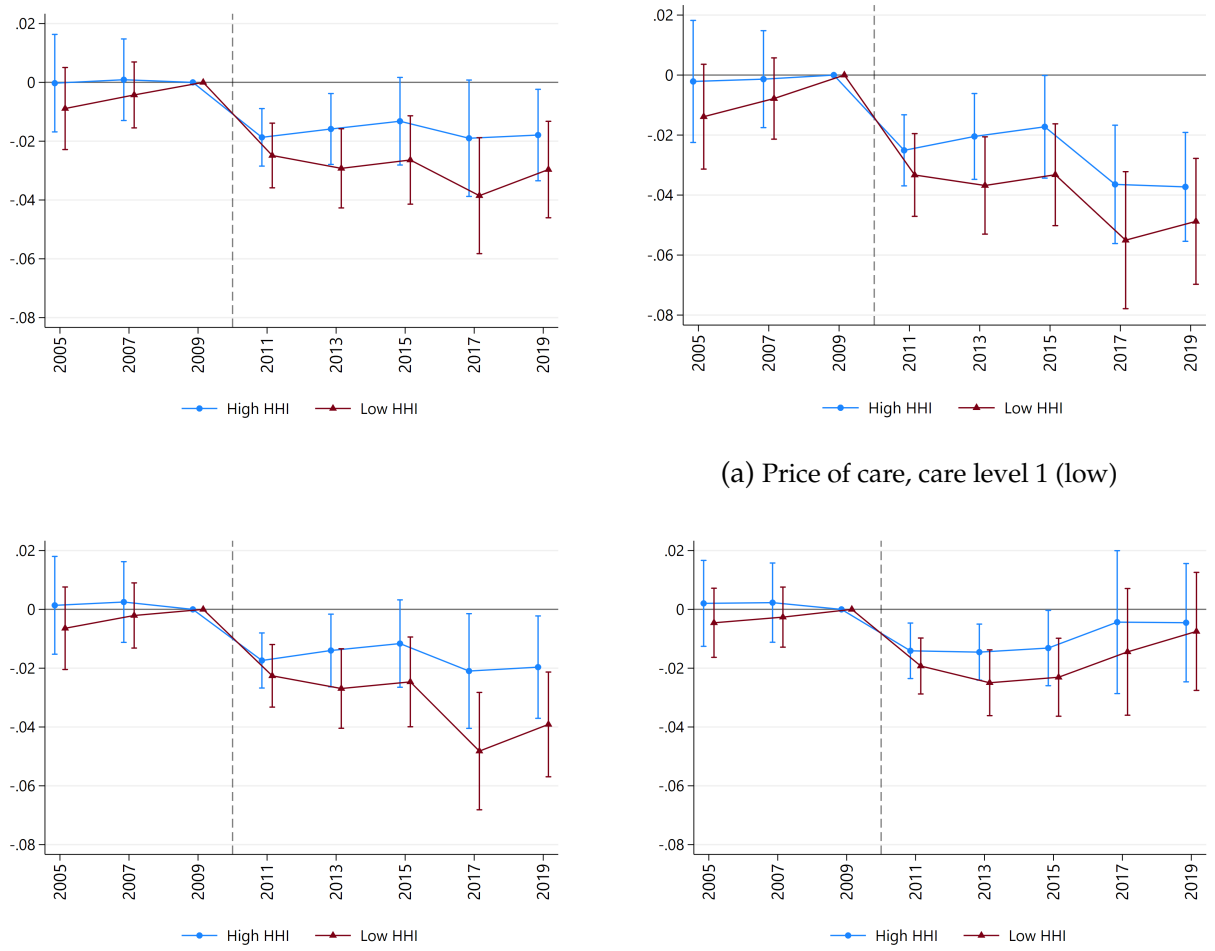
We provide further evidence for the role of market structure by allowing the treatment effect to vary with market concentration, measured by the Herfindahl-Hirschman Index (HHI) in the baseline year 2009. We compute the HHI as the sum of squared facility-level shares of regional nursing home residents in 2009 and classify regions as high or low concentration using a threshold of 0.15. Figure 5 shows that price effects are larger in regions with low HHI, where pre-treatment concentration is lower. This holds for all care levels. By 2019, in low-HHI regions, an increase of one foreign-born woman per 100 inhabitants reduces prices by approximately 3.0% for the average price, 4.9% for the low care level, and 3.9% for the medium care level, whereas the corresponding effects in high-HHI regions are smaller, at 1.8%, 3.7%, and 2.0%, respectively. For the high care level, the effects are small and statistically insignificant in both high- and low-HHI regions. As shown in Table B5, these differences between high- and low-HHI regions are statistically significant at the 5% level for the average price and for low- and medium-level care throughout 2013–2019, except for low-level care in 2019, for which the difference is significant at the 10% level.

Taken together, these findings indicate that price responses to immigration are strongest in more competitive market segments and regions with lower concentration, consistent with greater pass-through in more competitive environments.[33]

[32]This heterogeneity may also reflect differences in immigration-induced cost reductions, or the direct price effect of competition from alternative forms of care. We do not distinguish among these mechanisms.

[33]We explore two additional dimensions of heterogeneity, depicted in Figures B5 and B6. First, we split regions by their price level in 2009, using the median of each price measure, and find that price declines are concentrated in regions that were initially more expensive. Second, we classify regions by whether the

Figure 5: Effect of immigration on price of care by pre-reform concentration



(a) Price of care, care level 1 (low)

(b) Price of care, care level 2 (medium)

(c) Price of care, care level 3 (high)

Notes: The figure displays the estimated effects of immigration on the price of care and their 95% confidence intervals, based on a sample of 353 regions (excluding border regions). The plotted coefficients correspond to interactions between the instrumented treatment in equation (5) and an indicator for high versus low market concentration in 2009 as measured by HHI, where high is defined as HHI $\geq$ 0.15. The outcome variable is defined as 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 women per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019. *High HHI* and *Low HHI* samples include 56 and 297 regions, respectively. Formal tests of the differences between the estimated effects in high- and low-HHI regions are reported in Table B5.

To put our estimates into perspective, we compare them to 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 smaller effect: a 0.8% decline in the average price for each 10% increase in the share of

share of for-profit facilities in 2009 lies below or above the median. We find similar effects in regions with both low and high concentrations of for-profit facilities.

foreign-born women in the labor force. The estimated price effect of a 10% increase in the share of foreign-born women ranges from a 1.3% decline for care level 1 to a 1.0% decline for care level 2, with no statistically significant effect for care level 3. Given that care prices in Germany are not fully determined by market forces, a more muted response is not surprising.

Finally, our results are not sensitive to alternative samples, controls, weighting schemes, or treatment definitions. Table B6 reports the full set of estimated coefficients for all periods: OLS estimates for the main sample in column (1), the baseline IV estimates in column (2), and the robustness checks in columns (3)–(9). Including all regions in the analysis yields somewhat less precise second-stage estimates but similar magnitudes (column (3)). The results, including the absence of meaningful pre-trends, also remain stable when we replace the baseline demographic controls with the fertility rate (column (4)), extend the control set to include GDP per capita, unemployment, and the female share of the unemployed (column (5)), or additionally control for East Germany (column (6)).[34] Weighting the regressions by the population aged 75 and above in 2009 produces a similar pattern of results (column (7)).

Columns (8) and (9) consider alternative definitions of immigration exposure. In column (8), we define the endogenous treatment variable (ΔF_r in Eq. (5)) using foreign-born women from EU-11 only. The estimated pattern remains similar, although the coefficients are larger in absolute value, consistent with the narrower scale of the treatment.[35] In column (9), we redefine both the endogenous treatment and the shift-share instrument using 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.[36] Taken together, columns (8) and (9) show that the estimated pattern of price effects is robust to alternative definitions

[34]We include this indicator because several relevant labor-market institutions and wage-setting arrangements, including sector-specific minimum wages during parts of the study period, differed between East and West Germany.

[35]With the instrument and reduced-form relationship unchanged, instrumenting the smaller EU-11 component of female immigration yields a larger coefficient per additional immigrant. We prefer the baseline treatment because it captures the broader change in the local foreign-born female population associated with the policy-induced EU-11 inflows. By contrast, interpreting column (8) as the causal effect of EU-11 female immigration requires a stronger exclusion restriction: predicted EU-11 inflows must affect nursing home outcomes only through the realized increase in EU-11 women. This condition would be violated, for example, if EU-11 inflows displaced or attracted female migrants from other origins and those changes independently affected nursing home outcomes.

[36]The average change in the alternative treatment is about 2.5 times as large as the baseline treatment, i.e. the stock of foreign-born women increases between 2009 and 2019 on average by 1.59 per 100 inhabitants (based on the 2009 population), while the stock of all foreign-born individuals increases over the same period on average by 4.13 per 100 inhabitants. Because both the treatment and the instrument change, however, the difference between the two coefficients cannot be interpreted as the additional effect of male immigration.

of immigration exposure.

Figure C9 further shows that the estimated effects on care-level-specific prices in 2017 and 2019, the years for which these prices are imputed, remain robust across five sets of imputation assumptions. Appendix C provides further details on the imputation procedure and the alternative assumptions considered.

7 Mechanisms

Our analysis has shown that the arrival of immigrant workers decreases the price of care in nursing homes, particularly for low and medium care levels. Guided by the conceptual framework in Section 3, we examine the mechanisms underlying the price effects. We first study the production-cost channel, focusing on labor costs, quality provision and scale. We then turn to the broader care-market channel and assess the extent to which changes in production costs are reflected in prices.

7.1 Nursing home production-cost channel

7.1.1 Labor costs

Given that labor costs constitute the largest component of production costs, we begin by examining whether immigration affects the labor input margin of the production function. 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.

We first examine whether immigration affects total staffing, workforce composition, and average wages in nursing homes. The results are shown in Figure 6. We report estimates for the main sample excluding border regions and include results for the full sample for robustness. We 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. Furthermore, Panel (a) indicates that the overall number of care workers in nursing homes, measured in full-time equivalents, does not significantly change with immigration after the reform. This stands in contrast to prior work documenting positive effects of immigration on nursing home staffing, including total employment of nurse professionals (Furtado and Ortega, 2026) and hours per nursing home resident (Grabowski et al., 2026a); conversely, for registered nurses, Cortés and Pan (2014) document negative effects

Figure 6: Effect of immigration on employment and wages in nursing homes

(a) Total employment (in FTE)

(b) Native employment (in FTE)

(c) Share of foreign workers

(d) Average wage

Notes: The figure displays the estimated effects of immigration on the total employment (in full-time equivalents), native employment (in full-time equivalents), the average share of foreign workers, and the average wage, along with their 95% confidence intervals, obtained from the second stage of equation (5), estimated separately for each year from 2005 to 2019 based on a sample of 353 regions (377 regions, when including all regions). The outcomes are defined as log differences (difference for the outcome *share of foreign workers*) relative to 2009. The treatment variable is the instrumented change in the stock of foreign-born women per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019. The estimates shown in the figure are reported in Table B7, along with the corresponding OLS estimates and results from alternative specifications.

of immigration on the stock of native workers.[37] However, we observe a sizable shift in the composition of the workforce: Panel (b) shows that an additional foreign-born woman per 100 inhabitants reduces native employment in nursing homes by up to 11.7%. At the

[37]In particular, Furtado and Ortega (2026) document an increase of 21 nurse professionals per 1,000-person increase in immigration. They further attribute part of this increase to a crowding-in of native workers. Grabowski et al. (2026a) 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. Cortés and Pan (2014) document large negative effects, finding that each additional foreign nurse reduces native nurse employment by between one and two workers over a ten-year period.

same time, Panel (c) documents that the average share of foreign workers rose sharply following the 2011 policy change. By 2019, an additional foreign-born woman per 100 inhabitants increases the average share of foreign workers in nursing homes by 4.9 percentage points using the main regional sample. Alongside this shift toward a higher share of foreign workers, average wages paid in nursing homes decline. Panel (d) documents the causal effect of immigration on the log average wage. By 2019, an increase of one foreign-born woman per 100 inhabitants reduces the average wage in the nursing home sector by 3.7% in the main specification.[38,39]

To further characterize the workforce adjustment beyond its native–foreign composition, we next examine whether immigration changes the average characteristics of nursing-home workers. We focus on labor-market experience in Germany and age, both of which are associated with earnings and can be measured consistently over our study period.[40] Figure 7 presents the corresponding estimates. By 2019, an additional foreign-born woman per 100 inhabitants decreases average labor market experience by 6.6%; the effect on the average age is smaller, at about 1.6%. Across all labor-market outcomes examined in Figures 6 and 7, the results are robust to including regions bordering Poland or the Czech Republic, using alternative sets of controls, and adopting alternative definitions of the treatment and instrument (see Table B7).

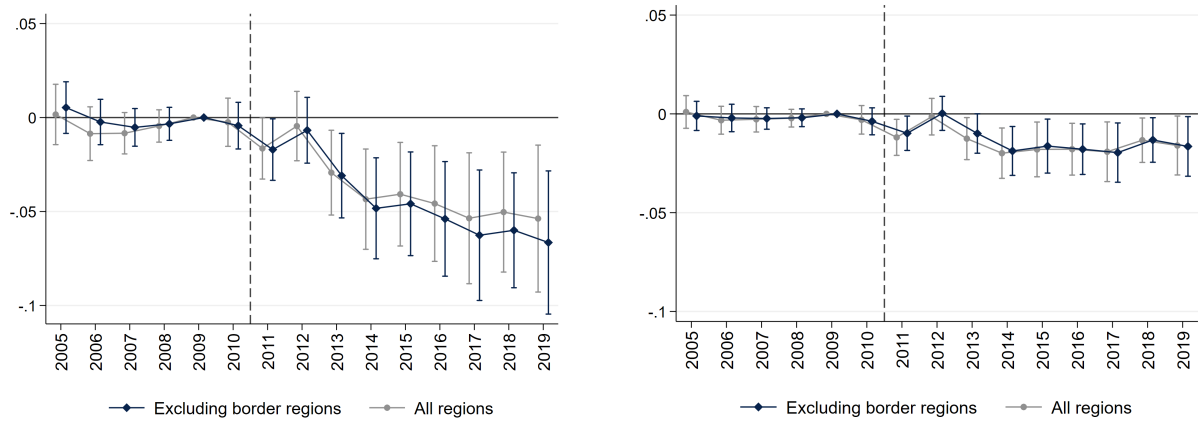
Notably, the timing of the price and labor market responses differs for three main reasons. First, nursing home prices are negotiated in advance based on expected labor costs (as noted in Sections 2 and 3), so anticipated cost reductions following the labor market opening may already be reflected in lower prices in 2011, even if realized labor cost adjustments occur later. Second, differences in measurement contribute to a lag in observed wage responses. Our labor market measures are constructed from administrative data observed on June 30 of each year, while price measures refer to December 15 (see Section

[38]The decline in average wages is also robust to expressing wages per full-time equivalent, as shown in Appendix Figure B7.

[39]While the effect on the share of foreign-born workers gradually increases after the labor market opening, the effect on wages remains relatively stable over this period, as do the price effects. One possible explanation is that the composition of foreign-born workers changes over time. Initially, foreign workers may have been more concentrated in lower-paid positions due to differences in recognized qualifications and limited labor market experience in Germany. As foreign workers acquire formal recognition of qualifications and accumulate work experience in Germany, their wages may gradually converge toward those of native workers, attenuating the wage effect of a further increase in their employment share. Consistent with this explanation, Dustmann et al. (2013) document that immigrants' initial occupational and wage downgrading diminishes with time spent in the United Kingdom.

[40]Our data only capture work experience in Germany, omitting any experience gained abroad. Moreover, we cannot estimate the effect of immigration on the share of assistants in nursing homes, 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 7: Effect of immigration on the composition of the nursing home workforce



(a) Average labor market experience

(b) Average age

Notes: The figure displays the estimated effects of immigration on 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 (5), estimated separately for each year from 2005 to 2019 based on a sample of 353 regions (377 regions, when including 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 women per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019. The estimates shown in the figure are reported in Table B8, along with the corresponding OLS estimates and results from alternative specifications.

4). Because the first labor market opening occurred in May 2011, the 2011 data likely do not capture meaningful changes in workforce composition or wages. Finally, estimates of labor market outcomes for 2011 and 2012 should be interpreted with caution, as the identification of care workers relies on imputed occupational codes. This is due to substantial missing information during the transitional period from 2011 to 2012 associated with a change in occupational coding (see Section 4). From 2013 onward, when care workers can be reliably identified, we observe a clear and robust adjustment in wages and related outcomes.

We then turn to worker-level data to assess the wage implications of the increased foreign-worker share. Table 4 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, there are differences in (recognized) qualifications and responsibilities: foreign workers are substantially more likely to be employed as lower-paid nursing assistants (51.6%) rather than skilled nurses, compared to natives (34.4%). As outlined in Section 2, this may partly result from the requirement for formal recognition of foreign qualifications in order to work as a nurse in Germany, a process that can be administratively and financially demanding. Second, differences in labor market

Table 4: 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 are pooled worker-year averages for care workers employed in nursing homes between 2011 and 2019, reported separately for native and foreign workers. Workers are classified by nationality at first observation. Labor market experience measures the number of years since the worker's first job in Germany. Because occupational information is available only from 2012 onward, the assistant share is calculated over 2012–2019. The sample contains 151,704 distinct foreign workers and 943,314 distinct native workers across all 377 regions.

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.

We examine to what extent these observable differences account for the foreign–native wage gap. For the period 2012–2018, Table 5 shows that, conditional on employment hours and year fixed effects, foreign workers earn about 10% less than native workers. Adding region fixed effects and age controls widens the gap to about 13%. By contrast, controlling for labor-market experience in Germany reduces the gap to 6.6%, while additionally accounting for employment in an assistant position lowers it further to 3.4%. The estimate remains unchanged when establishment fixed effects replace region fixed effects. Thus, differences in German labor-market experience and occupational position explain a substantial share of the lower average wages of foreign workers.

Taken together, these results point to a clear role of the labor-cost channel. Immigration increases the share of foreign workers in nursing homes, shifts the composition of the workforce toward workers with less German labor-market experience, and reduces average wages. At the worker level, foreign workers are disproportionately employed in lower-paid positions and have less accumulated labor-market experience in Germany, two factors that account for a substantial share of the foreign–native wage gap. Overall, the evidence is consistent with immigration reducing labor costs through changes in workforce composition.

Table 5: Foreign–native wage gap, 2012–2018

	Dependent variable: Log daily wage					
	(1)	(2)	(3)	(4)	(5)	(6)
1(Foreign worker)	-0.100***	-0.124***	-0.130***	-0.066***	-0.034***	-0.034***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Part-time control	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	No	Yes	Yes	Yes	Yes	No
Age and age squared	No	No	Yes	Yes	Yes	Yes
German LM experience	No	No	No	Yes	Yes	Yes
Assistant position	No	No	No	No	Yes	Yes
Establishment fixed effects	No	No	No	No	No	Yes
Observations	4,503,650	4,503,650	4,503,650	4,503,650	4,503,650	4,503,237
Individuals	1,085,547	1,085,547	1,085,547	1,085,547	1,085,547	1,085,266
Adjusted R^2	0.089	0.111	0.234	0.238	0.273	0.356

Notes: The table reports estimates of the foreign–native wage gap from a series of individual-level Mincer wage regressions. The dependent variable is the logarithm of the individual daily wage. Workers are classified as native or foreign based on their nationality at first observation. All specifications include categorical controls for employment status—full-time, part-time, or marginal employment—and year fixed effects. Columns (2)–(5) sequentially add region fixed effects, age and age squared, German labor-market experience and its square, and an indicator for employment in an assistant position (i.e. low level of task requirement). Column (6) replaces region fixed effects with establishment fixed effects. The sample comprises native and foreign long-term care workers employed in the sector between 2012 and 2018, with non-missing information on all individual-level characteristics included in columns (1)–(5). Standard errors are clustered at the individual level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

7.1.2 Other production margins: quality provision and scale

Beyond labor costs, immigration may affect production costs through adjustments in other inputs or facility choices. These margins include quality provision and scale of production.

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 (2026) and Grabowski et al. (2026a) find that stronger regional immigration inflows improve care quality through higher staffing levels, we observe no change in overall staffing. 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. While this pattern could raise concerns about potential quality differences, lower pay does not necessarily reflect lower qualifications, given the potentially limited recognition of foreign credentials (as outlined in Section 2) and the fact that experience acquired outside Germany may not be fully credited in pay scales.

Rather than inferring quality effects from changes in workforce composition, we assess the impact of immigration on care provision using the inspection-based quality measures described in Section 4. These measures are based on standardized, unannounced assessments conducted at the nursing-home level and cover a broad range of observable care processes and organizational practices, including adequate nutrition and hydration,

adherence to doctors' prescriptions, and regular first-aid and emergency training for staff. This approach differs from that of Furtado and Ortega (2026) and Grabowski et al. (2026a), who study health outcomes among nursing home residents.[41] Such outcomes may more directly reflect resident well-being, but they also depend on underlying health, case mix, and other factors beyond the care provided by the nursing home. Although inspections do not capture all dimensions of resident welfare, they are more closely tied to facility practices and provide standardized, facility-specific evidence on a broad range of care processes and organizational practices.

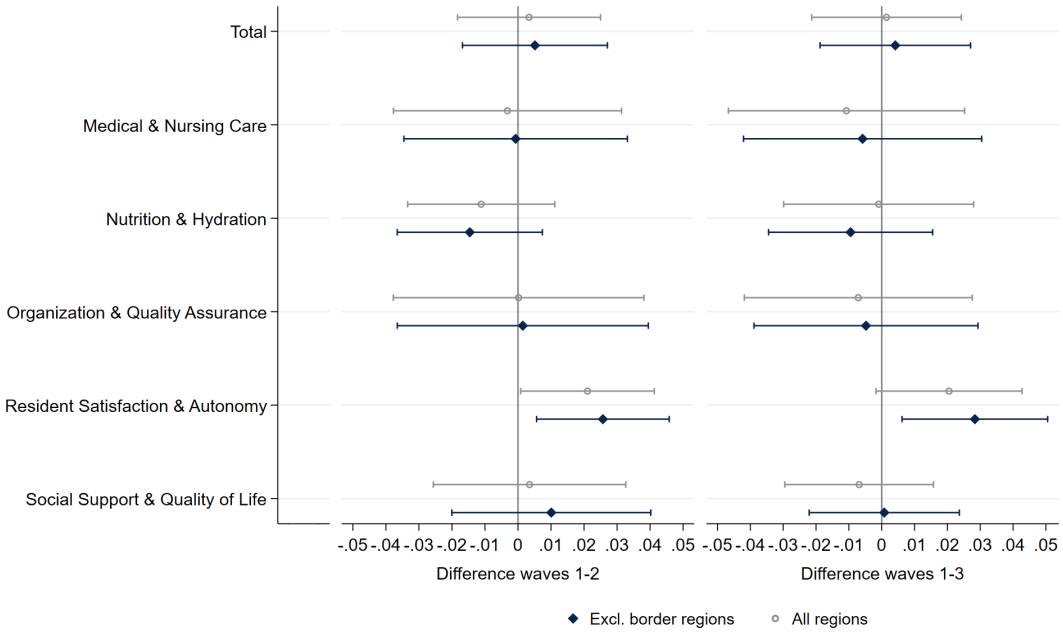
To quantify the effect of immigration on care quality, we estimate equation (5) using the (instrumented) time-invariant treatment and baseline controls. As discussed in Section 4, the quality measures are available in three waves. To match this structure, we adapt the main specification to the lower frequency of the data and compare the change in the share of facility–criterion assessments with no issues identified during inspection in waves 2 and 3 (post-labor market opening) relative to the pre-reform baseline in wave 1.[42] 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 8 reports the main results. We find no statistically significant effect of immigration on the overall inspection-based quality measure or on the share of facility–criterion assessments for which no issues were identified in the quality dimensions *Medical and Nursing Care, Nutrition and Hydration, Social Support and Quality of Life,* or *Organization and Quality Assurance*. The estimates for the total quality measure are sufficiently precise to rule out declines larger than approximately 2 percentage points in both the short and longer term. The estimates for the individual quality dimensions are less precise, but we find no evidence of adverse effects. By contrast, immigration is associated with a modest improvement in resident satisfaction and autonomy: in the longer term, an additional foreign-born woman per 100 inhabitants increases the share of facility–criterion assessments receiving a full score in this domain by 2.8 percentage points. Estimates us-

[41] Mortality could provide an alternative resident outcome, but it also reflects underlying health, case mix, hospital treatment, and other factors beyond nursing home care. Moreover, the available death statistics do not allow us to distinguish deaths in nursing homes from those in hospitals.

[42] More precisely, we estimate the following equation separately for each wave $w = \{2, 3\}$: $\Delta share_{r,w} = \alpha_w + \beta_w \Delta F_r + \omega_w X_{r,2009} + \epsilon_{r,w}$, where $\Delta share_{r,w}$ represents the difference in the share of facility–criterion assessments 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 8: Impact of immigration on nursing home quality over short- and long-term horizons



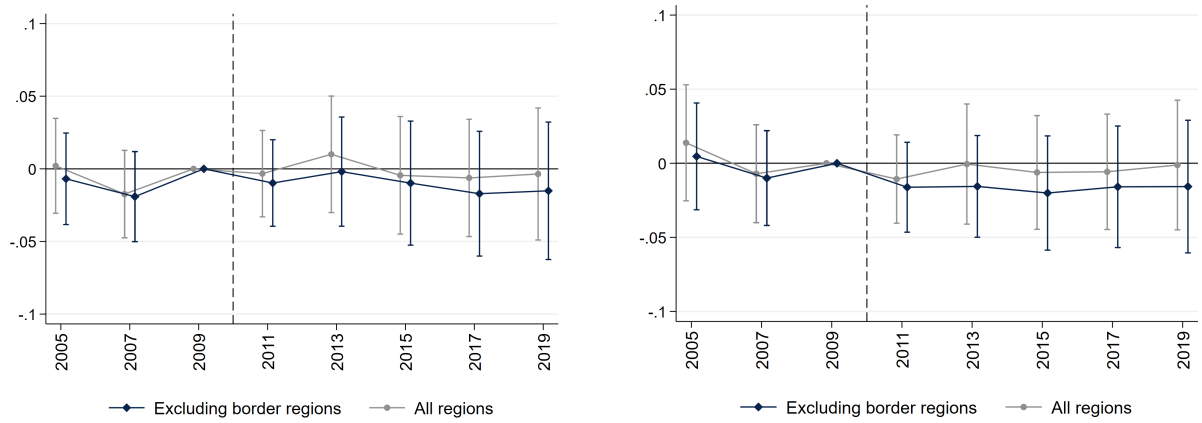
Notes: The figure displays the estimated effects of immigration on the share of facility–criterion assessments for which no issues were found across five quality categories, as well as across all categories, along with 95% confidence intervals. Estimates compare changes in these shares in wave 2 (2011–2013) and wave 3 (2014–2016) relative 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 D; for the estimates shown in the figure, the corresponding OLS estimates and results from alternative specifications, see Table B10.

ing the full regional sample yield similar results; furthermore, as shown in Table B10, the results are consistent when using alternative control sets (columns (4)–(5)), an alternative treatment and instrument definition that includes both genders (column (6)), as well as varying thresholds for defining a criterion as satisfied (columns (7)–(8)).

Immigration may also affect average costs through scale effects if larger resident numbers allow providers to spread fixed costs over more units of output. 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 into 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 average nursing home capacity and occupancy. As illustrated in Panel (a) of Figure 9, the number of available places in nursing homes does not change with increased immigration after 2011, and no significant

Figure 9: Effect of immigration on average nursing home (NH) capacity and occupancy



(a) Average NH capacity (available places)

(b) Average NH occupancy (residents receiving care in nursing homes)

Notes: The figure displays the estimated effects on nursing home capacity and occupancy, along with 95% confidence intervals, obtained from the second stage of equation (5), based on a sample of 353 regions (377 regions, when including 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 women per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019. The estimates shown in the figure are reported in Table B11, along with the corresponding OLS estimates.

pre-trends are detected prior to that. Similarly, we find no effect on the average occupancy of nursing homes in Panel (b). Furthermore, in Figure B8, we analyze a range of auxiliary outcomes related to potential scale effects, including nursing home stock, facility entry and exit, regional-level bed capacity, and the regional-level number of care recipients. We find no meaningful effects of immigration on any of these margins.

In sum, we find no evidence that changes in the observed scale-related margins contribute to the price decline. This finding is consistent with the employment effects documented above, which show no significant change in the number of FTE workers, and hence no change in capacity constraints related to the staffing regulation (see Section 2).

Overall, we find no evidence that immigration reduces prices by lowering measured quality or increasing production scale. Instead, the evidence points toward labor-cost reductions as the primary margin within the production-cost channel.

7.2 Broader care-market effects

The second channel in the conceptual framework operates through changes in the broader market for long-term care. Immigration may increase the availability of alternatives to institutional care, thereby improving households' outside options and increasing competitive pressure on nursing homes. In particular, a larger supply of immigrant workers

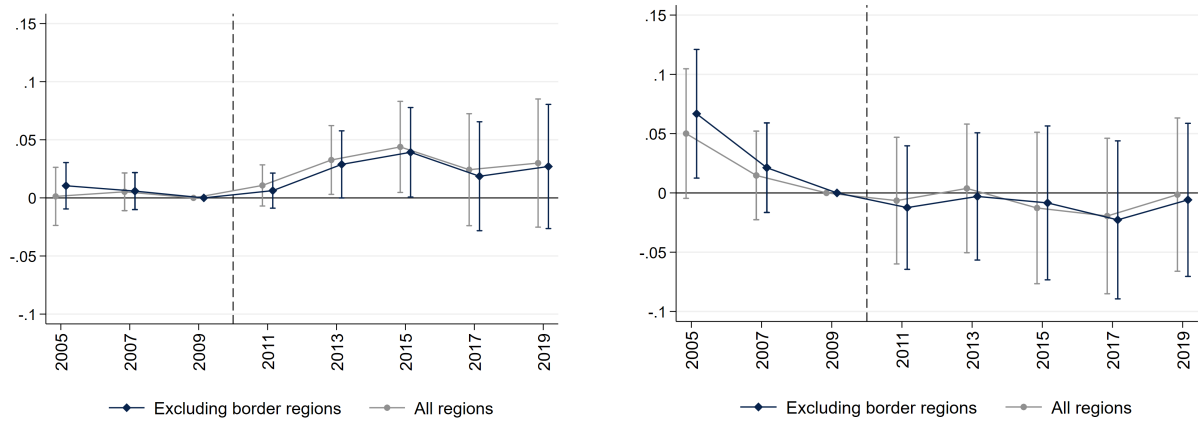
available to provide home-based care may make privately arranged care more accessible and attractive. In Germany, this can occur through greater availability of informal caregivers, for whom households can use cash benefits from the long-term care insurance to organize care arrangements privately. Although 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 instance, 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 competition for care in nursing homes, which could lead to price adjustments.

Figure 10 presents the results. We find a significant positive effect on the take-up of informal care. By 2015, an additional foreign-born woman per 100 inhabitants increases the number of informal care recipients by 3.9%. The point estimates are similar for 2017 and 2019. While the estimates are noisy, the results indicate a clear post-reform level shift. In contrast, we find no effect of immigration on the stock of individuals receiving care from professional caregivers at home; however, because the pre-trend test rejects the null of parallel trends for this outcome, the estimate should be interpreted with caution (see Table B4).

Previous evidence from the United States documents that immigration affects care arrangements for the elderly. Butcher et al. (2022) show that greater local immigrant availability reduces institutionalization, while Almuhaisen et al. (2024) find that stricter immigration enforcement increases institutionalization rates. Both papers provide indirect evidence on home-based care as the relevant channel, documenting changes in employment and hours worked in the home health and private household sectors. In our setting, we are able to observe a more direct margin through the take-up of cash benefits provided by the long-term care insurance, which are predominantly used to finance privately arranged informal care for individuals with relatively low care needs. We find that immigration increases cash benefit take-up, consistent with an expansion of informal care provision.

However, in contrast to these U.S. studies, we do not find a decline in the take-up of institutional care. This suggests that, while immigration increases the use of home-based care, it does not induce substitution away from formal care in Germany. Instead, increased foreign-born labor supply appears to facilitate home-based care arrangements that would otherwise be provided by family members.

Figure 10: 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 (5), based on a sample of 353 regions (377 regions, when including 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 women per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019. The estimates shown in the figure are reported in Table B11, along with the corresponding OLS estimates.

Importantly for our main results, greater availability of home-based care plausibly improves the outside option for individuals at lower care levels. This may increase competitive pressure on nursing homes and contribute to the observed price reductions, even in the absence of a decline in nursing home take-up.

Thus, the broader care-market channel does not appear to operate through a reduction in aggregate demand for nursing homes. Instead, it is consistent with a change in the competitive environment faced by providers, particularly for residents with lower care needs, for whom alternative arrangements are closer substitutes.

7.3 Implied cost pass-through

The conceptual framework implies that the effect of immigration on prices depends not only on whether immigration reduces production costs but also on the extent to which providers pass these cost changes through to prices.

To assess the implied degree of cost pass-through, we compare the estimated price response with the estimated change in production costs. Immigration reduces average nursing home wages, while we find no evidence of changes in quality provision or production scale. We therefore use the estimated wage decline, scaled by labor's share of nursing home expenditures, to approximate the immigration-induced change in produc-

tion costs.[43]

Similarly to Renkin et al. (2022), we combine our estimated effects on the average wage and the average price of care.[44] We calculate the implied pass-through as $\widehat{\theta} = \frac{\hat{\beta}_P}{s_L \hat{\beta}_W}$, where $\hat{\beta}_P$ and $\hat{\beta}_W$ are the estimated effects of immigration on log average price of care and log average wage, respectively. We present the implied pass-through under two assumptions: $s_L = \{0.7, 0.8\}$, corresponding to the reported range of the personnel-cost share of nursing homes (Haun, 2020).

Combining the estimated price decline of -2.6% with the wage decline of -3.7% yields an implied pass-through of 1.0 in 2019 (SE: 0.5) when $s_L = 0.7$ and 0.9 (SE: 0.4) when $s_L = 0.8$.[45] The estimates are imprecise and do not allow us to quantify the exact degree of pass-through. Nevertheless, the point estimates are consistent with substantial, and potentially complete, transmission of lower labor costs into prices.

This calculation relies on three important assumptions. First, it uses the observed decline in labor costs to approximate the overall change in production costs. While we find no detectable changes in quality provision or production scale, we cannot rule out changes in other unobserved cost components. Second, the calculation attributes the entire price response to the nursing home production-cost channel formalized in Equation (2). If the broader care-market channel also contributes to the observed price decline, the calculation attributes too much of the price response to lower production costs and therefore overstates cost pass-through. Finally, nursing home prices are negotiated based on expected rather than realized production costs. The timing of price and observed labor-cost responses may therefore differ (see Section 2.1). This issue is particularly relevant around the 2011 labor market opening, when the timing and magnitude of immigration-induced labor-cost changes were difficult for negotiating parties to predict.[46]

[43]Our wage measure captures employee gross earnings subject to social security contributions rather than total employer labor costs. Employer labor costs in Germany consist of gross remuneration plus employer-side non-wage labor costs, primarily employer social security contributions. Since these contributions are calculated largely as fixed percentages of gross earnings, percentage changes in gross wages closely approximate percentage changes in employer labor costs.

[44]Calculating care-level-specific pass-through would require information on both the labor-cost share and the wage response at each care level. We do not observe how labor costs are allocated across care levels, and the mix of assistants and qualified nurses may vary with care intensity, potentially generating different wage responses. A care-level-specific calculation would therefore require additional strong assumptions about both cost shares and workforce composition.

[45]Because the wage and price outcomes come from separate data infrastructures, they cannot be linked at the provider or regional level. Standard errors for $\widehat{\theta}$ are calculated using the delta method, under the simplifying assumption that the estimated coefficients $\widehat{\beta}_P$ and $\widehat{\beta}_W$ are uncorrelated.

[46]Table B9 reports year-specific estimates. From 2013 onward, the point estimates are generally close to one, although they remain imprecisely estimated.

8 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 supply-side effects of immigration.

Our headline result is that an additional foreign-born woman per 100 inhabitants reduces the price of care services by 2.6%. We then provide evidence that competition plays an important role in shaping this price response. The effects are largest for low-intensity care, where informal care is a closer substitute for nursing home care, and in initially less concentrated markets.

Guided by our conceptual framework, we examine the channels underlying the price decline. Immigration shifts the composition of the nursing home workforce toward foreign-born workers, who are disproportionately employed in lower-paid positions and have significantly less labor market experience in Germany, and reduces average wages by 3.7% by 2019. At the same time, we find no deterioration in inspection-based quality and no evidence of scale effects through changes in nursing home capacity or occupancy. Finally, immigration increases the take-up of informal care among individuals with low care needs, potentially strengthening competitive pressure on nursing homes and contributing to the larger price reductions in the low-care segment.

Overall, our results have broader policy implications. They show that immigration can lower prices in labor-intensive service industries without measurable declines in service quality. More competitive markets appear to strengthen the transmission of lower costs into prices, allowing consumers to benefit from these cost reductions. At the same time, part of the decline in labor costs reflects the concentration of foreign workers in lower-paid positions, potentially because experience and qualifications acquired abroad are not fully recognized. The resulting benefits for consumers should therefore be distinguished from the distributional consequences for foreign workers. These considerations are particularly relevant in the nursing home sector, where population aging and the resulting rise in long-term care needs may exacerbate labor shortages and put upward pressure on care prices.

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Online Appendix

A Additional institutional background on the German long-term care sector

In 2019, 9,045 nursing homes offered permanent care in Germany.[47] 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% (Federal Statistical Office, 2025a, b).[48] Entry into the nursing home market in Germany is not restricted. Facilities must meet certain building standards and comply with qualification and staffing requirements, but are otherwise free to operate.[49]

Each nursing home negotiates the overall price for its care services with state-level long-term care (LTC) insurance 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. The negotiations are based on *expected* costs, including labor, which accounts for approximately 70–80% of total expenditures in these facilities (Haun, 2020), and take into account appropriate compensation for entrepreneurial risk. Nursing homes are required to disclose their expected cost structures to the negotiating parties (see, e.g., Grant et al., 2021; Heger et al., 2025; Schmitz and Stroka, 2014).[50] For 2025, the average profit margin in nursing homes in Germany was estimated to be approximately 7.3%, with higher margins reported among for-profit providers (IBISWorld, 2025).[51] Market competition can influence both the assumptions underlying cost projections and the size of the risk premium. Negotiated prices also take into account the rates of comparable providers, creating an additional channel through which competition may shape prices. Nursing homes have considerable flexibility in setting prices, as negotiations generally do not impose significant constraints. As a result, there is substantial variation in care prices in nursing

[47] Overall, there were 11,317 nursing homes, however about 2,000 offered multiple kinds of care (e.g., day care, short-term care). In the empirical analysis, we focus on homes providing permanent (long-term) care only.

[48] 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.

[49] Staffing requirements regulate both the resident-to-nurse ratio and the qualification mix of the staff. See Sozialgesetzbuch Elftes Buch (SGB XI) § 84 Bemessungsgrundsätze, available at https://www.gesetze-im-internet.de/sgb_11/, last accessed January 2026.

[50] See SGB XI, §§ 82-87.

[51] The profit margin refers to all nursing homes classified under WZ 2008 code 87.30 (residential nursing care), which includes institutions providing long-term residential care for the elderly as well as for persons with disabilities, with elderly care facilities constituting the majority of the sector (around 60% of industry turnover).

homes, both within and across regions. In 2009, the median daily price was €53.76, while the 10th and 90th percentiles were €43.84 and €64.72, respectively. The interdecile range amounted to 38.2% of the mean price.[52] 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 by a collective agreement set wages according to clearly defined pay groups and experience-based steps. Facilities which were 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.[53] 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, 18% under an in-house collective agreement, and 37% of nursing homes paid wages without any collective agreement coverage (Bundesministerium für Gesundheit, 2016).

In German nursing homes, the workforce comprises different professional groups with distinct qualifications, responsibilities, and pay. Nursing is a licensed occupation, requiring either a domestic professional qualification (typically three years of vocational training) or the formal recognition of a foreign qualification. As immigrant labor has become an increasingly important feature of the long-term care workforce (Haan and Wnuk, 2024), the recognition of foreign credentials plays a central role. Since 2007, Germany has applied a standardized procedure to assess foreign credentials for regulated professions, including nursing, for EU citizens in line with the 2005 European Directive EC/2005/36a (Anger et al., 2024). To obtain recognition, nurses must demonstrate training equivalent to the German vocational program, sufficient German language proficiency (B2), medical fitness, and personal aptitude (e.g., no criminal record and evidence of reliability). The recognition process is complex, involves fees, and requires submission of documents in German, with translations by sworn or authorized translators.[54] In particular, financial

[52]Descriptive statistics rely on prices constructed by weighting facility-level average daily prices by the national distribution of care recipients across care levels; see Section 4 for details of the weighting.

[53]The statutory care sector minimum wage in Germany, which applies to qualified nurses, nursing assistants, and care aides, amounted to 8.50 (7.50) euros per hour in West (East) Germany in 2010 and 11.05 (10.55) euros per 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, last accessed January 2026.

[54]See https://www.anerkennung-in-deutschland.de/html/en, last accessed February 2026.

aspects and German language skills pose challenges (Bundesministerium für Bildung und Forschung, 2021). Consequently, some immigrants with foreign nursing degrees may choose to work as (lower-paid) nursing assistants or aides (hereafter "assistants"), as these occupations are not licensed and, hence, do not require formal recognition of qualifications.

Since 2009, German nursing homes have been evaluated regularly by an external institution, 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.[55] 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.[56]

Care-dependent individuals are free to choose among nursing homes and, even when restricting their search to their own district, they can select from an average of 20 facilities that provide long-term residential care.[57] Residents pay the price of care resulting from the negotiations described above minus—if eligible—a fixed monthly contribution from statutory LTC insurance, depending on their assigned care level.[58] The contribution of the LTC insurance 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 typically exceeds the LTC benefit, residents must co-pay, sometimes up to 50% of the total price (Schmitz and Westphal, 2017). Residents who cannot finance the remaining co-payment may receive means-tested social assistance through *Hilfe zur Pflege* (Geyer et al., 2025). 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.[59]

[55]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.

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

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

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

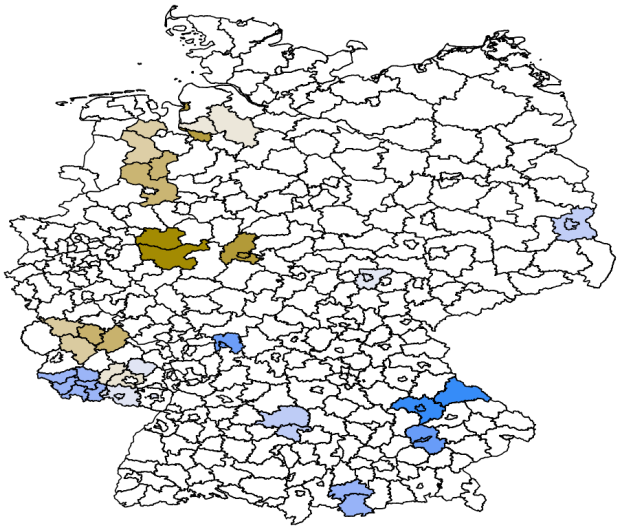
[59]For example, see AOK – Die Gesundheitskasse, n.d..

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 LTC insurance 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). In 2009, approximately 2.3 million individuals were classified as care-dependent under LTC insurance in Germany. 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 LTC benefits, alongside the impact of demographic aging.[60]

[60]See Statistisches Bundesamt (Destatis), 2020.

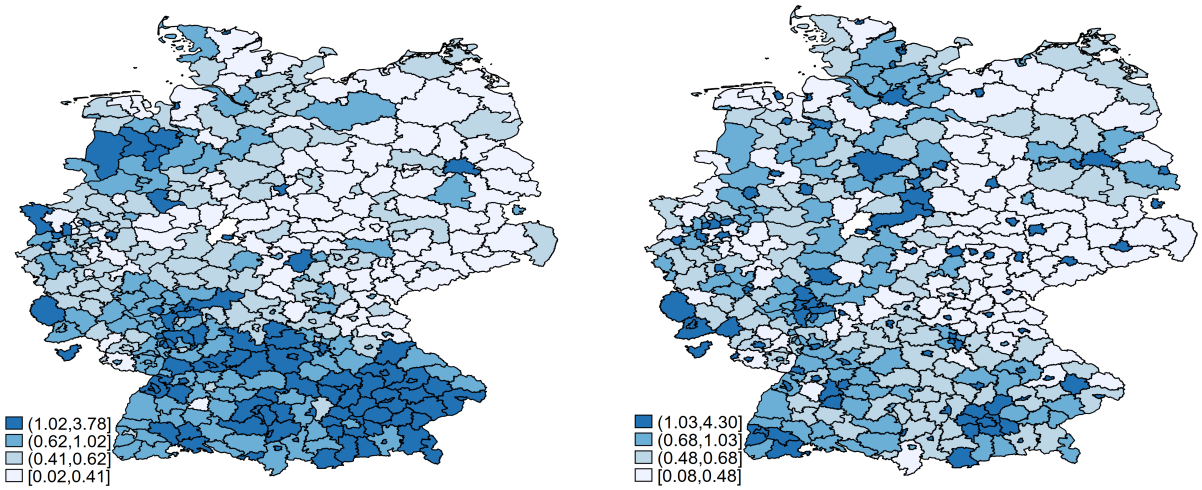
B Additional tables and figures

Figure B1: 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.

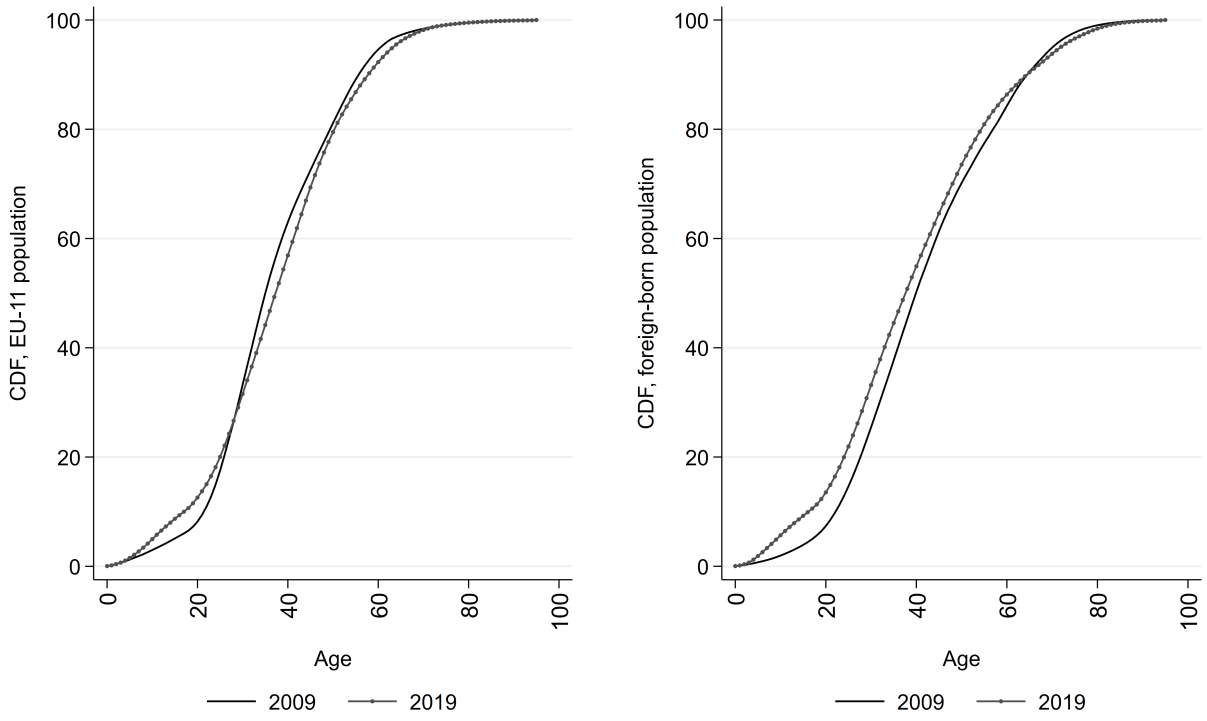
Figure B2: Net change in the stock of foreign-born women, 2009–2019



(a) EU-11 (b) Other origins

Notes: The maps display the net change in the number of foreign-born women 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 B3: Age distribution by origin

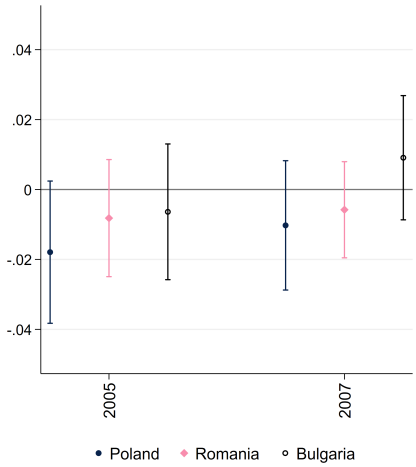


(a) EU-11

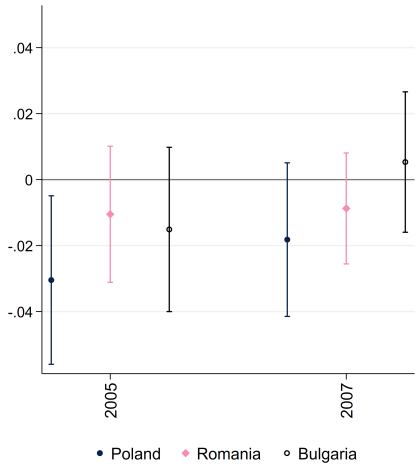
(b) All origins

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.

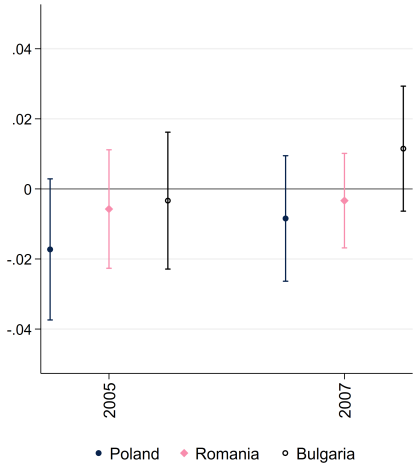
Figure B4: Pre-trend estimates for instruments with highest Rotemberg weights



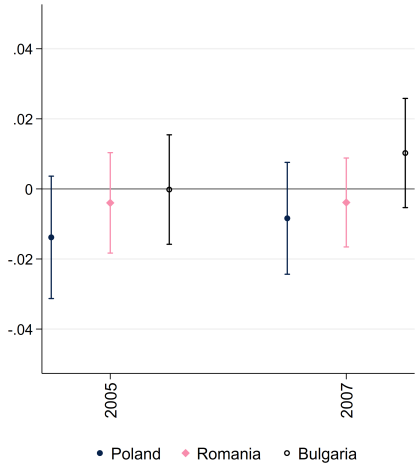
(a) Average price



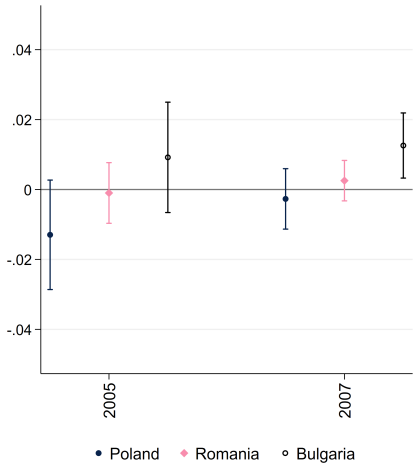
(b) Price of care, care level 1 (low)



(c) Price of care, care level 2 (medium)



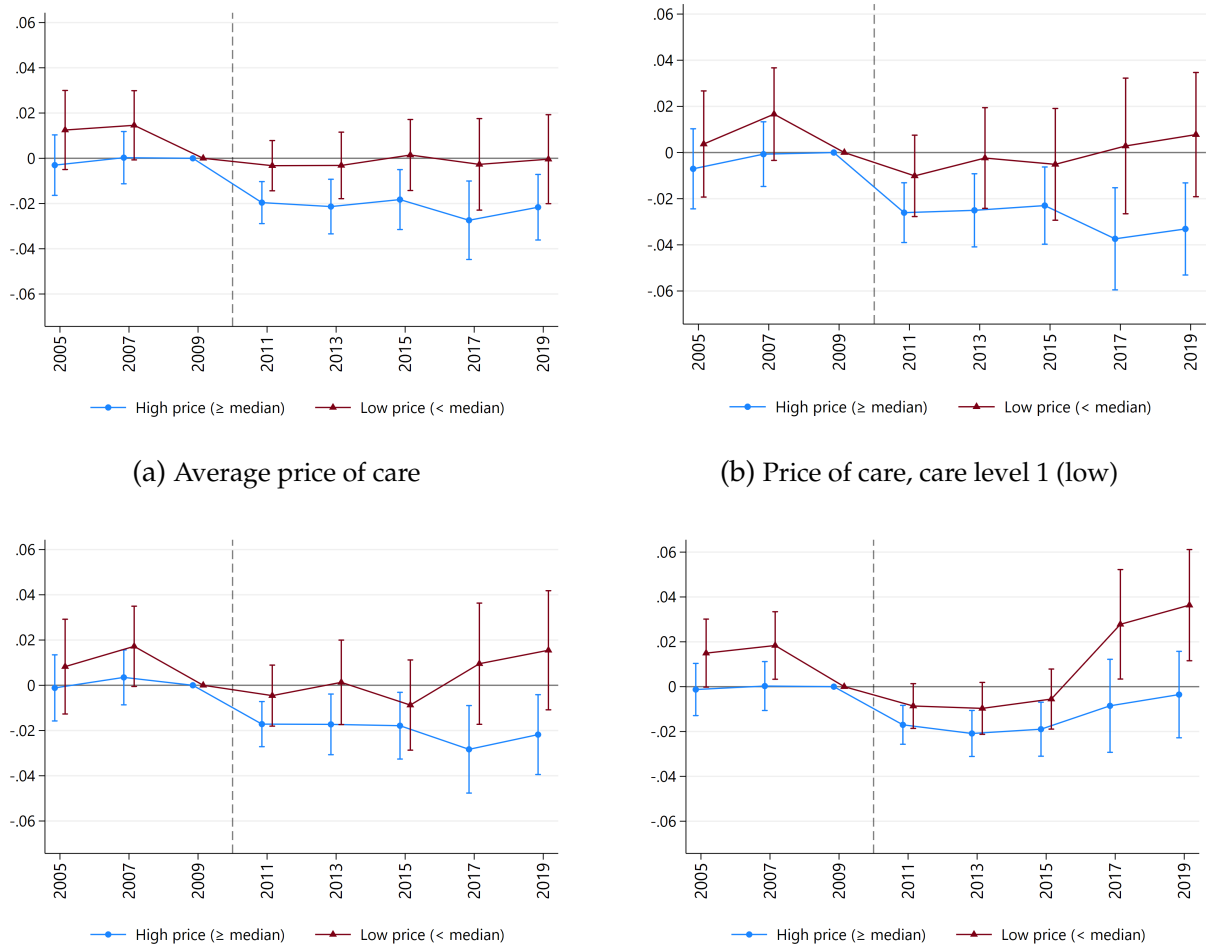
(d) Price of care, care level 3 (high)



(e) Price of room and board

Notes: Figure plots second-stage coefficients and 95% confidence intervals from estimating equation (5) using shift-share instruments corresponding to the origins with the highest Rotemberg weights: Poland, Romania, and Bulgaria, based on the sample of non-border regions (N=353).

Figure B5: Effect of immigration on price of care by pre-reform price level



(a) Average price of care

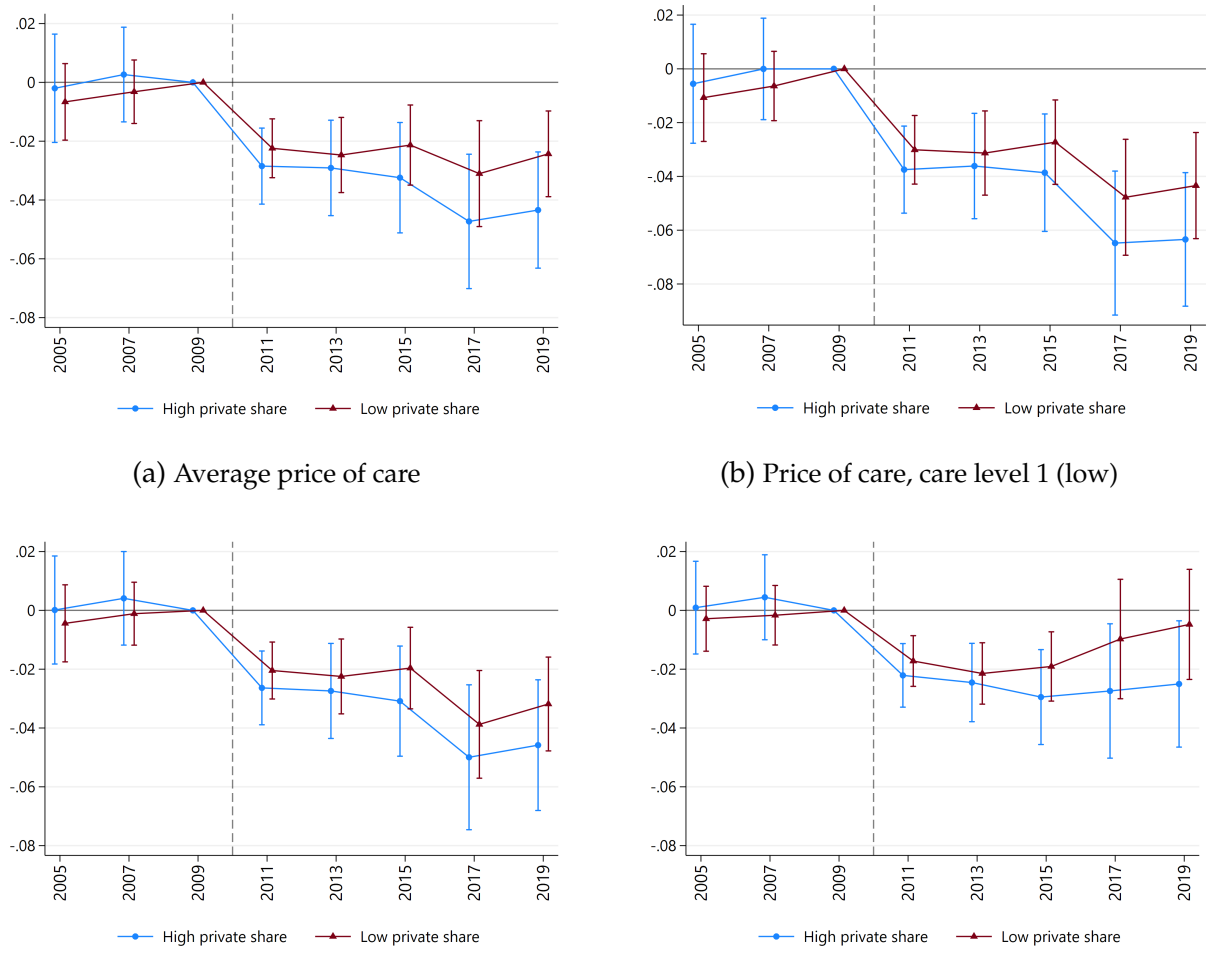
(b) Price of care, care level 1 (low)

(c) Price of care, care level 2 (medium)

(d) Price of care, care level 3 (high)

Notes: The figure displays the estimated effects of immigration on the price of care and their 95% confidence intervals, based on a sample of 353 regions (excluding border regions). The plotted coefficients correspond to interactions between the instrumented treatment in equation (5) and an indicator for high versus low price level in 2009, where *high* is defined as median regional price or above. The outcome variable is defined as 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 women per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019.

Figure B6: Effect of immigration on price of care by pre-reform regional share of for-profit facilities



(a) Average price of care

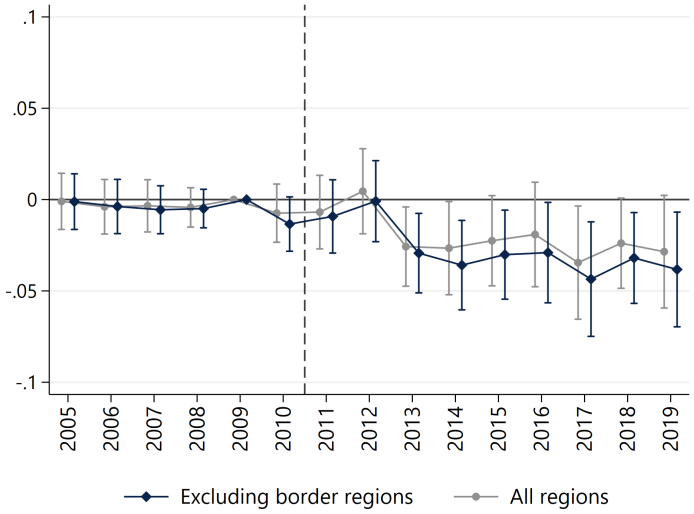
(b) Price of care, care level 1 (low)

(c) Price of care, care level 2 (medium)

(d) Price of care, care level 3 (high)

Notes: The figure displays the estimated effects of immigration on the price of care and their 95% confidence intervals, based on a sample of 353 regions (excluding border regions). The plotted coefficients correspond to interactions between the instrumented treatment in equation (5) and an indicator for high versus low share of for-profit facilities in 2009, where *high* is defined as median regional share (equal to 0.53) or above. The outcome variable is defined as 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 women per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019.

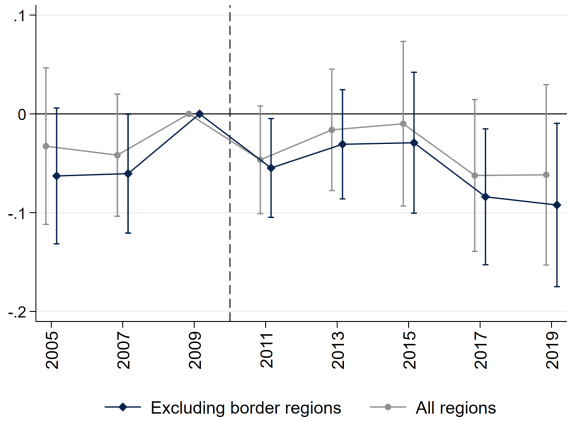
Figure B7: Effect of immigration on wages per full-time equivalent



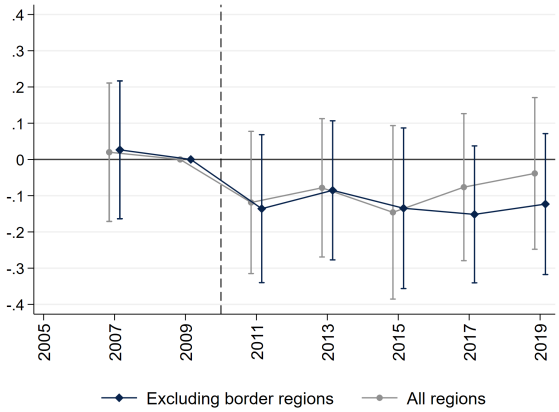
(a) Average wage per FTE

Notes: The figure displays the estimated effects of immigration on the average wage per full-time equivalent, along with 95% confidence intervals, obtained from the second stage of equation (5), estimated separately for each year from 2005 to 2019. Estimates are based on a sample of 353 regions (377 regions when including border regions). The outcome is defined as the log difference relative to 2009. The treatment variable is the instrumented change in the stock of foreign-born women per 100 inhabitants as of 2009, measured over the period from 2009 to 2019.

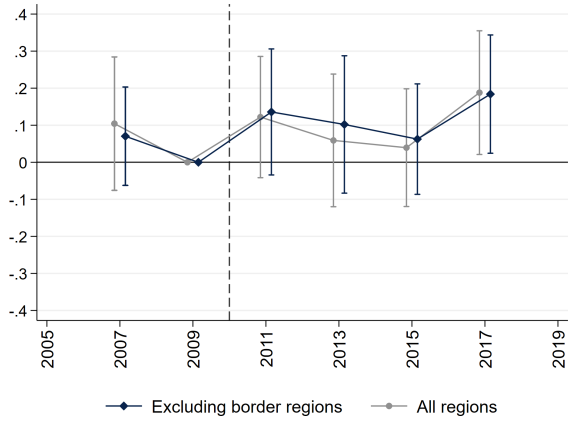
Figure B8: Effect of immigration on nursing home stock, entries and exits



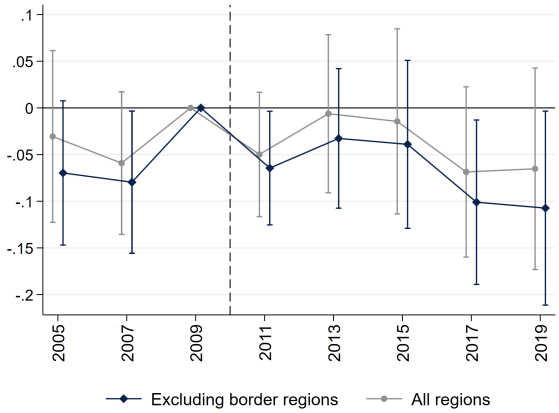
(a) Number of nursing homes



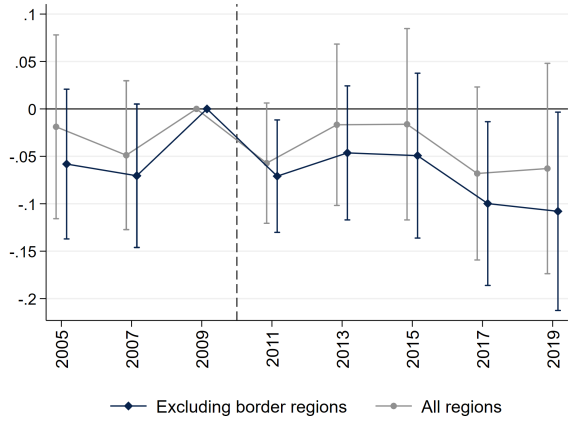
(b) Entries of nursing homes



(c) Exits of nursing homes



(d) Regional stock of available beds



(e) Regional stock of nursing home recipients

Notes: The figure displays the estimated effects on nursing home stock, entries and exits, as well as regional stocks of beds and nursing home recipients along with 95% confidence intervals, obtained from the second stage of equation (5), based on a sample of 353 regions (377 regions, when including 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 women per 100 inhabitants (as of 2009), measured over the period from 2009 to 2019.

Table B1: Descriptive statistics of nursing home outcomes, sample excl. border regions

Variable	2005	2009	2013	2017
Daily price in nursing homes in euros:				
Average price of care	52.63	54.84	56.17	66.40
	(5.70)	(6.13)	(5.60)	(7.15)
Price of care, care level 1 (low)	42.44	44.87	46.88	54.65
	(5.79)	(6.09)	(5.59)	(7.22)
Price of care, care level 2 (medium)	55.32	58.32	61.19	77.60
	(6.20)	(6.72)	(6.29)	(7.28)
Price of care, care level 3 (high)	69.12	72.61	76.46	86.07
	(6.58)	(7.34)	(7.55)	(7.19)
Price of room and board	18.69	19.63	20.79	23.00
	(3.39)	(3.72)	(4.06)	(4.45)
Worker characteristics in nursing homes:				
Stock of FTE workers	768.81	834.11	921.74	993.02
	(803.50)	(878.76)	(964.95)	(1043.83)
Stock of native FTE workers	717.76	776.77	839.12	851.04
	(736.17)	(804.76)	(859.73)	(867.07)
Share of foreign workers	0.05	0.05	0.07	0.11
	(0.05)	(0.05)	(0.06)	(0.08)
Average daily wage	54.92	54.76	57.70	64.17
	(6.21)	(6.08)	(6.48)	(6.53)
Capacity and occupancy of nursing homes:				
Facility capacity	77.77	77.03	76.25	77.36
	(19.46)	(19.24)	(17.86)	(16.42)
Facility occupancy	68.24	65.72	65.39	69.25
	(18.14)	(16.79)	(15.53)	(14.44)
Regional stock — nursing homes:				
Nursing homes	20.17	22.02	22.70	23.99
	(20.74)	(21.64)	(21.77)	(22.53)
Available places in nursing homes	1538.41	1677.48	1718.76	1839.53
	(1889.93)	(2014.03)	(2026.69)	(2109.88)
Nursing home care recipients	1350.47	1439.07	1495.71	1655.02
	(1653.00)	(1667.16)	(1745.49)	(1879.84)
Number of regions		353		

Notes: The depicted variables are constructed by first aggregating nursing home data within each region-year cell: price, facility capacity and occupancy, share of foreign workers as well as wage variables are averaged across facilities, while the other outcomes are summed (see Section 4). For this table, we take the average of these variables across regions for the years 2005, 2009, 2013, and 2017, excluding regions bordering Poland and the Czech Republic. Standard deviations are reported in parentheses in the row below each mean. Based on own calculations.

Table B2: Descriptive statistics of nursing home quality

Category	Wave 1	Wave 2	Wave 3
Medical & Nursing Care	0.541	0.687	0.777
	(0.167)	(0.117)	(0.086)
Nutrition & Hydration	0.753	0.857	0.886
	(0.099)	(0.067)	(0.057)
Organization & Quality Assurance	0.735	0.881	0.921
	(0.113)	(0.047)	(0.041)
Resident Satisfaction & Autonomy	0.777	0.839	0.854
	(0.095)	(0.063)	(0.056)
Social Support & Quality of Life	0.920	0.982	0.992
	(0.074)	(0.022)	(0.016)
Total	0.706	0.814	0.857
	(0.100)	(0.063)	(0.046)
Number of regions	369	377	377

Notes: The depicted variables are the regional-level averages of the share of observed facility–criterion assessments with no issues found during the inspection, across the three available waves. Based on the sample including all regions. Standard deviations are reported in parentheses in the row below each mean. Based on own calculations.

Table B3: Summary of Rotemberg weights, sample of all regions

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..

Table B4: Joint tests of pre-reform coefficients

Outcome	Joint p-value	Joint χ^2 statistic
Daily price in nursing homes:		
Δ Log average price of care	0.634	0.91
Δ Log price of room and board	0.356	2.06
Δ Log price of care, care level 1	0.477	1.48
Δ Log price of care, care level 2	0.765	0.54
Δ Log price of care, care level 3	0.905	0.20
Worker characteristics in nursing homes:		
Δ Log FTE staff	0.633	0.91
Δ Log native FTE staff	0.594	1.04
Δ Share of foreign workers	0.535	1.25
Δ Log mean wage	0.226	2.97
Δ Log mean age	0.658	0.84
Δ Log average LM experience	0.130	4.07
Capacity and occupancy of nursing homes:		
Δ Log number facilities	0.140	3.94
Δ Log places available	0.375	1.96
Δ Log NH residents	0.531	1.27
Δ Log ambulatory care recipients	0.044	6.25
Δ Log informal care recipients	0.590	1.05

Notes: The table reports joint tests of the null hypothesis that the estimated pre-reform coefficients for $year = 2005, 2007$ are equal to zero for a given outcome. The tests are based on the main specification, i.e. second-stage IV results with the baseline controls, where the immigration treatment is instrumented with a shift-share instrument depicted in equation (6). Regressions are based on 353 regions.

Table B5: High-minus-low HHI differences in the estimated effects of immigration on care prices, by year

	Difference in the effect on Δ log price of care: High HHI $-$ Low HHI			
Year	Average	Level 1	Level 2	Level 3
2005	0.009	0.012*	0.008	0.007
	(0.005)	(0.007)	(0.006)	(0.005)
2007	0.005	0.006	0.005	0.005
	(0.004)	(0.005)	(0.004)	(0.004)
2011	0.006*	0.008*	0.005	0.005
	(0.004)	(0.004)	(0.003)	(0.003)
2013	0.013***	0.016***	0.013***	0.010***
	(0.004)	(0.005)	(0.004)	(0.003)
2015	0.013***	0.016***	0.013***	0.010**
	(0.005)	(0.006)	(0.005)	(0.004)
2017	0.020***	0.019***	0.027***	0.010
	(0.006)	(0.007)	(0.006)	(0.007)
2019	0.012**	0.011*	0.019***	0.003
	(0.005)	(0.006)	(0.005)	(0.006)

Notes: The table reports formal tests of whether the effect of immigration on care prices differs between high- and low-HHI regions. The HHI is calculated as the sum of squared facility-level shares of nursing home residents within each region in 2009, and regions are classified as high or low concentration using a threshold of 0.15. Each entry is the coefficient on the interaction between the instrumented immigration measure and an indicator for high HHI, estimated separately by year and outcome. The coefficient therefore represents the high-minus-low difference in the estimated immigration effect; the corresponding group-specific estimates are reported in Figure 5. The regressions use the baseline controls and exclude border regions. Robust standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B6: Effect of immigration on nursing home prices, full results

			IV							
		OLS	Main	All regions	Alternative controls 1	Alternative controls 2	East DE dummy	Elderly weighted	EU-11 treatment	Both genders
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Log average price of care	2005	–0.003	–0.006	–0.006	–0.010*	–0.018	–0.007	–0.010*	–0.015	–0.003
		(0.004)	(0.007)	(0.007)	(0.006)	(0.011)	(0.007)	(0.006)	(0.016)	(0.003)
	2007	–0.002	–0.003	–0.003	–0.009*	–0.009	–0.002	–0.003	–0.007	–0.001
		(0.004)	(0.006)	(0.005)	(0.005)	(0.009)	(0.006)	(0.004)	(0.014)	(0.002)
	2011	–0.009**	–0.023***	–0.018***	–0.021***	–0.035***	–0.023***	–0.023***	–0.056***	–0.010***
		(0.004)	(0.005)	(0.007)	(0.004)	(0.010)	(0.005)	(0.009)	(0.014)	(0.002)
	2013	–0.013***	–0.025***	–0.024***	–0.028***	–0.032***	–0.024***	–0.030**	–0.062***	–0.011***
		(0.004)	(0.007)	(0.006)	(0.006)	(0.010)	(0.007)	(0.012)	(0.019)	(0.003)
	2015	–0.011**	–0.022***	–0.017**	–0.019***	–0.031***	–0.021***	–0.032***	–0.055***	–0.009***
		(0.005)	(0.007)	(0.007)	(0.006)	(0.011)	(0.007)	(0.011)	(0.019)	(0.003)
	2017	–0.016***	–0.032***	–0.023**	–0.034***	–0.049***	–0.028***	–0.038**	–0.080***	–0.014***
		(0.005)	(0.009)	(0.010)	(0.008)	(0.014)	(0.009)	(0.017)	(0.025)	(0.004)
	2019	–0.015***	–0.026***	–0.013	–0.031***	–0.042***	–0.019***	–0.027**	–0.064***	–0.011***
		(0.005)	(0.008)	(0.012)	(0.007)	(0.012)	(0.007)	(0.012)	(0.020)	(0.003)
Δ Log price of care, care level 1	2005	–0.004	–0.010	–0.009	–0.013*	–0.023	–0.011	–0.016**	–0.025	–0.004
		(0.006)	(0.008)	(0.008)	(0.007)	(0.014)	(0.009)	(0.008)	(0.021)	(0.004)
	2007	–0.002	–0.006	–0.006	–0.012**	–0.014	–0.006	–0.006	–0.014	–0.003
		(0.005)	(0.007)	(0.007)	(0.006)	(0.012)	(0.007)	(0.005)	(0.016)	(0.003)
	2011	–0.011**	–0.031***	–0.025***	–0.028***	–0.045***	–0.031***	–0.032**	–0.076***	–0.013***
		(0.005)	(0.007)	(0.008)	(0.006)	(0.013)	(0.007)	(0.013)	(0.019)	(0.003)
	2013	–0.014***	–0.032***	–0.031***	–0.037***	–0.040***	–0.031***	–0.036**	–0.078***	–0.013***
		(0.005)	(0.008)	(0.008)	(0.007)	(0.012)	(0.008)	(0.016)	(0.024)	(0.003)
	2015	–0.012**	–0.028***	–0.024***	–0.025***	–0.040***	–0.028***	–0.042***	–0.069***	–0.012***
		(0.005)	(0.008)	(0.008)	(0.007)	(0.013)	(0.008)	(0.014)	(0.022)	(0.004)
	2017	–0.027***	–0.049***	–0.038***	–0.047***	–0.073***	–0.046***	–0.063**	–0.121***	–0.019***
		(0.007)	(0.011)	(0.012)	(0.010)	(0.018)	(0.011)	(0.026)	(0.033)	(0.005)
	2019	–0.026***	–0.045***	–0.029**	–0.050***	–0.068***	–0.038***	–0.054***	–0.111***	–0.019***
		(0.007)	(0.010)	(0.013)	(0.009)	(0.017)	(0.010)	(0.020)	(0.030)	(0.004)

Notes: The table reports estimates of Equation (5) for our main specification and sample as well as under alternative specifications and samples. Column (1) presents OLS results with baseline controls for the main sample. Column (2) shows second-stage IV results with the same controls for the main sample (also shown in Fig. 4). Column (3) considers an alternative sample including all regions. Column (4) uses an alternative control set: fertility rate and ratio of facilities to elderly above 75. Column (5) extends the baseline control set to additionally include local GDP per capita, unemployment rate, and proportion of women among unemployed. Column (6) extends the baseline control set by adding a dummy for East Germany. Column (7) weights observations by the regional population aged 75 and above in 2009. Column (8) defines the endogenous treatment variable using the change in the stock of foreign-born women from the EU-11 countries only. Column (9) builds the treatment and the instrument using both genders. Regressions are based on 353 regions, except for column 3, which uses 377 regions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B6: Effect of immigration on nursing home prices, full results (continued)

			IV							
		OLS	Main	All regions	Alternative controls 1	Alternative controls 2	East DE dummy	Elderly weighted	EU-11 treatment	Both genders
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Log price of care, care level 2	2005	–0.002	–0.004	–0.004	–0.008	–0.014	–0.004	–0.007	–0.010	–0.002
		(0.004)	(0.007)	(0.007)	(0.006)	(0.011)	(0.007)	(0.005)	(0.016)	(0.003)
	2007	–0.001	–0.001	–0.002	–0.007	–0.005	–0.000	–0.000	–0.002	–0.000
		(0.003)	(0.006)	(0.005)	(0.005)	(0.009)	(0.006)	(0.004)	(0.014)	(0.002)
	2011	–0.008**	–0.021***	–0.017***	–0.020***	–0.031***	–0.021***	–0.021***	–0.052***	–0.009***
		(0.003)	(0.005)	(0.006)	(0.004)	(0.009)	(0.005)	(0.008)	(0.013)	(0.002)
	2013	–0.012***	–0.023***	–0.022***	–0.026***	–0.028***	–0.022***	–0.027**	–0.056***	–0.010***
		(0.004)	(0.007)	(0.006)	(0.006)	(0.010)	(0.007)	(0.011)	(0.018)	(0.003)
	2015	–0.010**	–0.021***	–0.016**	–0.018***	–0.026**	–0.020***	–0.031***	–0.051***	–0.009***
		(0.004)	(0.007)	(0.007)	(0.006)	(0.011)	(0.007)	(0.011)	(0.019)	(0.003)
	2017	–0.021***	–0.040***	–0.028**	–0.046***	–0.052***	–0.034***	–0.045***	–0.098***	–0.017***
		(0.005)	(0.009)	(0.011)	(0.008)	(0.014)	(0.009)	(0.016)	(0.027)	(0.004)
	2019	–0.019***	–0.033***	–0.019	–0.042***	–0.046***	–0.025***	–0.035***	–0.081***	–0.014***
		(0.005)	(0.008)	(0.013)	(0.007)	(0.013)	(0.008)	(0.011)	(0.023)	(0.004)
Δ Log price of care, care level 3	2005	–0.000	–0.003	–0.002	–0.006	–0.014	–0.003	–0.004	–0.006	–0.001
		(0.004)	(0.006)	(0.006)	(0.005)	(0.010)	(0.006)	(0.004)	(0.014)	(0.002)
	2007	–0.001	–0.001	–0.001	–0.006	–0.007	–0.000	–0.000	–0.003	–0.001
		(0.003)	(0.005)	(0.005)	(0.005)	(0.009)	(0.005)	(0.004)	(0.013)	(0.002)
	2011	–0.007**	–0.018***	–0.013**	–0.016***	–0.030***	–0.018***	–0.015***	–0.043***	–0.007***
		(0.003)	(0.004)	(0.006)	(0.004)	(0.008)	(0.005)	(0.006)	(0.011)	(0.002)
	2013	–0.012***	–0.022***	–0.019***	–0.021***	–0.028***	–0.021***	–0.026**	–0.053***	–0.009***
		(0.003)	(0.005)	(0.005)	(0.005)	(0.009)	(0.005)	(0.010)	(0.016)	(0.002)
	2015	–0.010***	–0.020***	–0.014**	–0.016***	–0.029***	–0.019***	–0.026***	–0.049***	–0.008***
		(0.004)	(0.006)	(0.007)	(0.005)	(0.010)	(0.006)	(0.010)	(0.016)	(0.003)
	2017	–0.003	–0.011	–0.010	–0.017**	–0.023	–0.007	–0.001	–0.028	–0.005
		(0.006)	(0.010)	(0.011)	(0.009)	(0.017)	(0.011)	(0.013)	(0.025)	(0.004)
	2019	–0.002	–0.007	–0.002	–0.015*	–0.018	–0.000	0.008	–0.016	–0.003
		(0.006)	(0.010)	(0.012)	(0.008)	(0.016)	(0.010)	(0.011)	(0.023)	(0.004)

Notes: The table reports estimates of Equation (5) for our main specification and sample as well as under alternative specifications and samples. Column (1) presents OLS results with baseline controls for the main sample. Column (2) shows second-stage IV results with the same controls for the main sample (also shown in Fig. 4). Column (3) considers an alternative sample including all regions. Column (4) uses an alternative control set: fertility rate and ratio of facilities to elderly above 75. Column (5) extends the baseline control set to additionally include local GDP per capita, unemployment rate, and proportion of women among unemployed. Column (6) extends the baseline control set by adding a dummy for East Germany. Column (7) weights observations by the regional population aged 75 and above in 2009. Column (8) defines the endogenous treatment variable using the change in the stock of foreign-born women from the EU-11 countries only. Column (9) builds the treatment and the instrument using both genders. Regressions are based on 353 regions, except for column 3, which uses 377 regions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B6: Effect of immigration on nursing home prices, full results (continued)

			IV							
		OLS	Main	All regions	Alternative controls 1	Alternative controls 2	East DE dummy	Elderly weighted	EU-11 treatment	Both genders
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Log price of room and board	2005	–0.000	0.003	0.000	–0.001	0.001	0.004	0.008**	0.006	0.001
		(0.002)	(0.004)	(0.004)	(0.003)	(0.006)	(0.004)	(0.004)	(0.009)	(0.002)
	2007	–0.000	0.003	0.003	–0.001	0.004	0.005*	0.008***	0.009	0.001
		(0.002)	(0.003)	(0.003)	(0.002)	(0.005)	(0.003)	(0.002)	(0.007)	(0.001)
	2011	–0.003**	–0.001	–0.001	0.002	0.001	–0.002	–0.003	–0.003	–0.000
		(0.001)	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)	(0.002)	(0.006)	(0.001)
	2013	–0.003	–0.004	–0.002	–0.000	–0.006	–0.005	–0.009*	–0.011	–0.002
		(0.003)	(0.004)	(0.004)	(0.003)	(0.005)	(0.004)	(0.005)	(0.009)	(0.002)
	2015	0.000	–0.000	0.001	0.006	0.002	–0.001	–0.006	–0.000	0.000
		(0.003)	(0.004)	(0.004)	(0.004)	(0.006)	(0.004)	(0.006)	(0.010)	(0.002)
	2017	–0.001	–0.002	–0.001	0.005	–0.001	–0.002	–0.011	–0.006	–0.001
		(0.004)	(0.007)	(0.007)	(0.006)	(0.009)	(0.007)	(0.009)	(0.017)	(0.003)
	2019	0.001	0.005	0.008	0.013**	0.006	0.005	–0.007	0.012	0.002
		(0.004)	(0.006)	(0.007)	(0.006)	(0.010)	(0.007)	(0.008)	(0.016)	(0.003)

Notes: The table reports estimates of Equation (5) under various specifications. Column (1) presents OLS results with baseline controls and regional sample. Column (2) shows second-stage IV results with the same controls (also shown in Fig. 4). Column (3) includes all regions. Column (4) uses an alternative control set: fertility rate and ratio of facilities to elderly above 75. Column (5) extends the baseline control set to additionally include local GDP per capita, unemployment rate, and proportion of women among unemployed. Column (6) extends the baseline control set by adding a dummy for East Germany. Column (7) weights observations by the regional population aged 75 and above in 2009. Column (8) defines the endogenous treatment variable using the change in the stock of foreign-born women from the EU-11 countries only. Column (9) builds the treatment and the instrument using both genders. Regressions are based on 353 regions, except for column 3, which uses 377 regions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B7: Effect of immigration on employment and wages, full results

			IV					
		OLS	Main	All regions	Alternative controls 1	East DE dummy	EU-11 treatment	Both genders
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Log FTE staff	2005	–0.008	0.015	0.016	0.024*	0.009	0.037	0.007
		(0.010)	(0.016)	(0.017)	(0.013)	(0.016)	(0.040)	(0.007)
	2006	–0.005	0.008	0.006	0.015	0.004	0.021	0.004
		(0.009)	(0.012)	(0.013)	(0.010)	(0.013)	(0.030)	(0.005)
	2007	–0.002	0.007	0.001	0.011	0.002	0.016	0.003
		(0.008)	(0.012)	(0.012)	(0.010)	(0.013)	(0.030)	(0.005)
	2008	–0.009	0.004	0.001	0.005	0.001	0.009	0.002
		(0.006)	(0.009)	(0.009)	(0.008)	(0.009)	(0.022)	(0.004)
	2010	–0.002	0.010	0.009	0.006	0.012	0.024	0.004
		(0.006)	(0.010)	(0.009)	(0.009)	(0.010)	(0.024)	(0.004)
	2011	–0.007	0.020	0.014	0.021	0.019	0.048	0.009
		(0.009)	(0.020)	(0.019)	(0.019)	(0.020)	(0.051)	(0.008)
	2012	–0.012	0.014	0.005	0.023	0.014	0.034	0.006
		(0.013)	(0.024)	(0.024)	(0.024)	(0.025)	(0.061)	(0.010)
	2013	–0.007	0.008	0.001	0.011	0.009	0.021	0.004
		(0.012)	(0.024)	(0.024)	(0.023)	(0.025)	(0.060)	(0.010)
	2014	0.003	0.006	–0.002	0.001	0.007	0.014	0.003
		(0.011)	(0.022)	(0.022)	(0.023)	(0.022)	(0.054)	(0.009)
	2015	0.006	0.009	–0.002	0.004	0.011	0.021	0.004
		(0.012)	(0.022)	(0.023)	(0.024)	(0.023)	(0.055)	(0.009)
	2016	0.007	0.003	–0.013	–0.005	0.006	0.007	0.001
		(0.012)	(0.022)	(0.024)	(0.025)	(0.023)	(0.055)	(0.009)
	2017	–0.002	–0.005	–0.017	–0.011	–0.000	–0.012	–0.002
		(0.012)	(0.024)	(0.025)	(0.026)	(0.024)	(0.058)	(0.010)
	2018	–0.007	–0.020	–0.033	–0.026	–0.015	–0.048	–0.008
		(0.013)	(0.026)	(0.027)	(0.028)	(0.026)	(0.063)	(0.011)
	2019	0.006	–0.002	–0.012	–0.009	0.000	–0.005	–0.000
		(0.014)	(0.027)	(0.027)	(0.029)	(0.027)	(0.066)	(0.011)
Δ Log native FTE staff	2005	–0.008	0.016	0.018	0.025*	0.009	0.040	0.008
		(0.010)	(0.016)	(0.017)	(0.013)	(0.016)	(0.041)	(0.007)
	2006	–0.004	0.012	0.010	0.017*	0.007	0.029	0.006
		(0.009)	(0.013)	(0.013)	(0.010)	(0.013)	(0.031)	(0.005)
	2007	–0.001	0.010	0.005	0.014	0.006	0.025	0.005
		(0.008)	(0.013)	(0.013)	(0.010)	(0.013)	(0.032)	(0.005)
	2008	–0.010	0.004	0.001	0.006	0.001	0.010	0.002
		(0.006)	(0.009)	(0.009)	(0.008)	(0.010)	(0.023)	(0.004)
	2010	–0.003	0.010	0.009	0.006	0.012	0.025	0.004
		(0.006)	(0.009)	(0.009)	(0.009)	(0.010)	(0.024)	(0.004)
	2011	–0.008	0.020	0.014	0.021	0.020	0.050	0.009
		(0.009)	(0.021)	(0.021)	(0.021)	(0.022)	(0.055)	(0.009)
	2012	–0.018	0.004	–0.004	0.013	0.005	0.009	0.002
		(0.014)	(0.026)	(0.026)	(0.026)	(0.027)	(0.064)	(0.011)
	2013	–0.017	–0.013	–0.019	–0.010	–0.012	–0.032	–0.005
		(0.012)	(0.025)	(0.025)	(0.024)	(0.026)	(0.061)	(0.011)
	2014	–0.014	–0.029	–0.035	–0.033	–0.027	–0.071	–0.012
		(0.012)	(0.022)	(0.023)	(0.023)	(0.022)	(0.053)	(0.009)
	2015	–0.016	–0.039*	–0.047**	–0.044*	–0.036	–0.096*	–0.016*
		(0.012)	(0.022)	(0.023)	(0.024)	(0.023)	(0.055)	(0.009)
	2016	–0.023*	–0.062***	–0.074***	–0.069***	–0.058**	–0.153***	–0.026***
		(0.012)	(0.023)	(0.024)	(0.025)	(0.023)	(0.059)	(0.009)
	2017	–0.040***	–0.087***	–0.095***	–0.092***	–0.080***	–0.213***	–0.037***
		(0.012)	(0.025)	(0.026)	(0.027)	(0.025)	(0.068)	(0.011)
	2018	–0.055***	–0.115***	–0.123***	–0.121***	–0.107***	–0.283***	–0.048***
		(0.013)	(0.028)	(0.029)	(0.030)	(0.028)	(0.081)	(0.012)
	2019	–0.053***	–0.117***	–0.121***	–0.123***	–0.111***	–0.288***	–0.050***
		(0.015)	(0.030)	(0.030)	(0.032)	(0.030)	(0.087)	(0.013)

Notes: See notes of Table B6 for details. *** p<0.01, ** p<0.05, * p<0.1.

Table B7: Effect of immigration on employment and wages, full results (continued)

			IV					
		OLS	Main	All regions	Alternative controls 1	East DE dummy	EU-11 treatment	Both genders
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Share of foreign workers	2005	–0.000	–0.002	–0.001	–0.003	–0.002	–0.004	–0.001
		(0.001)	(0.003)	(0.003)	(0.002)	(0.003)	(0.006)	(0.001)
	2006	–0.001	–0.004*	–0.003	–0.005**	–0.004	–0.010*	–0.002*
		(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.001)
	2007	–0.000	–0.002	–0.002	–0.003*	–0.002	–0.005	–0.001
		(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)	(0.001)
	2008	0.001	–0.001	–0.001	–0.002	–0.001	–0.003	–0.001
		(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)	(0.001)
	2010	0.001	0.000	0.000	0.000	0.000	0.000	0.000
		(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)	(0.001)
	2011	–0.000	–0.003	–0.003	–0.003	–0.003	–0.007	–0.001
		(0.001)	(0.003)	(0.003)	(0.003)	(0.003)	(0.008)	(0.001)
	2012	0.003	0.005	0.004	0.004	0.004	0.011	0.002
		(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.008)	(0.001)
	2013	0.006***	0.014***	0.013***	0.013***	0.013***	0.034***	0.006***
		(0.002)	(0.004)	(0.003)	(0.003)	(0.004)	(0.009)	(0.001)
	2014	0.011***	0.022***	0.020***	0.021***	0.021***	0.054***	0.009***
		(0.002)	(0.005)	(0.005)	(0.004)	(0.005)	(0.015)	(0.002)
	2015	0.013***	0.025***	0.023***	0.024***	0.023***	0.061***	0.011***
		(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.017)	(0.002)
	2016	0.017***	0.036***	0.033***	0.036***	0.034***	0.088***	0.015***
		(0.004)	(0.008)	(0.008)	(0.007)	(0.008)	(0.025)	(0.003)
	2017	0.022***	0.037***	0.035***	0.039***	0.035***	0.092***	0.016***
		(0.004)	(0.007)	(0.007)	(0.007)	(0.007)	(0.023)	(0.003)
	2018	0.028***	0.048***	0.045***	0.049***	0.046***	0.118***	0.021***
		(0.004)	(0.009)	(0.008)	(0.008)	(0.008)	(0.030)	(0.004)
	2019	0.030***	0.049***	0.045***	0.052***	0.046***	0.121***	0.021***
		(0.005)	(0.010)	(0.009)	(0.009)	(0.009)	(0.033)	(0.004)
Δ Log mean wage	2005	–0.002	–0.010	–0.006	–0.014**	–0.007	–0.025	–0.005
		(0.004)	(0.007)	(0.008)	(0.006)	(0.007)	(0.017)	(0.003)
	2006	–0.008*	–0.012*	–0.010	–0.015**	–0.009	–0.030*	–0.005*
		(0.004)	(0.007)	(0.007)	(0.006)	(0.007)	(0.017)	(0.003)
	2007	–0.002	–0.009	–0.005	–0.013***	–0.007	–0.022	–0.004
		(0.004)	(0.006)	(0.006)	(0.005)	(0.006)	(0.015)	(0.002)
	2008	–0.001	–0.006	–0.003	–0.008*	–0.005	–0.014	–0.003
		(0.003)	(0.005)	(0.006)	(0.005)	(0.005)	(0.013)	(0.002)
	2010	–0.003	–0.011	–0.007	–0.007	–0.012	–0.026	–0.005
		(0.004)	(0.007)	(0.008)	(0.007)	(0.008)	(0.018)	(0.003)
	2011	–0.007	–0.005	–0.003	–0.002	–0.006	–0.012	–0.002
		(0.005)	(0.009)	(0.009)	(0.008)	(0.009)	(0.021)	(0.004)
	2012	–0.005	0.001	0.004	–0.001	0.000	0.001	–0.000
		(0.005)	(0.009)	(0.010)	(0.008)	(0.009)	(0.022)	(0.004)
	2013	–0.012*	–0.027***	–0.024**	–0.023**	–0.027**	–0.065**	–0.012***
		(0.006)	(0.010)	(0.011)	(0.009)	(0.010)	(0.026)	(0.004)
	2014	–0.011*	–0.032***	–0.025**	–0.028***	–0.033***	–0.079***	–0.014***
		(0.006)	(0.011)	(0.011)	(0.010)	(0.011)	(0.027)	(0.004)
	2015	–0.012*	–0.027**	–0.021*	–0.027***	–0.027**	–0.067**	–0.012**
		(0.007)	(0.011)	(0.012)	(0.010)	(0.012)	(0.028)	(0.005)
	2016	–0.013*	–0.026**	–0.020	–0.030***	–0.025**	–0.063**	–0.011**
		(0.007)	(0.012)	(0.012)	(0.010)	(0.012)	(0.028)	(0.005)
	2017	–0.018**	–0.039***	–0.033**	–0.043***	–0.037***	–0.096***	–0.017***
		(0.007)	(0.014)	(0.014)	(0.012)	(0.014)	(0.035)	(0.006)
	2018	–0.019***	–0.030***	–0.024*	–0.035***	–0.027**	–0.073***	–0.013***
		(0.007)	(0.011)	(0.012)	(0.010)	(0.012)	(0.028)	(0.005)
	2019	–0.021***	–0.037***	–0.031**	–0.039***	–0.034**	–0.091**	–0.016***
		(0.007)	(0.014)	(0.015)	(0.013)	(0.014)	(0.037)	(0.006)

Notes: Specification definitions correspond to the identically named specifications in Table B6. See Table B6 for details. *** p<0.01, ** p<0.05, * p<0.1.

Table B8: Effect of immigration on the workforce composition, full results

			IV					
		OLS	Main	All regions	Alternative controls 1	East DE dummy	EU-11 treatment	Both genders
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Log average LM experience	2005	0.015***	0.005	0.002	0.017**	–0.002	0.013	0.003
		(0.005)	(0.007)	(0.008)	(0.007)	(0.006)	(0.017)	(0.003)
	2006	0.008*	–0.002	–0.009	0.005	–0.007	–0.006	–0.001
		(0.004)	(0.006)	(0.007)	(0.006)	(0.006)	(0.015)	(0.003)
	2007	0.003	–0.005	–0.008	0.001	–0.008	–0.013	–0.002
		(0.004)	(0.005)	(0.006)	(0.005)	(0.005)	(0.013)	(0.002)
	2008	–0.001	–0.003	–0.004	0.001	–0.005	–0.008	–0.001
		(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.011)	(0.002)
	2010	0.001	–0.004	–0.003	–0.003	–0.004	–0.011	–0.002
		(0.004)	(0.006)	(0.007)	(0.006)	(0.006)	(0.016)	(0.003)
	2011	–0.008*	–0.017**	–0.016**	–0.019**	–0.015*	–0.042**	–0.007**
		(0.005)	(0.008)	(0.008)	(0.008)	(0.008)	(0.020)	(0.003)
	2012	–0.004	–0.007	–0.005	–0.015*	–0.002	–0.017	–0.003
		(0.005)	(0.009)	(0.009)	(0.009)	(0.009)	(0.022)	(0.004)
	2013	–0.014**	–0.031***	–0.029**	–0.040***	–0.025**	–0.076**	–0.013***
		(0.006)	(0.011)	(0.012)	(0.011)	(0.011)	(0.030)	(0.005)
	2014	–0.022***	–0.048***	–0.043***	–0.062***	–0.040***	–0.119***	–0.021***
		(0.006)	(0.014)	(0.014)	(0.014)	(0.013)	(0.037)	(0.006)
	2015	–0.026***	–0.046***	–0.041***	–0.066***	–0.036***	–0.113***	–0.020***
		(0.007)	(0.014)	(0.014)	(0.015)	(0.013)	(0.037)	(0.006)
	2016	–0.028***	–0.054***	–0.046***	–0.076***	–0.043***	–0.132***	–0.024***
		(0.008)	(0.016)	(0.016)	(0.016)	(0.014)	(0.042)	(0.006)
	2017	–0.031***	–0.063***	–0.054***	–0.086***	–0.050***	–0.154***	–0.027***
		(0.008)	(0.018)	(0.018)	(0.018)	(0.016)	(0.048)	(0.007)
	2018	–0.036***	–0.060***	–0.050***	–0.085***	–0.046***	–0.147***	–0.026***
		(0.008)	(0.016)	(0.016)	(0.015)	(0.013)	(0.044)	(0.006)
	2019	–0.042***	–0.066***	–0.054***	–0.091***	–0.051***	–0.163***	–0.029***
		(0.009)	(0.019)	(0.020)	(0.019)	(0.016)	(0.054)	(0.008)
Δ Log mean age	2005	0.002	–0.001	0.001	–0.002	0.001	–0.003	–0.000
		(0.002)	(0.004)	(0.004)	(0.003)	(0.004)	(0.009)	(0.002)
	2006	–0.001	–0.002	–0.003	–0.004	–0.001	–0.005	–0.001
		(0.002)	(0.004)	(0.004)	(0.003)	(0.004)	(0.009)	(0.001)
	2007	–0.001	–0.002	–0.003	–0.003	–0.001	–0.006	–0.001
		(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)	(0.001)
	2008	–0.001	–0.002	–0.002	–0.001	–0.001	–0.005	–0.001
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.001)
	2010	0.000	–0.004	–0.003	–0.000	–0.005	–0.009	–0.002
		(0.002)	(0.003)	(0.004)	(0.003)	(0.004)	(0.009)	(0.001)
	2011	–0.005*	–0.010**	–0.012**	–0.008*	–0.010**	–0.024**	–0.004**
		(0.003)	(0.004)	(0.005)	(0.004)	(0.005)	(0.011)	(0.002)
	2012	–0.001	0.000	–0.001	–0.000	0.000	0.001	0.000
		(0.003)	(0.004)	(0.005)	(0.004)	(0.005)	(0.011)	(0.002)
	2013	–0.005*	–0.010*	–0.013**	–0.009*	–0.010*	–0.024*	–0.004**
		(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.013)	(0.002)
	2014	–0.008***	–0.019***	–0.020***	–0.020***	–0.018***	–0.046***	–0.008***
		(0.003)	(0.006)	(0.006)	(0.006)	(0.006)	(0.017)	(0.003)
	2015	–0.009***	–0.016**	–0.018**	–0.019***	–0.016**	–0.040**	–0.007**
		(0.003)	(0.007)	(0.007)	(0.007)	(0.007)	(0.018)	(0.003)
	2016	–0.009***	–0.018***	–0.018***	–0.020***	–0.017***	–0.044***	–0.008***
		(0.003)	(0.007)	(0.007)	(0.006)	(0.007)	(0.017)	(0.003)
	2017	–0.008**	–0.020**	–0.019**	–0.022***	–0.019**	–0.048**	–0.009***
		(0.003)	(0.008)	(0.008)	(0.007)	(0.008)	(0.020)	(0.003)
	2018	–0.007**	–0.013**	–0.013**	–0.014***	–0.012**	–0.032**	–0.006**
		(0.003)	(0.006)	(0.006)	(0.005)	(0.006)	(0.015)	(0.002)
	2019	–0.009***	–0.016**	–0.016**	–0.016**	–0.015**	–0.040**	–0.007**
		(0.003)	(0.008)	(0.008)	(0.007)	(0.008)	(0.020)	(0.003)

Notes: Specification definitions correspond to the identically named specifications in Table B6. See Table B6 for details. *** p<0.01, ** p<0.05, * p<0.1.

Table B9: Implied pass-through of migration-induced wage changes into long-term care prices

			$s_L = 0.70$		$s_L = 0.80$	
Year	$\widehat{\beta_P}$	$\widehat{\beta_W}$	$\widehat{\theta}$	$p_{H_0:\theta=1}$	$\widehat{\theta}$	$p_{H_0:\theta=1}$
2005	-0.006	-0.010	0.866	0.904	0.758	0.803
	(0.007)	(0.007)	(1.109)		(0.970)	
2007	-0.003	-0.009	0.423	0.535	0.370	0.439
	(0.006)	(0.006)	(0.932)		(0.815)	
2011	-0.023***	-0.005	6.688	0.630	5.852	0.638
	(0.005)	(0.009)	(11.797)		(10.322)	
2013	-0.025***	-0.027***	1.346	0.579	1.177	0.745
	(0.007)	(0.010)	(0.623)		(0.545)	
2015	-0.022***	-0.027**	1.169	0.781	1.023	0.966
	(0.007)	(0.011)	(0.607)		(0.531)	
2017	-0.032***	-0.039***	1.188	0.729	1.040	0.933
	(0.009)	(0.014)	(0.543)		(0.475)	
2019	-0.026***	-0.037***	0.997	0.996	0.873	0.762
	(0.008)	(0.014)	(0.481)		(0.421)	

Notes: The table reports the implied pass-through of migration-induced changes in labor costs into long-term care prices. Pass-through is computed as $\widehat{\theta} = \widehat{\beta}_P/(s_L \times \widehat{\beta}_W)$, where $\widehat{\beta}_P$ and $\widehat{\beta}_W$ denote the estimated effects of immigration on log average price of care and log average wage, respectively, and s_L denotes labor's share of total costs. We report estimates for $s_L \in \{0.70, 0.80\}$, corresponding to the reported range of personnel costs as a share of total nursing-home expenditures. Both $\widehat{\beta}_P$ and $\widehat{\beta}_W$ are estimated using our baseline specification based on 353 regions and including the baseline controls. Standard errors are reported in parentheses. Standard errors for $\widehat{\theta}$ are calculated using the delta method, under the simplifying assumption that the estimated coefficients $\widehat{\beta}_P$ and $\widehat{\beta}_W$ are uncorrelated. The reported p-values correspond to tests of the null hypothesis of full pass-through, $H_0 : \theta = 1$. Significance stars refer to $\widehat{\beta}_P$ and $\widehat{\beta}_W$: *** p<0.01, ** p<0.05, * p<0.1.

Table B10: Effect of immigration on nursing home quality

	OLS	IV						
		Main	All regions	Alternative controls 1	Alternative controls 2	Both genders	Alternative cutoff 1	Alternative cutoff 2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Difference waves 1-2								
Total	0.005	0.005	0.003	0.003	–0.013	0.002		0.001
	(0.006)	(0.011)	(0.011)	(0.010)	(0.018)	(0.005)		(0.011)
Medical & Nursing Care	0.004	–0.001	–0.003	–0.007	–0.042	–0.001		–0.004
	(0.009)	(0.017)	(0.018)	(0.015)	(0.028)	(0.007)		(0.018)
Nutrition & Hydration	–0.006	–0.015	–0.011	–0.015	–0.036*	–0.006		–0.006
	(0.006)	(0.011)	(0.011)	(0.010)	(0.020)	(0.005)		(0.010)
Organization & Quality Assurance	0.003	0.001	0.000	0.001	–0.024	0.000		–0.002
	(0.010)	(0.019)	(0.019)	(0.017)	(0.032)	(0.008)		(0.020)
Resident Satisfaction & Autonomy	0.017***	0.026**	0.021**	0.029***	0.029*	0.011**		0.010*
	(0.006)	(0.010)	(0.010)	(0.009)	(0.017)	(0.004)		(0.005)
Social Support & Quality of Life	–0.003	0.010	0.004	0.007	0.020	0.004		0.010
	(0.005)	(0.015)	(0.015)	(0.013)	(0.029)	(0.006)		(0.015)
Panel B: Difference waves 1-3								
Total	0.011	0.004	0.001	0.002	–0.020	0.001	0.001	–0.006
	(0.007)	(0.012)	(0.012)	(0.010)	(0.018)	(0.005)	(0.012)	(0.010)
Medical & Nursing Care	0.014	–0.006	–0.011	–0.011	–0.054*	–0.004	–0.011	–0.014
	(0.012)	(0.019)	(0.018)	(0.016)	(0.030)	(0.008)	(0.020)	(0.019)
Nutrition & Hydration	0.001	–0.009	–0.001	–0.014	–0.045**	–0.004	–0.016	–0.010
	(0.008)	(0.013)	(0.015)	(0.011)	(0.022)	(0.005)	(0.014)	(0.010)
Organization & Quality Assurance	0.009	–0.005	–0.007	–0.008	–0.026	–0.003	–0.006	–0.011
	(0.011)	(0.017)	(0.018)	(0.015)	(0.030)	(0.007)	(0.017)	(0.018)
Resident Satisfaction & Autonomy	0.019***	0.028**	0.021*	0.030***	0.032*	0.012**	0.028**	0.003
	(0.007)	(0.011)	(0.011)	(0.010)	(0.018)	(0.005)	(0.011)	(0.006)
Social Support & Quality of Life	–0.004	0.001	–0.007	0.000	0.003	0.000	0.001	0.001
	(0.005)	(0.012)	(0.012)	(0.010)	(0.020)	(0.005)	(0.012)	(0.012)
Wave 1–2 cut-off (grades, 1.0–5.0)	1	1	1	1	1	1	1	2
Wave 3 cut-off (fulfillment shares, 0–1)	1	1	1	1	1	1	0.85	0.85

Notes: The table reports estimates of a modified Eq. (5) (see footnote 42) under various specifications. Column (1) presents OLS results with baseline controls and regional sample. Column (2) shows second-stage IV results with the same controls (also shown in Figure 8). Column (3) includes all regions. Column (4) uses an alternative control set: fertility rate and ratio of facilities to elderly above 75. Column (5) extends the baseline control set with GDP per capita, unemployment rate, and the proportion of women among unemployed. Column (6) builds the treatment and the instrument using both genders. In Columns (1)–(6), 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. Column (7) relaxes the wave-3 threshold, treating a criterion as satisfied if it is fulfilled for at least 85% of assessed residents. Column (8) relaxes both thresholds, treating a criterion as satisfied if it receives a grade of at most 2.0 in waves 1 and 2, or if it is fulfilled for at least 85% of assessed residents in wave 3. Based on a balanced panel of 347 regions, except for column (3), which uses 369 regions. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B11: 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 ambulatory 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	–0.011	–0.063*	–0.006	–0.007	0.003	0.005	0.034**	0.067**	0.009	0.010
	(0.019)	(0.035)	(0.009)	(0.016)	(0.010)	(0.018)	(0.017)	(0.028)	(0.007)	(0.010)
2007	–0.009	–0.060**	–0.009	–0.019	–0.003	–0.010	0.014	0.021	0.002	0.006
	(0.015)	(0.031)	(0.008)	(0.016)	(0.009)	(0.016)	(0.011)	(0.019)	(0.005)	(0.008)
2011	–0.031**	–0.055**	0.006	–0.010	0.001	–0.016	–0.015	–0.012	0.005	0.006
	(0.013)	(0.026)	(0.007)	(0.015)	(0.007)	(0.015)	(0.012)	(0.027)	(0.005)	(0.008)
2013	–0.002	–0.031	0.012	–0.002	0.001	–0.016	–0.015	–0.003	0.016*	0.029*
	(0.016)	(0.028)	(0.009)	(0.019)	(0.009)	(0.018)	(0.013)	(0.027)	(0.008)	(0.015)
2015	0.019	–0.029	0.014	–0.010	0.002	–0.020	–0.021	–0.008	0.026**	0.039**
	(0.018)	(0.036)	(0.011)	(0.022)	(0.011)	(0.020)	(0.015)	(0.033)	(0.011)	(0.020)
2017	–0.003	–0.084**	0.014	–0.017	0.016	–0.016	–0.030*	–0.023	0.024*	0.019
	(0.018)	(0.035)	(0.011)	(0.022)	(0.011)	(0.021)	(0.017)	(0.034)	(0.014)	(0.024)
2019	–0.012	–0.092**	0.018	–0.015	0.016	–0.016	–0.033*	–0.006	0.034**	0.027
	(0.022)	(0.042)	(0.014)	(0.024)	(0.013)	(0.023)	(0.018)	(0.033)	(0.016)	(0.027)

Notes: The table reports estimates of Equation (5) for outcomes related to the availability and use of care. Outcomes are log differences relative to 2009. For each outcome, the first column reports OLS estimates and the second reports second-stage IV estimates; thus, columns (1), (3), (5), (7), and (9) are OLS estimates, while columns (2), (4), (6), (8), and (10) are IV estimates. All specifications include the baseline controls. The IV specifications instrument the change in the stock of foreign-born women between 2009 and 2019, measured per 100 inhabitants in 2009, using the shift-share instrument defined in Equation (6). Regressions use the main sample of 353 regions. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

C 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 C12). 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 *average price*. Second, we construct a harmonized series of prices by care level using an imputation method. Both procedures are described below.

Table C12: 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 average 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 *average 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 table above), 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 $\alpha_5 = 1$, which is close to the empirical alpha, at 0.93.[61] 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 is 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.[62] 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.

[61] Alternatively, one could anchor the procedure at the bottom of the care distribution by assuming $\alpha_2 = 1$, so that the grade 2 price directly identifies the price of former care level 1 ($p_{1,1} = p_{2,2}$), with the prices of levels 2 and 3 then recovered recursively from $p_{3,2}$ and $p_{4,2}$. In contrast to α_5, however, the empirical value of α_2 is further away from one (0.87 in 2015): a large share of grade 2 residents had no care level under the old system—individuals with impaired everyday competence but no physical care needs—and their old-system price, $p_{0,1}$, is not observed. The approximation error introduced at the anchor, which propagates through the recursion, would therefore be larger than under our approach of anchoring at the top, where the assumption $\alpha_5 = 1$ is close to its empirical counterpart.

[62] 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 at the regional level.

$$\alpha_3 = \frac{d_{1,1}}{d_{1,1} + d_{2,0}}$$
$$\alpha_4 = \frac{d_{2,1}}{d_{2,1} + d_{3,0}}$$

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 biennial change over this interval, and (3) use this change to extrapolate the values for 2017 and 2019. If the resulting α parameters exceed 1, we cap them at 0.9999. In practice, the 2017 values equal the 2015 levels plus one biennial increment, while the 2019 values add two increments.

Sensitivity of results to the imputation procedure

We assess the sensitivity of the price estimates to alternative assumptions governing the imputation parameters α_3 and α_4, as well as to an alternative direct mapping between the old and new care classifications. In our baseline procedure, α_3 and α_4 are calculated using the national distribution of nursing home residents in 2013 and 2015 and are extrapolated to 2017 and 2019 using the biennial change observed between these two years. We consider several alternatives.

First, we hold α_3 and α_4 fixed at their 2015 levels rather than extrapolating them forward. Second, instead of extending the absolute change observed between 2013 and 2015, we extrapolate the parameters using their proportional growth over this period. Third, we calculate the parameters using all care-dependent individuals rather than only nursing home residents and apply the baseline extrapolation procedure to the resulting values. Finally, we consider an extreme alternative mapping in which $\alpha_3 = \alpha_4 = 0$ and $\alpha_2 = 1$. Under this mapping, the prices of former care levels 1, 2, and 3 are set directly equal to the observed prices of grades 2, 3, and 4, respectively, rather than being recovered through the baseline recursive inversion. This last specification is deliberately conservative and is intended to span a broad range of possible mappings between the old and new care classifications.

Table C13 reports the values of α_3 and α_4 implied by each assumption, together with the corresponding estimates of the effect of immigration on care prices. Under most specifications, the extrapolated parameters approach one in the later years. The lower-bound specification therefore provides a substantially more extreme alternative than the empir-

ically based scenarios.

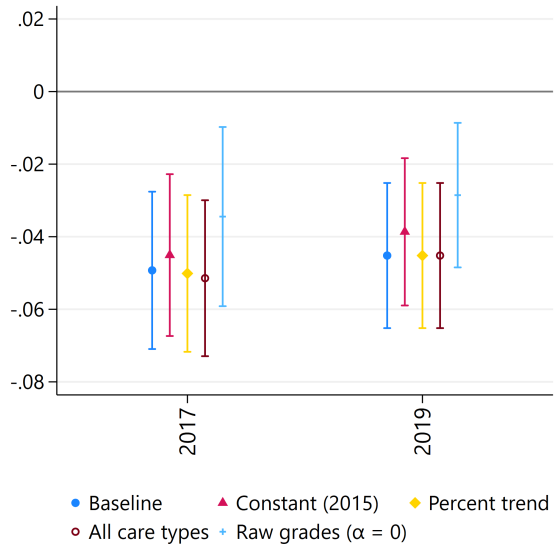
Table C13: Imputation parameters α_3 and α_4 under alternative assumptions

Year	Status	Baseline	Constant	Percent trend	All care types	$\alpha_3 = \alpha_4 = 0$
α_3						
2013	Observed	0.544	0.544	0.544	0.818	–
2015	Observed	0.696	0.696	0.696	0.894	–
2017	Extrapolated	0.848	0.696	0.890	0.970	0.000
2019	Extrapolated	1.000	0.696	1.000	1.000	0.000
α_4						
2013	Observed	0.893	0.893	0.893	0.953	–
2015	Observed	0.909	0.909	0.909	0.965	–
2017	Extrapolated	0.926	0.909	0.926	0.976	0.000
2019	Extrapolated	0.943	0.909	0.944	0.988	0.000

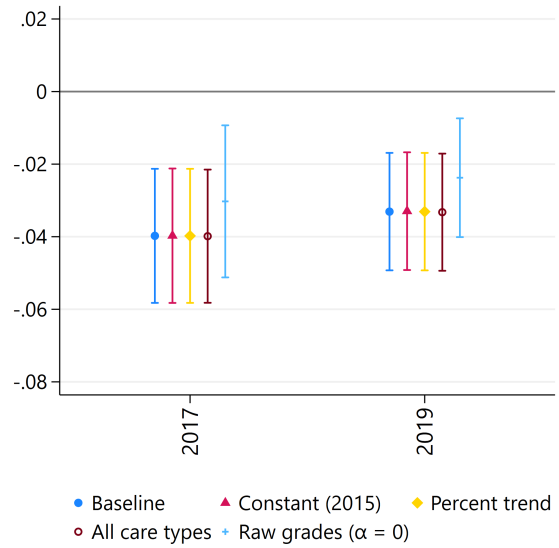
Notes: The baseline specification calculates the parameters using the national distribution of nursing-home residents and extrapolates the absolute change observed between 2013 and 2015. *Constant* holds each parameter fixed at its 2015 value. *Percent trend* extrapolates the proportional change observed between 2013 and 2015. *All care types* calculates the parameters using all care-dependent individuals and applies the baseline linear extrapolation. The final specification imposes $\alpha_3 = \alpha_4 = 0$ and $\alpha_2 = 1$ and maps the prices of former care levels 1, 2, and 3 directly to the observed prices of grades 2, 3, and 4, respectively. Extrapolated values are bounded above at 0.9999 in the underlying calculations; values reported as 1.000 reflect rounding.

Figure C9 shows the sensitivity of the estimated effects on care prices to alternative assumptions about the imputation parameters. The price of low-level care is the most sensitive to these assumptions because it is recovered at the final stage of the sequential imputation procedure and therefore incorporates uncertainty from the preceding step. Nevertheless, the corresponding estimates remain between -0.05 and -0.03 in both 2017 and 2019. The estimates for medium-level care range from -0.04 to -0.03 in 2017 and from -0.03 to -0.02 in 2019. Across the *Baseline*, *Constant (2015)*, *Percent trend*, and *All care types* specifications, the price of high-level care is unchanged because the imputed price of former care level 3 is anchored directly to the observed price of grade 5 care. Under the *Raw grades* specification, former care level 3 is instead mapped directly to grade 4. Even under this extreme alternative mapping, the estimated coefficient changes only minimally. Across all specifications, the sign and overall magnitude of the effects remain similar, and none of the alternative imputation assumptions changes the conclusions of the paper.

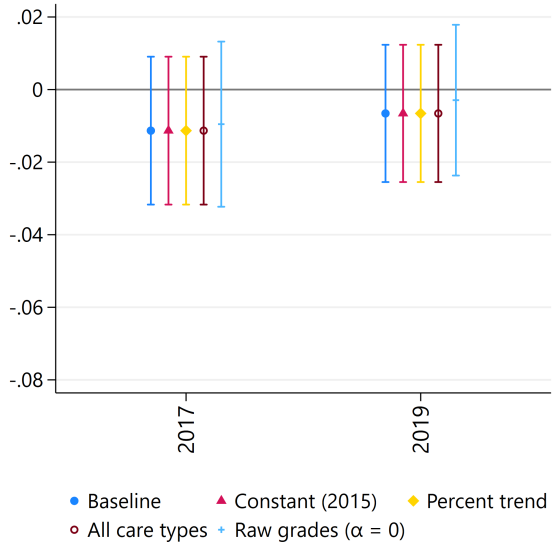
Figure C9: Sensitivity of the estimated effects of immigration on care prices to alternative imputation assumptions



(a) Price of care, care level 1 (low)



(b) Price of care, care level 2 (medium)



(c) Price of care, care level 3 (high)

Notes: The figure displays the estimated effects of immigration on care prices and their 95% confidence intervals under alternative assumptions used to impute care-level-specific prices following the 2017 reform of the care-level classification. *Baseline* calculates α_3 and α_4 using the national distribution of nursing-home residents in 2013 and 2015 and extrapolates the absolute change in these parameters to 2017 and 2019. *Constant (2015)* holds both parameters fixed at their 2015 values. *Percent trend* extrapolates the proportional change in the parameters observed between 2013 and 2015. *All care types* calculates the parameters using all care-dependent individuals, rather than nursing-home residents only, and applies the baseline linear extrapolation. *Raw grades* uses the extreme alternative mapping $\alpha_3 = \alpha_4 = 0$ and $\alpha_2 = 1$, assigning the prices of former care levels 1, 2, and 3 directly to the observed prices of grades 2, 3, and 4, respectively. All estimates are based on the baseline sample of 353 regions, excluding border regions. The outcome variable is 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 women per 100 inhabitants, measured between 2009 and 2019.

D 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 have been subject to regular, unannounced inspections since 2009, with the results of these checks accessible online in the form of grades on 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 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 2014–2016. Due to a questionnaire reform starting in 2014, the two data sources feature different questionnaires as well as scoring systems. This section gives details of the sample selection and harmonization of the two sources.

Sample definition

HNR restrict their dataset to nursing homes with at least 10 residents who require general care, i.e. excluding facilities specialized in particular conditions, such as dementia or stroke-related conditions. 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 inspections were conducted during the data-collection period, we retain the last observed inspection and drop the others to avoid counting facilities multiple times.[63]

Assigning facilities to regions

In line with the baseline analysis, we build a regional-level panel dataset. The data from HNR readily contain the information on the region in which a facility is located. For the AOK data, we assign facilities to regions using (i) the latitude and longitude of the supplied address; (ii) the postcode when geolocation is unsuccessful; and (iii) manual assignment when the previous steps do not identify a unique NUTS-3 region.

[63] No such adjustment is necessary in waves 1 and 2, where facility-wave observations are already unique.

Harmonizing and categorizing questions

Until 2014, the questionnaire contained 82 questions, while there were seventy-seven questions in years 2014–2016. Thirty-four questions are worded identically in the two questionnaires. We manually match another 40 questions that differ only slightly in wording.[64] 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 GPT-4o to perform the categorization. The category definitions, together with examples, are depicted in Table D1.

Outcomes

Until 2014, only final grades (for each question) are available. These grades are based on the German school grading 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 whom a given criterion was satisfied or not. We follow HNR and construct, for each region and wave, the proportion of facilities that satisfy a given criterion according to a common threshold rule. In our main specification, we use the strictest available threshold in each period: a criterion is coded as satisfied if the facility received a grade of 1.0 in waves 1 and 2, and if the criterion was fulfilled for 100% of assessed residents in wave 3. We then aggregate across criteria within each quality category by dividing the number of facility–criterion assessments satisfying the threshold by the total number of observed facility–criterion assessments. The overall quality measure is constructed analogously by pooling assessments across all 74 criteria. 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).

We also assess the sensitivity of the results to less stringent threshold choices. First, we keep the grade threshold in waves 1 and 2 fixed at 1.0, but relax the wave-3 threshold by coding a criterion as satisfied if it was fulfilled for at least 85% of assessed residents. Second, we relax both thresholds, coding a criterion as satisfied if the facility received a grade of at most 2.0 in waves 1 and 2, and if the criterion was fulfilled for at least 85% of assessed residents in wave 3.

[64] 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*?).

Table D1: 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?