Immigration, The Long-Term Care Workforce, and Elder Outcomes in the U.S.

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Although debates over immigration remain contentious, one important sector served heavily by immigrants faces a critical labor shortage: nursing homes. We merge a variety of data sets on immigration and nursing homes and use a shift-share instrumental variables analysis to assess the impact of increased immigration on nursing home staffing and care quality. We show that increased immigration significantly raises the staffing levels of nursing homes in the U.S., particularly in full time positions. We then show that this has an associated very positive effect on patient outcomes, particularly for those who are short stayers at nursing homes, and particularly for immigration of Hispanic staff.

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One of the most contentious topics of debate in the U.S. over the past decade has been immigration. Critics of U.S. immigration policy have highlighted the prospect that increased immigration leads to lower wages for natives, more use of welfare, and higher crime rates.[1] Supporters of existing, and even expanded, immigration, have highlighted the lack of empirical evidence supporting the claims of critics – and the enormous benefits to our economy in the past from immigration.[2] Public opinion on this issue is mixed, with roughly even shares of Americans believing in 2021 that immigration should be increased, kept at its present level, and decreased. Over 60% of Americans are either somewhat or very dissatisfied with present levels of immigration, but they disagree on whether it is too low or too high.[3]

Immigrants are relatively concentrated in a specific set of occupational groups in the U.S.[4] For many immigrant groups, long-term care services, including both nursing homes and home care, represent a disproportionate share of employment. 1.7% of individuals who were not born in the U.S. work in the home care or nursing home care industries, the majority of whom are direct care workers**,** making up 25% and 19% of direct care workers in these industries, respectively.[5]

The impact of immigration on the market for nursing home workers is particularly notable because this is a labor market with persistent excess demand. Over half of nursing homes are not compliant with CMS expected daily staffing levels over 80% of the time (Geng et

[1] For example, then-candidate Trump pointed to all three in a speech in August 2016 focused on immigration (New York Times, 2016).
[2] See op-eds by Alex Nowrasteh for Cato (2018) or Matthew Yglesias for Vox (2019).
[3] Results from Gallup's long-term tracker of American attitudes toward immigration.
[4] Pew Research Center estimates that in 2014, farming, fishing, and forestry had the highest immigrant share (46%), followed by building/grounds cleaning & maintenance (35%). Health care support is 20% immigrant, the 9th highest share. Full table is in Appendix.
[5] Calculations for the 16+ population from the ACS 2007-2018, based on having either the nursing home or home health care industry code. Direct care workers are defined here as registered nurses (RNs), licensed practical nurses (LPNs), and certified nurse aides (CNAs) in the nursing home industry or as RNs, LPNs, CNAs, home health aides, and personal care aides in the home health care industry.

al., 2019). This understaffing is not surprising given a combination of relatively weak regulation of nursing home staffing ratios and low reimbursement of nursing homes by their primary payer, state Medicaid programs.

The nursing home sector has been especially hard-hit by recent labor shortages in the United States amid the COVID-19 pandemic (McGarry et al., 2020). Since early 2020, the number of people working at nursing homes has fallen by over 10%, and staff departures worsened after facilities experienced COVID outbreaks (Bureau of Labor Statistics, 2022; Shen et al., 2022). These staffing losses impact the quality of care received by residents and have spillover effects for the hospitals that often discharge recovering patients to SNFs.[6] Amid this labor shortage and those occurring across the economy is a substantial backlog in the processing of work permits, preventing those who could otherwise alleviate shortages from working.[7]

With excess demand at constrained wages, the supply of nursing home workers becomes a key determinant of staffing levels. As such, immigration flows can have a direct and important effect on the staffing of nursing homes. Moreover, evidence from the Netherlands suggests that policies to match refugees or other low-skilled immigrants to occupations with labor shortages can alleviate these issues, with limited negative effects on native workers (Foged et al, 2020).

It is unclear however, how additional immigrant supply of long-term care workers will impact the quality of care of nursing home residents. On the one hand, to the extent that immigrant workers increase staffing levels at nursing homes, this may increase quality, which has been clearly shown in past work to rise with supply (Chen & Grabowski, 2015). On the other hand, an increased supply of unskilled immigrants may displace native workers who may have more positive impacts on care quality due to a lack of language barriers. More immigrants in

[6] See Washington Post (2022).
[7] See Vox (2022).

this sector could also displace higher skilled nurses if facilities substitute low skilled certified nursing assistants (CNAs) for higher-skilled registered nurses (RNs) and licensed practical nurses (LPNs).

In this paper, we investigate the impact of immigration on the supply of labor to nursing homes and the quality of care of older residents. To do so we match data on immigrant flows by local area and year to facility-level data on nursing home staffing and patient-level data on nursing home resident health outcomes. We look at the supply and wages of both low skilled and higher skilled jobs at nursing homes, and on the quality of care as measured by several indicators such as incidence of adverse events reported by nursing homes to regulators and medical-claims-based measures of hospitalizations and mortality.

Of course, it is possible that immigrant flows into an area can be correlated with unobserved determinants of nursing home labor supply. To address this problem, we follow Card (2001) in creating an instrument for immigrant flows to the area based on the existing distribution of immigrant ethnicities across U.S. cities and the national inflow of immigrants from that nationality. We update this instrument by focusing on national immigrant flows among groups who are most likely to work in the nursing home industry. Specifically, we focus on female immigrant flows as most direct care workers are women, and we weight our estimates by each ethnic group's historical propensity to work as a direct care provider in a nursing home.

We find that an increase in the supply of immigrants to a community has a strong positive effect on the supply of both lower-skilled (CNA) and higher-skilled (RN) hours provided to nursing home residents. We estimate that for every ten percent increase in female immigration, there are 0.7% more CNA hours per nursing home resident and 1.1% more RN hours per resident. Interestingly, we find that the impact on CNA supply is almost exclusively in full time

positions, which may be correlated with higher quality than part-time staff (Castle and Anderson, 2011); for RNs, there is a larger relative rise in part-time hours.

We also find strong and consistent evidence that increased immigration leads to improved patient care, particularly for those who are in the nursing homes for short stays (typically rehabilitation). Across a normalized composite quality score of nursing home-reported health outcomes, we find that both short- and long-term quality rises by roughly 0.01 standard deviations per 10% increase in female immigrants. We also find a decline in hospitalizations in the short term of 0.6% per 10% increase in female immigrants. We do not find any impact on patient mortality, nor do we find significant differences across patient types – although we do find evidence suggesting that immigrants from Hispanic countries have both the largest staffing effects and the largest positive effects on quality. Collectively, these results suggest that immigrants increase the quality of care of older adults residing in nursing homes.

Our paper proceeds as follows. In Part I, we discuss the economics of nursing home staffing and review the existing literature on the impacts of immigration and how it informs our analysis. Part II discusses our data sources and empirical strategy. Part III presents our results, while Part IV concludes.

Part I: Background

Nursing Home Staffing Economics

There are over 15,000 nursing homes in the U.S., 70% of which are for-profit (National Center for Health Statistics, 2019). Roughly 50% of nursing home revenues come from Medicaid, a state program that is jointly financed with the federal government (National Investment Center for Seniors Housing & Care, 2020). Individuals are entitled to nursing home

care under Medicaid if they are sufficiently disabled and have income and assets below the state-established thresholds, but states have considerable flexibility in determining reimbursement rates for facilities. States generally pay a daily baseline rate, called a per diem, and often add adjustments based on resident acuity and care quality (Medicaid and CHIP Payment and Access Commission, 2019). Moreover, residents who initially have income or asset levels above Medicaid eligibility are allowed to spend down their assets, with Medicaid paying for care once the person is eligible.

Meanwhile, 20% of nursing home revenues come from the traditional federal Medicare program, which pays the first 100 days of costs for eligible nursing stays (typically for patients recovering from injury or surgery).[8] Another 10% of revenue comes from Medicare Advantage plans. The remaining 20% of nursing home revenues come from private pay patients and other sources such as community programs and veterans' benefits.

These varying revenue streams highlight an important fact regarding who is served by nursing homes. Most facilities provide care to two distinct resident populations. On any given day, most beds will be occupied by long-stay residents. These individuals primarily receive personal care services (i.e., help with activities of daily living) and 24-hour supervision and they usually reside in the nursing home for the remainder of their lives. As mentioned previously, Medicaid is the primary payer for these stays.

On the other hand, 13% of nursing home residents on a given day are, on average, Medicare-covered short-stay patients (Kaiser Family Foundation, 2022). These individuals are required to receive skilled care (i.e., medical care and therapy from nurses and physical,

[8] To be eligible for Traditional Medicare coverage, a nursing home stay must be preceded by a 3-day hospital stay and there must be a documented need for daily skilled services that are deemed medically to treat a condition that was treated during the preceding hospital stay or that arose during a nursing home stay.

occupational, and speech therapists) in addition to personal care services. Stays last 28 days on average and nearly half of these patients are discharged back to the community once they have sufficiently recovered from injury or surgery (National Academies of Sciences, Engineering, and Medicine, 2022; Medicare Payment and Advisory Commission, 2021). Little empirical work has examined the staffing needs of these two different populations, but CMS has determined these groups are sufficiently distinct to warrant separate sets of outcome measures to monitor quality.[9] As such, it is likely that short- and long-stay residents may benefit differentially from changes in staff level and skill mix.

Direct care (including labor and supplies) accounts for roughly two-thirds of the costs for nursing homes, and about half of these costs go towards paying CNAs, LPNs, and RNs (Center for Health Information and Analysis, 2019; Bowblis & Applebaum, 2022). CNAs, who interact with patients frequently, both to monitor health and assist patients with activities of daily living, such as feeding, bathing, toileting, and mobility, constitute the largest expenditure within this group. CNA positions are typically held by less formally educated employees; only 9% of CNAs have a four-year college degree, with an even lower share (5%) for CNAs working in nursing homes.[10] CNA training is minimal, with a federal standard of 75 hours of training. In 2016, thirty states set higher standards, the highest being Maine at 180 hours, but only 6 states required more than 120 hours (Paraprofessional Healthcare Institute, 2016). CNAs are also typically paid close to minimum wage; the median hourly wage for CNAs in the U.S. is just under $15 per hour (Bureau of Labor Statistics, 2021). This low pay, coupled with very limited benefits, in part

[9] See CMS quality measures webpage.
[10] Calculations made using the 2007-2018 American Community Survey, identifying CNAs through their occupation code and those working in nursing homes through the industry code.

explains why the industry suffers very high rates of employee turnover estimated to average over 110% on an annual basis (Gandhi et al., 2021).

Nursing homes also employ more skilled labor, in the form of Licensed Practical Nurses (LPNs) and registered nurses (RNs). LPNs have much more training than CNAs, typically requiring a year or more of formal training after high school. They perform basic medical care such as monitoring and recording vital signs and helping with activities of daily living. RNs, meanwhile, are the most highly trained employees in nursing homes; most RNs have a four-year college degree.[11] RNs perform more advanced tasks such as administering medication, diagnostic testing, and overseeing the care provided by LPNs and CNAs. The typical nursing home has a ratio of 2.7 CNA hours to 1 LPN hour and 4 CNA hours to 1 RN hour.[12] Immigrants play a key role in filling all of these direct care positions within nursing homes, comprising roughly 19% of CNAs, 16% of LPNs and 20% of RNs in nursing homes.[13]

The nursing home industry has suffered from chronic understaffing. One early federally commissioned study concluded that staff to resident ratios of around 4.1 hours per resident day (HPRD) are needed to ensure high-quality resident care (Kramer et al., 2000, Institute of Medicine, 2001). We estimate that in 2019, the median staffing level in US nursing homes was 3.7 HPRD and that just 29% of nursing homes met the recommended staffing ratios. Bringing all US nursing homes to this target would require an additional 93,000 direct care workers, an increase of 13% relative to actual staffing levels in 2019.[14] The COVID pandemic only worsened

[11] 58% of RNs have a college degree or more in the 2007-2018 ACS.
[12] Based on daily staffing levels reported in the 2017-2019 Payroll-Based Journal Staffing data.
[13] Calculations for the 16+ population from the ACS 2007-2018.
[14] Using Q1 2019 payroll-based journal data, we determined the average hours of direct care per resident day for all nursing homes and subtracted this average from the target 4.1. We retained shortages (i.e., values >0) and converted the HPRD shortage to an hours per day shortage by multiplying by facilities' average daily census. Hours per day was then converted to an employee shortage by dividing by 7 (i.e., a typical full-time shift). This estimate likely underestimates the actual worker shortage due to the frequent use of part time staff in this industry.

this shortfall, as the difficult working conditions in nursing homes were made significantly riskier—as of September 2022 over 2,600 nursing home staff had died of COVID-19.[15] Nursing homes also report consistent excess demand for CNAs. For instance, following a 2018 California law that increased the minimum staffing ratios for nursing homes, more than half of facilities applied for a waiver due to an inability to fill open CNA positions (Kaiser Health News, 2018). Similarly, the nursing home industry has strongly pushed back against a proposed federal minimum staffing regulation by citing an inability to hire new workers.[16]

The Impact of Immigration

An enormous literature exists on the effect of immigration on labor market outcomes, often reaching different conclusions. Some studies have found small or positive effects on native wages and employment, with negative effects largely on previously arrived immigrants, and little effect on public spending (Card, 1990, 2005; Kugler & Yuksel, 2008; Ottaviano & Perri, 2008; Card, 2009). Other work has estimated reduced employment and wages for low-skilled U.S. born workers along with increased government spending (Borjas, 2003, 2019). Although this literature has focused on the impact of immigration on wages and employment, there has also been research into the implications for consumers, finding that immigration lowers prices in immigrant-intensive sectors (Cortes, 2008).

Relatively less research has focused on the impact of immigration for the health care labor force. Research into the supply of immigrant nurses on local nurse wages did not find consistent statistically significant effects, though the instrument used was somewhat weak (Kaestner & Kaushal, 2012).[17] There is also evidence that immigration in the United Kingdom

[15] See Covid-19 Nursing Home Data from the CMS.
[16] See, for example, the statement by the American Health Care Association (2022) representing nursing homes.
[17] F-Statistics across specifications range from 4.7 to 14.4 in the first stage when instrumenting the total supply of nurses with the supply of immigrant nurses.

reduced National Health Service waiting times, although this may have occurred due to migration out of immigrant-intensive locations rather than immigrant labor (Giuntella et al., 2016). A recent study found that immigration in the late 20th century resulted in a shift from institutional care to home care for the elderly because of the reduced cost of home health aides and other workers, such as gardeners and housekeepers, that are essential to aging at home (Butcher et al., 2021); we investigate this issue as well below.

In circulating early drafts of this paper, we were made aware of one existing unpublished working paper that has explored the implications of immigration for patient care quality (Furtado & Ortega, 2022). The paper follows a similar shift-share approach to ours, focusing on instrumented changes in immigration levels over 5-year periods at the commuting zone-level and finding that immigration resulted in large increases in the supply of CNAs and RNs and a rise in the quality of nursing home care. As detailed in the Appendix, this paper has a number of limitations that we address here, including: using older, lower quality data on both outcomes and staffing; focusing primarily on patient falls, an ambiguous measure of quality; using aggregated data which is severely censored due to CMS data reporting rules; and ignoring the critical distinction between short and long stay patients. We address all of these concerns, in particular through higher quality/updated data, a richer and broader set of measures of labor supply and patient outcomes, and disaggregated data that allows us to avoid censoring and also to examine whether the effects of immigration vary across nursing home resident type, including short- and long-stay residents (who, as noted before, are very different), residents in different racial/ethnic groups, and those with and without certain chronic conditions (e.g., Alzheimer's disease and related dementias).

Part II: Data and Empirical Strategy

Data

Data for this study come from several sources. Annual measures of immigrant flows were obtained from the 2000-2018 American Community Survey (ACS) micro-level dataset.[18] This nationally representative survey, administered by the U.S. Census Bureau to more than one million respondents annually, contains detailed information on a variety of economic and demographic characteristics. Importantly for the present study, the ACS asks respondents for detailed information on their birthplace, their current occupation, and annual wages.

We measure nursing home census and staffing levels using 2006-2018 data from the Certification and Survey Provider Enhanced Reports (CASPER; formerly known as OSCAR). CASPER surveys must be completed at least every 15 months as part of facilities' requirements for maintaining Medicare and Medicaid certification. They obtain information on a wide range of facility characteristics including resident census, quality outcomes, and staffing levels for CNAs, LPNs, and RNs during the two weeks prior to the survey date. Staffing hours are reported separately for full- and part-time workers in each job category. Hourly wage data was obtained from the 2006 – 2018 waves of the American Community Survey micro-level dataset.

Information about resident health outcomes come from several sources. The Minimum Data Set (MDS) contains information on comprehensive resident assessments that are required to be performed by all Medicare-Medicaid certified nursing homes for all residents. These assessments must be completed 5-, 14-, 30-, 60-, and 90-days following nursing home admission,

[18] Data obtained from IPUMS USA (Ruggles et. al, 2022).

and quarterly thereafter; residents are also assessed at discharge and may be required to have unscheduled assessments due to a change in health or functional status. These assessments cover a broad range of topics including resident physical and mental health status, functional capacities, nutritional needs, and use of select prescription medications. Additionally, Medicare enrollment data from the Master Beneficiary Summary File (MBSF) is used to identify resident deaths, and Medicare inpatient and outpatient claims are used to identify hospitalizations for Medicare-eligible nursing home residents. These various data sources underlie CMS's quality reporting initiative for nursing homes—5-star quality scores reported on the federally produced Care Compare website.[19] Furthermore, they have been widely used to study quality of care provide by nursing homes across hundreds of peer-reviewed journal articles (National Academies of Sciences, Engineering, and Medicine, 2022).

Sample

Our sample encompasses over 16 million Medicare beneficiaries residing in 13,000 unique nursing homes that are in metropolitan statistical areas (MSAs). The primary unit of analysis for our empirical work examining quality outcomes and staffing levels is the nursing facility. For each facility, we use data on all residents, but we also separate them into short-stay and long-stay (i.e., in the nursing homes for 90 or more days) patients. Additionally, certain outcomes are not applicable to all residents. These nuances are discussed in greater detail in the Outcomes section. For analyses of nursing staff wages, our unit of analysis is the state-MSA, which accounts for the fact that some MSAs span more than one state.

Outcomes

[19] https://www.medicare.gov/care-compare/?providerType=NursingHome&redirect=true

Nursing home staff hours are reported in CASPER as average weekly full-time employee equivalents (FTEs) over the 2 weeks preceding the CASPER assessment by job type (CNA, LPN, and RN) and employment status (full vs part time). We convert FTEs in each facility into a staffing ratio by multiplying the number of FTEs by 5 (35 hours divided by 7 days) to calculate hours per day and then dividing by the number of daily residents, calculated as the average daily occupancy rate multiplied by the number of beds. Annual nursing home census is measured as the total number of residents residing in each facility at the time of its annual CASPER survey.

Previous evaluations of the CASPER data have found reported staffing levels to contain extreme and implausible values. We address this by identifying outlier observations and imputing the staffing values for these cases.[20] Staffing levels are reported overall, as well as separately for full- and part-time workers; when overall staffing is imputed, we impute full and part time shares using the same methodology. For computing wages, annual income and weeks worked were obtained from the ACS data for individuals who reported their occupation as CNA, LPN, and in the nursing home industry. Weighted annual median hourly wages were calculated at the state-MSA level.

We use a wide variety of resident outcomes from the MDS data, focusing on the outcome measures that are likely to be impacted by the level and quality of direct care provided by nursing home staff to residents. Additionally, these measures are commonly used to assess facility-level quality, and most are included in CMS's 5-star quality score. The specific measures include pressure sores, use of physical restraints, placement of an indwelling catheter,

[20] See LTC Focus data dictionary for additional information on the validity of CASPER data. https://ltcfocus.org/about. We define outliers as observations where staffing levels for each worker category are a) above 250% or below 40% of the facility-specific median across sample years, b) between 200-250% or 40-50% of the median where the prior wave was between 83-120% of the median, or c) reported as 0 hours for CNAs, LPNs, or RNs. We then impute these observations based upon facility census, the closest previous (or subsequent, if the first wave) non-outlier observation for the facility, and several facility-level characteristics including average age of resident, whether the facility has an ADRD special care unit, the payer-mix, and for-profit status.

inappropriate use of antipsychotics, feeding tube placement and urinary tract infection; a description of these measures and their rationale are detailed in Table 1. Because of the large number of assessment outcomes, we focus our analysis on a composite quality measure, defined as the average of standardized z-scores on all the outcomes listed in Table 1.

MDS assessments can be both scheduled (and therefore exogenous to resident health status) and unscheduled due to a change in resident health. To account for the latter endogeneity, we construct the outcome measures using only scheduled MDS assessments. For short-stay residents, scheduled assessments occur in accordance with the Medicare prospective payment system that requires assessments to be competed on days 5, 14, 30, 60, and 90 of SNF stays. Because 63% of Medicare stays end within 30 days, we focus primarily on the 5-, 14-, and 30-day assessments for short stays and estimate regressions separately for each assessment timing.[21] For long-stay residents, we use quarterly and annual assessments (the latter of which is more comprehensive and replaces the quarterly assessment).[22] In order to capture the overall quality impacts during a residents stay, we pool these assessments.

Resident deaths are identified using the death date included in the Medicare Master Beneficiary Summary File while hospitalizations are identified using Medicare inpatient claims from MedPAR. Due to a lack of claims data for Medicare Advantage enrollees, hospitalization outcomes are restricted to fee-for-service Medicare beneficiaries. Claims-based measures can be observed without concern about ascertainment bias related to assessment schedules. As such, we construct these binary outcome measures at regular intervals. For short-stay residents, we

[21] Calculation based upon the length of stay for all MDS residents between 2008-2018 whose stays are initially covered by Medicare.

[22] Scheduled MDS assessments are often coded as change-in-status assessments if a change in health status is identified during the assessment. As a result, we identify assessments that were likely to have been scheduled but were recategorized, defined as cases where a quarterly assessment is missing but there is a nearby (within 20 days of the last assessment + 90 days) quarterly assessment.

identify the date of nursing home admission and measure whether outcomes occurred by 5-, 14-, 30-days following admission. For long-stay residents, we measure outcomes quarterly (i.e., every ~90 days from the date of admission), conditional on being in the nursing home at the start of a given quarter.

One concern with using quality measures based on resident assessments is selective mortality. If immigration impacts mortality, then the surviving residents of nursing homes may be particularly healthy or sick. But in fact, we will show below that there is no impact of our measure on mortality in either the short or long run.

Another concern is that immigration-related improvements in quality could affect nursing home length of stay, particularly for short-stay rehabilitative residents for whom the goal of care is to be discharged back into the community. We address this concern by constructing separate analytic samples for each short-stay scheduled assessment (i.e., prospective payment system assessment occurring at 5, 14, 30, 60, and 90 days) that are conditional on being in the nursing home at that time. This type of endogeneity is less of a concern for long-stay residents who are rarely discharged from the nursing home back into the community. As such, we stack all long-stay quarterly assessments into a single analysis sample, controlling for residents' tenure in the nursing home at the time of assessment to account for differences in risk as a function of time since admission. This leads to a heavier weight on longer-staying patients; our results are similar if we randomly choose one quarter per long stay patient.

Empirical Strategy

Our primary analytic approach is to use year-to-year variation within state-MSAs in immigrant flows to estimate the impact of changes in the immigrant population on the nursing

home labor market and nursing home resident health outcomes. That is, we estimate regressions of the form:

$$Y_{i,h,j,t} = I_{j,t} + X_{i,h,j,t} + \gamma + \delta + \gamma * \lambda_t + \varepsilon_{i,h,j,t} \quad \text{Eq. 1}$$

Where i indexes individual nursing home residents, h indexes nursing homes, j indexes state-MSAs, and t indexes year. $Y_{i,h,j,t}$ is the quality outcome of interest, $I_{j,t}$ is the flow of immigrants into a given state-MSA-year, $X_{i,h,j,t}$ captures resident characteristics (age, race/ethnicity, dual eligibility for Medicare and Medicaid, gender), γ is an state-MSA-level fixed effect, δ is a year fixed effect, and $\gamma * \lambda_t$ is a state-MSA-specific time trend. $\varepsilon_{i,h,j,t}$ is a standard error term clustered at the state-MSA level.

We expect that the geographic region in which immigrants chose to locate once arriving in the U.S. is influenced by several labor market conditions which are likely endogenous with our outcomes of interest. For instance, immigrants may elect to move to areas with rising CNA wages resulting from a competitive nursing home market, where facilities also compete on quality to attract new admissions.

To address this selection issue, we instrument for local immigrant flows using national immigration flows, because the decision to immigrate to the United States is unlikely to be influenced by local nursing home labor market condition. We use the shift-share approach developed by Card (2001). Specifically, we use the propensity of certain immigrant groups to settle in certain geographic locations to predict local immigrant flows given the national flow of particular immigrant groups each year.

We extend this approach in several ways. First, because most direct care workers in nursing homes are women, we restrict our instrument to female immigrant flows.[23] Furthermore,

[23] Kaiser Family Foundation (2020) documents the gender mix of direct care workers.

we leverage the fact that certain immigrant groups tend to work as direct care staff in nursing homes and weight our instrument by this likelihood. Using data from a base period (2000-2005), we determine each immigrant group's relative probability of working as a CNA in comparison to the average among all immigrants and use these probabilities to construct weights for each observable immigrant group in our data. More specifically, our instrument is:

$$\sum \widehat{K_{J,e,t}} = \sum \left(S_{t,e} * K_{j,e,2005}\right) * W_{e,2005} \qquad \text{Eq. 2}$$

$\widehat{K_{J,e,t}}$ is the estimated stock of immigrants of ethnicity e in state-MSA $j$in year t. This value is estimated by determining the national stock of this immigrant group in the same year, relative to the size of the population in our base year of 2005 ($S_{t,e}$). We multiply this ratio by the observed size of the immigrant population of ethnicity e in state-MSA j in 2005, and further weight the estimate by the relative propensity to work in a nursing home ($W_{e,2005}$). Within each state-MSA, we sum estimated stocks of immigrants of each ethnicity to produce the final instrument.

In our base models, we instrument for the observed stock of immigrants in a state-MSA-year using $\sum \widehat{K_{J,e,t}}$ and estimate our models using two-stage least squares. We also construct alternate instruments that stratify immigrants into the following groups: likely to be Black (non-Black) race, likely to be Hispanic (non-Hispanic) ethnicity, likely to be English (non-English) speaking. We calculate likely race, ethnicity, and English-speaking status instruments by measuring the share of immigrants from each birthplace group who were black, Hispanic, or from countries with English as an official language in the 2005 ACS.[24] We then apply this

[24] Note that two birthplace variables are used – the general birthplace categories, which group some countries with smaller immigrant populations, and more detailed categories that specify the particular country of birth. The general categories are used for our instrument, while the detailed categories are used to identify immigrants likely to speak English.

fraction to the population from each birthplace in subsequent MSA-years before summing the measures to the MSA-level.

The means of our sample, which consisted of 307 MSAs, are shown in Table 2. On average, sample MSAs contained 37 nursing homes and 3,404 nursing home residents. The mean female immigrant population was 65,630, suggesting, on average, 19 female immigrants per nursing home resident.

Part III: Results

First Stage

Figure 1 shows the first stage relationship between immigration and our shift-share instrument at the MSA-year level. We find a strong relationship between our instrument and observed female immigrant stocks in an MSA with an F-statistic of 147. Our model implies that 70% of relative female immigrant population increases within an MSA can be attributed to an exogenous supply shock. Results are similar when we apply alternate weights that account for the propensity to hold any nursing position, as opposed to a CNA role, in a nursing home.

Impacts on Nursing Home Census

Table 3 displays the 2SLS estimated relationship between immigration and nursing home census. We find that immigration shocks reduce nursing home census— each additional female immigrant results in 0.002 fewer nursing home residents. The average MSA has 66,000 female immigrants, meaning that an annual 10% increase in this population equates to a 0.4% reduction in the nursing home population relative to the sample mean. This finding is consistent with the fact that immigrants also often work as home health or personal care aides, professions that allow older adults to remain in their home longer and at greater levels of disability.

The finding is also supported by an earlier study which found influxes of immigrants between 1980 and 2000 likely reduced the lifetime risk of an older adult becoming institutionalized by 10 percent while increasing the availability and lowering the costs of home services (i.e., home health aides, housekeepers) (Butcher et al., 2021). Our results extend this earlier paper by showing similar results with more recent years of data at a more granular (i.e., annual) level. Furthermore, our findings show that the benefits of additional immigrants extend to older adults who are sufficiently sick and disabled to be nursing home certifiable, meaning that a physician deems nursing home level of care to be medically necessary, but who choose to remain living in the community.

In Appendix Table 1, we examine whether immigration results in favorable selection in who resides in a nursing home according to a claims-based measures of comorbidity. We do not find evidence of significant changes in resident case mix; our insignificant estimates point to residents becoming sicker as immigration rises, consistent with the healthiest individuals selecting out of the nursing home in favor of other (i.e., home-based) care settings. If anything, this would bias against our finding that more immigration improves the outcomes of nursing home residents.

Impacts on Staffing

Table 4 presents the impact of increased immigration on nursing home staffing ratios. Because of the aforementioned decline in the size of the nursing home population, it is critical to evaluate staffing effects relative to the number of occupied beds.

After accounting for the potential endogeneity of immigrant flows using 2SLS, we find substantial effects on CNA staffing—each one unit increase in female immigrants per nursing home resident (about 3,400 female immigrants) results in an increase of 0.009 CNA hours per

resident day, an increase of 0.4% relative to the sample mean. Recall the average MSA has roughly 66,000 female immigrants, as well as 3,400 nursing home residents, meaning that each two-unit increase in female immigrants per nursing home resident is approximately a 10% increase in the number of female immigrants. In the context of a 10% increase in female immigrants, this would be a 0.7% increase in CNA HPRD.

Our IV results also do not suggest any evidence of crowd-out of more skilled employees; indeed, the rise in LPNs and RNs are comparable to the rise in CNAs in terms of the percent change relative to the mean. Effects are, however, small in terms of additional staff hours provided. For LPNs and RNs, we estimate an increase of about 0.003 HPRD (although only the RN estimate is significant), or 0.3 hours at the mean facility. In percentage terms, a 10% increase in female immigrants would result in a 0.7% increase in LPN hours per resident day and a 1.1% increase for RNs.

In total, overall direct care hours per resident day increase 0.015 per unit increase in the female immigrant to nursing home resident ratio, equivalent to an additional 1.5 staff hours per day for the average facility. This equates to a 0.8% increase in total direct care hours per resident day per 10% increase in female immigrants and suggests that a 50% rise in female immigration could, by itself, offset about 30% of the estimated shortfall in nursing home staffing.[25]

The next two rows of Table 4 divides this total rise in hours into full time and part time employment, a major concern given the enormous turnover in the CNA workforce. Several studies suggest that higher staff turnover has negative impacts on patient care, and previous work has demonstrated that departing nursing home staff are more likely to be part-time workers

[25] As detailed in footnote 25, we estimate a national daily staffing shortfall of about 93,000 full-time direct care staff, equivalent to over 650,000 staff hours. We estimate that a 50% increase in the female immigrant population would increase direct-care staffing ratios by 0.15 hours per resident day, equivalent to 195,000 staff hours for the 1.3 million residents of US nursing homes (2019 average daily census).

(Castle, Engberg and Men 2007; Zheng et al. 2002; Frogner & Spetz, 2015). Additionally, full-time staff may be more efficient at delivering quality resident care. When nursing home workers unionize, a move that typically increases full-time employee hours, total staffing hours were found to decline with no negative effect on resident outcomes (Finnigan & Hale, 2018; Sojourner et al., 2012).

We find that our main estimate of the effect of higher levels of immigration on CNA staffing is driven entirely by a rise in full-time CNA employment. Each unit increase in the female immigrant rate results in a 0.009 (0.5% relative to the mean) increase in the full-time CNA staffing ratio and a non-significant -0.03% reduction in the part-time CNA staff ratio. This suggests that new workers induced to join the labor force by immigration may prefer or are more willing to accept full-time employment at a single facility as opposed to part-time shift work across multiple nursing homes.[26] On the other hand, for LPNs and RNs, we find comparable impacts on full- and part-time work. The increases in CNA supply are consistent with the high immigrant share of CNAs and the relatively short training period, while the increases in RN staffing ratios are consistent with both the supervisory capacity these nurses fill and the fact that 20% of RNs working in nursing homes are immigrants.[27]

Table 5 explores the impact on wages run at the state-MSA level (due to data availability). Despite a sizeable rise in labor supply, we find negligible impacts on wages. This is consistent with the excess demand for staff posited earlier.

Impacts on Quality

[26] Van Houtven et al. (2020) document this trend of holding multiple jobs across facilities.
[27] Calculations based on the 2007-2018 ACS.

As noted earlier, we measure the impact on quality at different periodicities for the short- and long-stay populations. Table 6 shows the summary results for composite quality, hospitalizations, and mortality; Table 7 shows the results for each component of quality.

We begin with results for the short-stay population at their 5-day, 14-day and 30-day evaluations; the size of the sample is falling due to deaths and the exit of those short-stayers who are discharged after completing their nursing home-based rehabilitation. We find consistent evidence of increased quality associated with a rise in immigration. At each duration in Column 1 of Table 6, we show a reduction in adverse outcomes (measured by our quality composite outcome) associated with more immigration.

Table 7 shows the impacts on each of the components that make up the composite in Table 6. Some of these impacts are very sizeable: we estimate that a one unit increase in the rate of female immigrant per nursing home residents within an MSA leads to a 7% decline in the use of daily restraints. But the results are generally more modest, with the impact on quality being less than 1% of the mean. For the composite measure, we find consistent reduction in adverse outcomes of about 0.005 standard deviations from the mean per unit increase in immigration, implying that a 10% increase in female immigrants would reduce adverse outcomes by about 0.01 standard deviations.

The last row of Table 6 turns to the longer stay population where we stack all 90-day MDS evaluations and add control variables to our regression models accounting for length of stay. As before, we see a significant decline in the composite quality score of a similar magnitude as found in the short-stay population: 0.0045 standard deviations per unit increase in immigration or 0.009 standard deviations for a 10% increase in female immigrants. In Table 7, as for the short-stay population, we find a strong negative impact on use of restraints. We also see a

very large and significant reduction in inpatient psychiatric medications. On the other hand, we now see positive impacts on feeding tubes and (marginally significant) on catheters. Notably, increased catheterization is primarily problematic if it is inappropriate and leads to an increase in UTIs (Elpern et al. 2009). But we find a non-significant reduction in UTIs among long-stay residents when immigration increases, suggesting that any increase in catheterization may be clinically appropriate.

Columns 2 and 3 of Table 6 examine the impact on mortality and hospitalization as recorded in Medicare claims. For this analysis, we examine results within the first 5 days, 14 days, and 30 days after each nursing home admission to parallel our short-stay resident analyses from earlier. For long-stay residents, we examine these outcomes in each resident's ~90-day period starting at their admission. Although this mirrors the analysis for our MDS-based outcomes which is based upon quarterly assessments of residents, it differs in that the outcomes are measured over the full quarter rather than at the time of assessment.

We find no impacts on mortality at both short and long durations, concluding that there are not meaningful impacts of immigration on patient mortality and that as a result there is not sample selection in our existing quality measures.

On the other hand, we do find significant reductions in hospitalizations in the short run: for example, at 14 days, we find a reduction in hospitalizations of 0.3% per unit change in female immigrants per resident, or 0.6% for a 10% increase in female immigration. These effects fade over time and are negligible over the longer run, consistent with the risk of hospital readmission being greater during the first 14 days following hospital discharge and evidence that readmissions become less preventable as the time since hospital discharge increases (Graham et al., 2017; Burke et al., 2016). For comparison, a 1-star increase in the CMS 5-star quality score

was found to reduce hospitalizations by about 3% (Cornell et al., 2019), while a 10% increase in the Medicaid payment rate above the average of about $100 per day was associated with 5% reduction in the odds of hospitalization (Intrator et al., 2007).

Taken together, these quality results paint a consistent picture of improved quality of care resulting from increased immigration. A natural supposition is that these improvements arise through increased staffing. Directly tying the rise in staffing from our earlier analysis to the improvement in outcomes is challenging because immigration may change not only the number of nursing home workers but also their characteristics (e.g., the share of workers who are full-time employees), which may independently be correlated with quality. Nevertheless, it is useful to compare our estimates to those from previous research on the impact of nursing home staffing on patient outcomes.

Past literature generally finds that a 1% increase in staffing levels improve outcomes by 0.3-0.6% or 0.002-0.006 standard deviations.[28] In comparison, we estimate that a 10% rise in female immigrants leads to a 0.8% increase in staffing. Thus, our results imply that a 1% rise in staffing would improve composite quality by 0.012 and 0.011standard deviations for short- and long-stay residents, respectively. Individual domains of quality improve by 0.7% (hospitalization for short-stay residents), 0.8% (pressure sores), 1.5% (UTIs) and 9% (restraint use). Our results are therefore consistent with and towards the upper end of previous estimates of the impact of staffing on outcomes.

[28] For example, state-imposed minimum staffing ratios that increased CNA staffing by about 5% were found to reduce care deficiency citations by about 3% (Chen & Grabowski, 2015), or 0.03 standard deviations of the sample mean. Increases in Medicaid payment rates to nursing homes of about 10% were found to increase staffing levels by about 6% and reduce the use of restraints by 2% (0.01 standard deviations) and the incidence of pressure sores by 7% (0.002 standard deviation) (Grabowski, 2004). State wage pass-through subsidies were found to increase CNA staffing by 1% on average and reduce the incidence of pressure sores by 0.9% (0.03 standard deviations) (Foster & Lee, 2015).

Heterogeneity of Impacts on Quality

We next examine whether the effects of immigration on quality vary by select resident characteristics. Table 8 presents results where our sample is divided by race and ADRD status. We focus in this table on composite quality, mortality, and hospitalization, and we show results for 14 days (to summarize short stay) and all quarters stacked (to summarize long stay).

Overall, we find little heterogeneity in our findings. In no case is the result significantly different across groups. For those (non-significant) differences that do emerge, the message is quite mixed. On the one hand, we see stronger quality measure improvements for Blacks and those with ADRD. But those groups also see the positive mortality impacts as well, suggesting potential selection bias in the quality measures.

We also examine immigrant heterogeneity as well – do certain types of immigrants have more significant impacts on patient quality? To measure immigrant staff heterogeneity, we decompose our female immigrant population and instrumental variables by English and non-English speaking, Black and Non-Black, and Hispanic and Non-Hispanic. In particular, we measure the share of immigrants from each birthplace who fell into each category in the 2005 ACS, apply this fraction to the population from each birthplace in subsequent MSA-years, and then sum the measures to the MSA-level. For race and ethnicity, we use the race and ethnicity variables directly in the ACS, while for English and non-English speaking, we identify the share of immigrants from the broader birthplace categories (which we use when building our instrument) that were from a country with English as an official or recognized language (identified using the more detailed birthplace categories in the ACS). This procedure is used to produce disaggregated versions of both our instrument and endogenous regressor.

The results of this staff heterogeneity analysis are presented in Table 9. There are two sets of rows for each of the three immigrant group comparisons we carry out. The first column shows the impact on total direct care hours (the full set of staffing results are show in Appendix Table 4). We see that the impacts are fairly comparable by language and race, but that the impacts are much larger for Hispanic than non-Hispanic immigration. Hispanic female immigration yields roughly twice as large a staffing increase as non-Hispanic immigration, with a one-unit increase in our female Hispanic immigrant instrument resulting in an increase of 0.036 total direct care hours per resident day compared with a 0.019 hour per resident day increase for non-Hispanic female immigrants.

The remaining columns of Table 9 shows the same set of quality results from Table 8 but separated by staff immigrant group rather than patient group. The staffing effects carry over to the quality outcomes, with Hispanic female immigration having between 2-5 times the effect of non-Hispanic immigration on the quality composite and short-stay hospitalizations. One possible reason that the effect on quality is larger than what would be implied by the effect on staffing is evident in Appendix Table 4. Hispanic female immigration has a disproportionate effect on CNA and RN staffing while non-Hispanic female immigration primarily increases CNA and LPN staffing, suggesting that Hispanic immigration yields both a larger increase in total staffing and an improvement in the staffing skill mix.

These results raise the further question of whether there are significant "concordance" effects; that is, do black staff have a particularly large effect on black patients? A recent literature in economics has documented such concordance effects in the context of physician care (e.g., Alsan, 2019). We investigate these concordance effects in Appendix Table 5, and we do not find any consistent patterns. Thus, the main lesson from our heterogeneity analyses is that

Hispanic immigration has the largest marginal impact on staffing and staff quality, but that otherwise heterogeneity is second order.

Part IV: Conclusion

Increases in the immigration population result in improved nursing home direct care staffing levels, particularly among full-time staff, with little impact on industry wages or the skill mix of direct care staff. These findings are consistent with persistent excess demand for direct care staff in this industry. Immigration-induced staffing increases were found to meaningfully improve the quality of resident care, particularly on measures most likely to be directly impacted by the availability and quality of direct care workers. We find reductions in the use of physical restraints, the development of urinary tract infections, and rehospitalization among short-stay rehabilitative residents. Within the long-stay population, we find reductions in the use of physical and chemical (i.e., inappropriate antipsychotic medications) restraints and the development of pressure sores. The magnitude of these quality effects was relatively large in comparison to our estimates of immigration's effects on staffing levels, suggesting that immigration improves both the supply and the quality of the nursing home workforce.

Inadequate staffing in nursing homes is a pressing policy issue. Despite proposals to implement federal staffing regulations or requiring facilities to spend a defined portion of their revenue staff, there is no clear policy consensus on how best to increase the supply of direct care workers to fill available openings. Increasing immigrant flows into the US may be one actionable policy solution to ensure there is an adequate workforce to ensure the rapidly aging population has access to quality long-term care.

Tables and Figures

Table 1: MDS Variable Definitions

Measure	Rationale	Sample
New stage 2-4 pressure sore	Pressure ulcers can result from a lack of staff supported mobility including being repositioned in bed or getting out of bed or a chair	All nursing home residents with a scheduled MDS assessment, excluding initial MDS assessments
Daily use of physical restraints	Facilities may use physical restraints as a substitute for adequate staff supervision to ensure patient safety	All nursing home residents with a scheduled MDS assessment
Placement of indwelling catheter	Facilities may use indwelling catheters in lieu of labor-intensive toileting schedules	All nursing home residents with a scheduled MDS assessment
Inappropriate use of Antipsychotics	The use of antipsychotic medications without a clear clinical indication can be a form of chemical restrained used to subdue residents and reduce the intensity of staff supervision required for these residents	All nursing home residents with a scheduled MDS assessment without a clinical indication for the use of antipsychotics.[29]
Feeding Tube Placement	Facilities may use placement of a feeding tube as a substitute for labor intensive manual feedings provided by staff	All nursing home residents with a scheduled MDS assessment
Urinary Tract Infection (UTI)	Inadequate toilet, resident cleaning, and placement of indwelling catheters can all increase the risk of UTIs	All nursing home residents with a scheduled MDS assessment

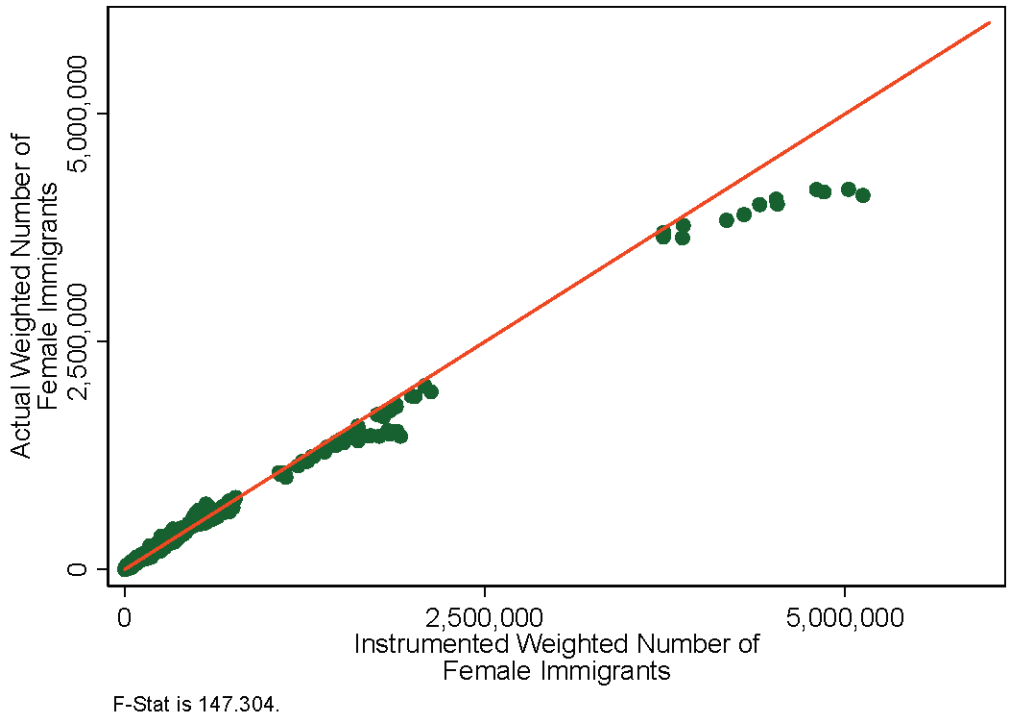
[29] Follows Lucas et al. (2014).

Table 2: Descriptive Statistics of Sample

	All Years	2008	2018
Number of Skilled Nursing Facilities (SNFs)	37.0	36.4	37.7
Number of SNF Residents	3,404	3,469	3,181
Immigrant Population	128,160	115,916	141,139
Female Immigrant Population	65,630	57,997	73,267
Immigrant Population Instrument	127,832	115,110	141,312
Female Immigrant Population Instrument	65,407	57,520	73,308
Immigrant Population Instrument (Weighted)	138,420	120,170	160,685
Female Immigrant Population Instrument (Weighted)	70,548	60,655	82,439
Immigrant Population (Weighted)	138,002	120,456	159,285
Female Immigrant Population (Weighted)	70,454	60,923	81,867
Immigrants per SNF Resident (Weighted)	26.0	21.7	32.0
Immigrant Instrument per SNF Resident (Weighted)	23.1	19.9	27.9
Female Immigrants per SNF Resident (Weighted)	13.2	10.8	16.2
Female Immigrant Instrument per SNF Resident (Weighted)	11.9	10.1	14.4
Observations (State-MSA-Years)	*3,650*	*307*	*302*

Data are from LTC Focus for number of facilities and residents and from the American Community Survey for immigrant variables. Weighted measures are the sum of immigrants from all birthplaces in the metropolitan statistical area (MSA), weighted by that birthplace's relative probability of working as a certified nurse aide in a nursing home. Sample of state-MSAs is restricted to 2007-2018. Each cell in Columns 2-4 shows the average MSA-State-Year value for the corresponding variable.

Figure 1: First Stage results



Measures are constructed with data from the 2000-2005 American Community Survey (ACS) for the relative probability weights and baseline immigrant population and the 2005-2018 ACS for national immigration flows by birthplace and actual immigrant populations. The plot presents actual and instrumented immigration data for 2006-2018, while the F-Statistic is from our first-stage regression.

Table 3: Resident Census and Immigration

VARIABLES	(1) Resident Census
Total Female Immigrants (Weighted)	-0.00197**
	(0.000848)
Observations	*3,642*
Sample Mean	3306.6
Percent change per 1,000 female immigrants	-0.060

Data are from CASPER for number of residents and from the American Community Survey for immigrant variables. Sample of metropolitan statistical areas (MSAs) is restricted to 2007-2018. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Effect of Immigration on Nursing Home Staffing

VARIABLES	(1) CNA Hours Per Resident	(2) LPN Hours Per Resident	(3) RN Hours Per Resident	(4) DC Hours Per Resident
Panel 1: All Hours, 2SLS				
Immigrants per SNF Resident (Weighted, Female)	0.00895***	0.00296	0.00282**	0.0147***
	(0.00325)	(0.00203)	(0.00113)	(0.00487)
Observations	126,901	126,901	126,901	126,901
Sample Mean	2.41	0.87	0.51	3.80
Pct change	0.37	0.34	0.55	0.39
Panel 2: Full-Time Hours, 2SLS				
Immigrants per SNF Resident (Weighted, Female)	0.00909**	0.00211	0.00170	0.0129***
	(0.00355)	(0.00164)	(0.00110)	(0.00462)
Observations	126,901	126,901	126,901	126,901
Sample Mean	1.98	0.72	0.39	3.09
Pct change	0.46	0.29	0.44	0.42
Panel 3: Part-Time Hours, 2SLS				
Immigrants per SNF Resident (Weighted, Female)	-0.000142	0.000849	0.00111*	0.00182
	(0.00181)	(0.000781)	(0.000671)	(0.00286)
Observations	126,901	126,901	126,901	126,901
Sample Mean	0.43	0.16	0.12	0.71
Pct change	-0.03	0.54	0.95	0.26

Staffing data are from OSCAR-CASPER 2006-2017 while immigration data is from the 2000-2017 American Community Survey. We clean certified nursing assistant (CNA), licensed practical nurse (LPN), and registered nurse (RN) staffing data using multiple imputation based upon metropolitan statistical area (MSA), year, nursing home census, and past facility-level values. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Effect of Immigration on Nursing Home Staff Wages

	(1) Median CNA Wage	(2) Median LPN Wage	(3) Median RN Wage
Female Immigrant Population (Weighted)	-2.41e-06	-2.35e-06	-1.92e-06
	(2.34e-06)	(1.01e-05)	(1.19e-05)
Observations	3,802	3,140	3,248
Sample Average	12.76	22.68	29.46
% Change per 1,000 Female Immigrants	-0.02	-0.01	-0.01

Immigration data are from the 2000-2018 American Community Survey (ACS) while median hourly wage data for certified nursing assistants (CNAs), licensed practical nurses (LPNs), and registered nurses (RNs) are calculated from ACS 2006-2018 by metropolitan statistical area. Wages are in 2018 dollars. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Effect of Immigration on Skilled Nursing Facility (SNF) Outcomes

VARIABLES	(1) Assessment-Based Quality Composite	(2) All Hospitalizations	(3) Mortality
Panel 1: Day 5			
Immigrants per SNF Resident	-0.00214***	-0.000202**	1.30e-05
(Weighted, Female)	(0.000655)	(9.53e-05)	(5.46e-05)
Observations	*18,004,810*	*23,860,804*	*32,631,756*
St. Dev./Sample Mean	*0.48*	0.05	0.02
St. Dev. Effect/Percent Change	*-0.0045*	-0.39	0.08
Panel 2: Day 14			
Immigrants per SNF Resident	-0.00241***	-0.000387*	4.29e-05
(Weighted, Female)	(0.000576)	(0.000231)	(0.000107)
Observations	*13,952,126*	*23,860,804*	*32,631,756*
St. Dev./Sample Mean	*0.47*	0.12	0.04
St. Dev. Effect/Percent Change	*-0.0052*	-0.31	0.10
Panel 3: Day 30			
Immigrants per SNF Resident	-0.00243***	-0.000248	-2.33e-05
(Weighted, Female)	(0.000526)	(0.000265)	(0.000152)
Observations	*6,928,777*	*23,860,804*	*32,631,756*
St. Dev./Sample Mean	*0.48*	0.21	0.08
St. Dev. Effect/Percent Change	*-0.0051*	-0.12	-0.03
Panel 4: All Quarters			
Immigrants per SNF Resident	-0.00201***	0.000170	4.16e-05
(Weighted, Female)	(0.000663)	(0.000245)	(9.42e-05)
Observations	*37,337,096*	*45,965,826*	*61,444,697*
St. Dev./Sample Mean	*0.45*	0.24	0.13
St. Dev. Effect/Percent Change	*-0.0045*	0.07	0.03

Immigration data are from the 2000-2018 American Community Survey, the components of the quality composite are from 2008-2018 minimum data set, hospitalizations are from the 2008-2018 MedPAR and mortality is from the 2008-2018 Master Beneficiary Summary File. Panels 1-3 focus on short-stay residents of skilled nursing facilities (SNFs), with results in column 1 restricting to all 5, 14, or 30 day assessments while columns 2 and 3 look for hospitalizations or mortality within 5, 14, or 30 days of admission to the nursing home. In the first column of Panel 4, the long-stay sample in is identified as either quarterly/annual scheduled assessments or change in status assessments within 20 days of when the next scheduled assessment should have been, where there are no other assessments within 20 days of the expected assessment date. Columns 2 and 3 pool observations for each quarter, starting at admission and counting ahead 90 days from the beginning of each stay to discharge or mortality, and look for hospitalizations or mortality in each quarter. Hospitalization models exclude individuals with Medicare Advantage plans as we cannot observe all hospitalizations for these individuals. Effect sizes are represented as standard deviations in Column 1 and percent changes in 2-3. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Effect of Immigration on Nursing Home Quality Components

VARIABLES	(1) Restraints	(2) Feeding Tube	(3) Catheter	(4) Inappropriate Anti-Psychotic Meds	(5) Pressure Ulcers	(6) UTI
Day 5						
Immigrants per SNF Resident	-0.000300***	-0.000146*	-0.000283	-0.000598	NA	-0.00102***
(Weighted, Female)	(6.38e-05)	(8.07e-05)	(0.000615)	(0.000381)	NA	(0.000369)
Observations	*18,002,485*	*17,978,791*	*17,991,493*	*16,302,295*	*NA*	*18,001,477*
Sample Mean	0.00	0.05	0.14	0.06	NA	0.17
Pct change	-7.14	-0.32	-0.20	-1.01	NA	-0.60
Day 14						
Immigrants per SNF Resident	-0.000409***	4.93e-06	-0.000587	-0.000676	0.000198	-0.00126***
(Weighted, Female)	(0.000101)	(8.65e-05)	(0.000403)	(0.000416)	(0.000273)	(0.000401)
Observations	*13,951,910*	*13,932,951*	*13,941,899*	*12,621,894*	*12,806,038*	13,949,578
Sample Mean	0.01	0.05	0.11	0.06	0.14	0.18
Pct change	-7.18	0.01	-0.52	-1.12	0.14	-0.69
Day 30						
Immigrants per SNF Resident	-0.000547***	-1.72e-05	-0.000199	-0.000637	-0.000174	-0.00114**
(Weighted, Female)	(0.000129)	(0.000122)	(0.000186)	(0.000506)	(0.000215)	(0.000443)
Observations	*6,928,694*	*6,916,357*	*6,921,427*	*6,193,965*	*6,910,052*	*6,927,133*
Sample Mean	0.01	0.06	0.10	0.06	0.15	0.17
Pct change	-6.96	-0.03	-0.21	-0.99	-0.12	-0.67
All Quarters						
Immigrants per SNF Resident	-0.000711***	0.000115	0.000105*	-0.00238**	-0.000154*	-0.000183
(Weighted, Female)	(0.000167)	(0.000105)	(5.71e-05)	(0.000964)	(9.01e-05)	(0.000177)
Observations	*37,335,932*	*37,305,233*	*37,329,331*	*27,672,184*	*37,260,180*	*37,324,995*
Sample Mean	0.02	0.04	0.04	0.10	0.05	0.04
Pct change	-4.01	0.27	0.25	-2.42	-0.34	-0.41

Immigration data are from the 2000-2018 American Community Survey and outcomes are from the 2008-2018 minimum data set. Panels 1-3 restricts to all 5, 14, or 30-day assessments of residents of skilled nursing facilities (SNFs), respectively. The sample in Panel 4 is restricted to either quarterly/annual scheduled assessments or change in status assessments within 20 days of when the next scheduled assessment should have been, where there are no other assessments within 20 days of the expected assessment date. See Table 1 for outcome definitions. Effect sizes are represented as percent changes. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Effect of Immigration on Nursing Home Outcomes – Heterogeneity

	Quality Composite		Hospitalization		Mortality	
VARIABLES	Short-Stay	Long-Stay	Short-Stay	Long-Stay	Short-Stay	Long-Stay
Panel 1: White, non-Hispanic						
Immigrants per SNF Resident	-0.00229***	-0.00172**	-0.000347	0.000227	6.80e-05	-2.62e-05
(Weighted, Female)	(0.000577)	(0.000705)	(0.000315)	(0.000280)	(0.000182)	(0.000144)
Observations	*11,076,011*	*29,591,350*	18,743,488	35,591,682	25,289,757	47,166,152
St. Dev./Sample Mean	*0.45*	*0.44*	0.12	0.23	0.04	0.13
St. Dev. Effect/Percent Change	*-0.0051*	*-0.0039*	-0.30	0.10	0.15	-0.02
Panel 2: Black, non-Hispanic						
Immigrants per SNF Resident	-0.00376***	-0.00259***	-0.000753***	0.000111	0.000155*	0.000254*
(Weighted, Female)	(0.000834)	(0.000856)	(0.000263)	(0.000459)	(8.06e-05)	(0.000144)
Observations	*1,705,095*	*4,758,991*	3,010,674	6,123,751	4,252,895	8,366,518
St. Dev./Sample Mean	*0.52*	*0.49*	0.15	0.28	0.04	0.11
St. Dev. Effect/Percent Change	*-0.0072*	*-0.0053*	-0.49	0.04	0.42	0.23
Panel 3: Hispanic						
Immigrants per SNF Resident	-0.00235***	-0.00236**	-0.000182	0.000131	0.000188	0.000230*
(Weighted, Female)	(0.000730)	(0.00120)	(0.000324)	(0.000221)	(0.000133)	(0.000135)
Observations	*755,579*	*1,909,008*	1,321,633	2,679,270	2,034,138	3,841,918
St. Dev./Sample Mean	*0.54*	*0.48*	0.14	0.26	0.04	0.11
St. Dev. Effect/Percent Change	*-0.0044*	*-0.0049*	-0.13	0.05	0.50	0.21
Panel 4: ADRD						
Immigrants per SNF Resident	-0.00379***	-0.00227***	-0.000276	0.000525**	0.000535	0.000327**
(Weighted, Female)	(0.000790)	(0.000648)	(0.000729)	(0.000227)	(0.000543)	(0.000138)
Observations	*3,209,733*	*20,471,016*	1,117,430	12,685,371	1,357,668	16,416,190
St. Dev./Sample Mean	*0.54*	*0.43*	0.07	0.13	0.02	0.10
St. Dev. Effect/Percent Change	*-0.0070*	*-0.0053*	-0.40	0.40	2.50	0.33
Panel 5: Not ADRD						
Immigrants per SNF Resident	-0.00205***	-0.00141	-0.000438*	6.29e-05	5.27e-05	-1.91e-06
(Weighted, Female)	(0.000421)	(0.000915)	(0.000244)	(0.000249)	(0.000133)	(0.000152)
Observations	*10,742,393*	*16,866,080*	22,743,374	33,280,455	31,274,088	45,028,507
St. Dev./Sample Mean	*0.44*	*0.47*	0.13	0.28	0.04	0.14
St. Dev. Effect/Percent Change	*-0.0047*	*-0.0030*	-0.35	0.02	0.12	0.00

Immigration data are from the 2000-2018 American Community Survey, the components of the quality composite are from 2008-2018 minimum data set, hospitalizations are from the 2008-2018 MedPAR, and mortality and skilled nursing facility (SNF) resident characteristics are from the 2008-2018 Master Beneficiary Summary File. Short-stay analyses in column 1 restrict to all 14-day assessments while columns 3 and 5 look for hospitalizations or mortality within 14 days of admission to the nursing home. Long-stay analyses in column 2 restrict to either quarterly/annual scheduled assessments or change in status assessments within 20 days of when the next scheduled assessment should have been, where there are no other assessments within 20 days of the expected assessment date. Columns 4 and 6 pool observations for each quarter, starting at admission and counting ahead 90 days from the beginning of each stay to discharge or mortality, and look for hospitalizations or mortality in each quarter. Hospitalization models exclude individuals with Medicare Advantage plans as we cannot observe all hospitalizations for these individuals. Effect sizes are represented as standard deviations in Columns 1-2 and percent changes in 3-6. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Effect of Immigration on Nursing Home Outcomes – Immigrant Heterogeneity

	Total Staffing Per	*Quality Composite*		*Hospitalizations*		*Mortality*	
VARIABLES	Resident Day	Short-Stay	Long-Stay	Short-Stay	Long-Stay	Short-Stay	Long-Stay
Predicted English-Speaking Female	0.0264***	-0.00411***	-0.00312**	-0.000608	0.000553	7.10e-05	0.000159
Immigrants per SNF Res. (Weighted)	(0.00985)	(0.00154)	(0.00121)	(0.000506)	(0.000481)	(0.000198)	(0.000163)
Effect in Percent or Standard Deviations	0.70	-0.01	-0.01	-0.49	0.23	0.17	0.12
Predicted Not English-Speaking	0.0224**	-0.00435***	-0.00388***	-0.000760*	0.000254	0.000169	5.59e-05
Immigrants per SNF Res. (Weighted)	(0.00925)	(0.000937)	(0.00125)	(0.000389)	(0.000448)	(0.000228)	(0.000162)
Effect in Percent or Standard Deviations	0.59	-0.01	-0.01	-0.62	0.10	0.39	0.04
Predicted Black Female Immigrants	0.0273**	-0.00383***	-0.00273***	-0.000696	0.000904**	-6.01e-05	-2.00e-05
per SNF Res. (Weighted)	(0.0106)	(0.00133)	(0.000923)	(0.000422)	(0.000441)	(0.000155)	(0.000144)
Effect in Percent or Standard Deviations	0.72	-0.01	-0.01	-0.56	0.37	-0.14	-0.02
Predicted Non-Black Immigrants	0.0202**	-0.00416***	-0.00384***	-0.000660	2.92e-05	0.000227	0.000152
per SNF Res. (Weighted)	(0.00800)	(0.00115)	(0.00117)	(0.000436)	(0.000411)	(0.000214)	(0.000164)
Effect in Percent or Standard Deviations	0.53	-0.01	-0.01	-0.53	0.01	0.53	0.12
Predicted Hispanic Immigrants	0.0358**	-0.00807***	-0.00826***	-0.00185***	-0.000458	0.000423	0.000126
per SNF Res. (Weighted)	(0.0150)	(0.00193)	(0.00237)	(0.000649)	(0.00102)	(0.000435)	(0.000304)
Effect in Percent or Standard Deviations	0.94	-0.02	-0.02	-1.50	-0.19	0.98	0.10
Predicted Non-Hispanic Immigrants	0.0186***	-0.00286***	-0.00218***	-0.000358	0.000509*	5.19e-05	7.71e-05
per SNF Res. (Weighted)	(0.00652)	(0.000868)	(0.000757)	(0.000357)	(0.000284)	(0.000140)	(0.000119)
Effect in Percent or Standard Deviations	0.49	-0.01	0.00	-0.29	0.21	0.12	0.06

Immigration data are from the 2000-2018 ACS, staffing data from CASPER and at the facility level, resident-level data for the components of the quality composite are from MDS 2008-2018, resident-level data on mortality is from the 2008-2018 Master Beneficiary Summary File, and resident-level data hospitalization is from 2008-2018 MedPAR. Our "concordance" instruments are built like the overall instruments for female immigration, weighted by the relative probability of being a CNA, except that we split the list of birthplaces into two groups for each sub-group (English, black, Hispanic). To split the sample by race/ethnicity, we calculate the national share of immigrants from each birthplace who reported being black or Hispanic in 2005. We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each category. For the English versus non-English instruments, we calculate the national share of people in each broader birthplace category in 2005 that are from countries where English is an official or recognized language (using the more detailed ACS birthplace variable). We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each language category. Short-stay quality composite analyses restrict to day 14 assessments while long-stay quality composite analyses restrict to either quarterly/annual scheduled assessments or change in status assessments within 20 days of when the next scheduled assessment should have been, where there are no other assessments within 20 days of the expected assessment date. Short-stay analyses in Columns 4 and 6 look for hospitalizations or mortality within 14 days of each admission to a nursing home, while long-stay analyses in Columns 5 and 7 pool observations for each quarter, starting at admission and counting ahead 90 days from the beginning of each stay to discharge or mortality, and look for hospitalizations or mortality in each quarter. Hospitalization analyses exclude Medicare Advantage beneficiaries as we have incomplete hospitalization data for them. Effect sizes for staffing, hospitalizations, and mortality are represented as percent changes, while those for the quality composite are in standard deviations. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

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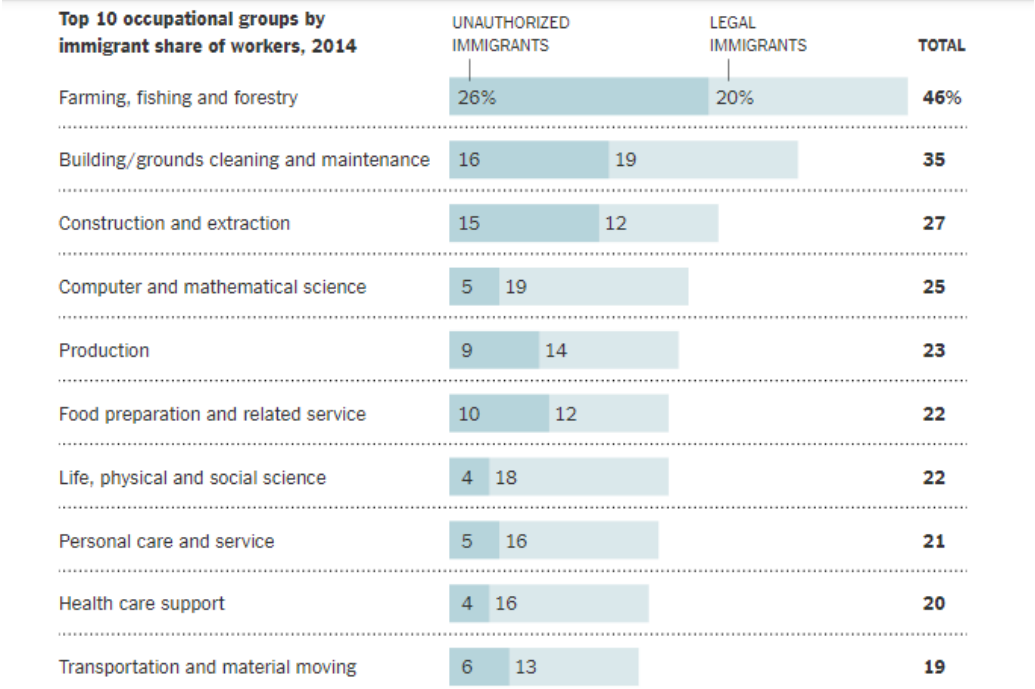
Appendix

Appendix Figure 1: Top Occupations for Immigrants



Note: Totals calculated prior to rounding.

Source: Pew Research Center

Appendix Table 1: Comorbidities at Admission and Immigration

VARIABLES	(1) Number of Chronic Conditions	(2) < Median # of Chronic Conditions
Female Immigrants per Resident (Weighted)	0.00122	-0.000469
	(0.0143)	(0.00108)
Observations	*31,432,314*	*31,432,314*
Sample Mean	8.78	0.43
Pct change	0.01	-0.11

Data are from the 2008-2018 Master Beneficiary Summary File for chronic conditions, the 2008-2018 MDS for nursing home admissions, and the 2000-2018 American Community Survey for immigration. The samples are composed of all new nursing home residents, and the outcomes for columns 1 and 2 are the total number of chronic conditions and whether the resident has fewer than the median number of conditions, respectively. Chronic conditions are defined by CMS and include 27 conditions.[30] Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

[30] For more detail on the chronic conditions, see the MBSF documentation: https://resdac.org/cms-data/files/mbsf-27-cc

Appendix Table 2: Effect of Immigration on Nursing Home Outcomes – Short-Stay Heterogeneity, Quality Components

VARIABLES	White	Black	Hispanic	ADRD	Not ADRD
Panel 1: Restraints					
Immigrants per SNF Res	-0.000334***	-0.000592***	-0.000647***	-0.000762***	-0.000390***
(Weighted, Female)	(8.04e-05)	(0.000136)	(0.000170)	(0.000191)	(0.000107)
Observations	*11,075,826*	*1,705,079*	*755,570*	*3,209,722*	*10,742,188*
Sample Mean	0.01	0.01	0.01	0.01	0.00
Pct change	-6.45	-9.01	-6.86	-6.56	-9.91
Panel 2: Feed Tube					
Immigrants per SNF Res	-7.85e-05	-0.000319	0.000818***	-0.000100	6.93e-05
(Weighted, Female)	(0.000107)	(0.000308)	(0.000253)	(0.000155)	(0.000152)
Observations	*11,061,437*	*1,702,830*	*754,008*	*3,206,861*	*10,726,090*
Sample Mean	0.04	0.10	0.09	0.06	0.05
Pct change	-0.21	-0.34	0.96	-0.18	0.15
Panel 3: Catheter					
Immigrants per SNF Res	-0.000615	-0.000774	-0.000537*	-0.000289	-0.000749*
(Weighted, Female)	(0.000433)	(0.000473)	(0.000311)	(0.000236)	(0.000409)
Observations	*11,067,913*	*1,703,873*	*754,983*	*3,209,175*	*10,732,724*
Sample Mean	0.11	0.11	0.11	0.10	0.12
Pct change	-0.54	-0.73	-0.50	-0.28	-0.65

Immigration data are from the 2000-2018 ACS, outcomes are from the 2008-2018 MDS, and resident characteristics are from the 2008-2018 Master Beneficiary Summary File. Regressions restrict to all 14-day assessments for those in skilled nursing facilities (SNFs). See Table 1 for outcome definitions. Effect sizes are represented as percent changes. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 2: Continued

VARIABLES	White	Black	Hispanic	ADRD	Not ADRD
Panel 4: Inappropriate Anti-Psychotic Meds					
Immigrants per SNF Res	-0.000679*	-0.000910	-0.000564	-0.00147***	-0.000204
(Weighted, Female)	(0.000405)	(0.000590)	(0.000632)	(0.000385)	(0.000292)
Observations	*10,050,306*	*1,520,369*	*669,613*	*2,697,630*	*9,924,264*
Sample Mean	0.06	0.06	0.08	0.16	0.03
Pct change	-1.14	-1.51	-0.72	-0.90	-0.63
Panel 5: Pressure Ulcers					
Immigrants per SNF Res	0.000440	-0.000373	-0.000531	0.000473	0.000220
(Weighted, Female)	(0.000311)	(0.000530)	(0.000330)	(0.000575)	(0.000271)
Observations	*10,181,711*	*1,578,614*	*668,423*	*2,924,604*	*9,881,429*
Sample Mean	0.14	0.20	0.16	0.14	0.15
Pct change	0.33	-0.19	-0.32	0.33	0.15
Panel 6: UTI					
Immigrants per SNF Res	-0.00144***	-0.00154***	-0.000969*	-0.000911**	-0.00133***
(Weighted, Female)	(0.000447)	(0.000503)	(0.000524)	(0.000452)	(0.000376)
Observations	*11,073,900*	*1,704,860*	*755,444*	*3,209,132*	*10,740,446*
Sample Mean	0.19	0.15	0.16	0.22	0.17
Pct change	-0.76	-1.01	-0.60	-0.41	-0.78

Immigration data are from the 2000-2018 ACS, outcomes are from the 2008-2018 MDS, and resident characteristics are from the 2008-2018 Master Beneficiary Summary File. Regressions restrict to all 14-day assessments for those in skilled nursing facilities (SNFs). See Table 1 for outcome definitions. Effect sizes are represented as percent changes. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 3: Effect of Immigration on Nursing Home Outcomes – Long-Stay Heterogeneity

VARIABLES	White	Black	Hispanic	ADRD	Not ADRD
Panel 1: Restraints					
Immigrants per SNF Res	-0.000663***	-0.000858***	-0.001000***	-0.000820***	-0.000917***
(Weighted, Female)	(0.000149)	(0.000232)	(0.000252)	(0.000194)	(0.000283)
Observations	*29,590,432*	*4,758,965*	*1,908,972*	*20,470,792*	*16,865,311*
Sample Mean	0.02	0.02	0.02	0.02	0.01
Pct change	-3.71	-5.66	-4.59	-4.03	-6.29
Panel 2: Feed Tube					
Immigrants per SNF Res	0.000143*	0.000241	-2.97e-05	0.000132	0.000286
(Weighted, Female)	(7.33e-05)	(0.000239)	(0.000419)	(0.000148)	(0.000404)
Observations	*29,567,875*	*4,754,467*	*1,907,122*	*20,452,794*	*16,852,606*
Sample Mean	0.03	0.10	0.09	0.03	0.05
Pct change	0.50	0.24	-0.03	0.38	0.54
Panel 3: Catheter					
Immigrants per SNF Res	0.000194**	7.30e-05	6.88e-05	9.33e-05*	0.000269
(Weighted, Female)	(7.85e-05)	(0.000105)	(0.000141)	(5.04e-05)	(0.000179)
Observations	*29,585,147*	*4,757,843*	*1,908,849*	*20,468,066*	*16,861,444*
Sample Mean	0.04	0.04	0.04	0.03	0.06
Pct change	0.46	0.20	0.19	0.34	0.47

Immigration data are from the 2000-2018 ACS, outcomes are from the 2008-2018 MDS, and skilled nursing facility (SNF) resident characteristics are from the 2008-2018 Master Beneficiary Summary File. The sample is restricted to either quarterly/annual scheduled assessments or change in status assessments within 20 days of when the next scheduled assessment should have been, where there are no other assessments within 20 days of the expected assessment date. See Table 1 for outcome definitions. Effect sizes are represented as percent changes. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 3: Continued

VARIABLES	White	Black	Hispanic	ADRD	Not ADRD
Panel 4: Inappropriate Anti-Psychotic Meds					
Immigrants per SNF Res	-0.00217**	-0.00266**	-0.00246**	-0.00234**	-0.00129**
(Weighted, Female)	(0.00108)	(0.00135)	(0.00119)	(0.001000)	(0.000596)
Observations	*21,877,874*	*3,533,519*	*1,407,451*	*14,449,815*	*13,222,556*
Sample Mean	0.10	0.09	0.12	0.15	0.05
Pct change	-2.18	-2.98	-2.03	-1.58	-2.85
Panel 5: Pressure Ulcers					
Immigrants per SNF Res	-5.75e-05	-0.000378***	7.03e-05	-0.000240**	-2.43e-05
(Weighted, Female)	(0.000117)	(0.000137)	(0.000162)	(0.000104)	(0.000167)
Observations	*29,530,948*	*4,748,765*	*1,904,968*	*20,428,272*	*16,832,083*
Sample Mean	0.04	0.06	0.04	0.04	0.05
Pct change	-0.13	-0.64	0.16	-0.61	-0.05
Panel 6: UTI					
Immigrants per SNF Res	-0.000248	-0.000307***	-0.000184	-0.000127	-0.000176
(Weighted, Female)	(0.000256)	(9.94e-05)	(0.000172)	(0.000176)	(0.000164)
Observations	*29,581,339*	*4,758,058*	*1,908,333*	*20,464,025*	*16,861,151*
Sample Mean	0.048	0.029	0.035	0.042	0.048
Pct change	-0.512	-1.04	-0.529	-0.305	-0.365

Immigration data are from the 2000-2018 ACS, outcomes are from the 2008-2018 MDS, and skilled nursing facility (SNF) resident characteristics are from the 2008-2018 Master Beneficiary Summary File. The sample is restricted to either quarterly/annual scheduled assessments or change in status assessments within 20 days of when the next scheduled assessment should have been, where there are no other assessments within 20 days of the expected assessment date. See Table 1 for outcome definitions. Effect sizes are represented as percent changes. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 4: Effect of Immigration on Staffing – Immigrant Heterogeneity

	(1)	(2)	(3)	(4)
		Hours per Resident Day		
VARIABLES	CNA	LPN	RN	Total Direct Care
Likely English-Speaking Female	0.0155**	0.00914***	0.00178	0.0264***
Immigrants per SNF Res. (Weighted)	(0.00736)	(0.00318)	(0.00167)	(0.00985)
Effect in Percentage Terms	0.64	1.05	0.35	0.70
Likely Not English-Speaking	0.0141**	0.00141	0.00693***	0.0224**
Immigrants per SNF Res. (Weighted)	(0.00574)	(0.00386)	(0.00229)	(0.00925)
Effect in Percentage Terms	0.58	0.16	1.36	0.59
Likely Black Female Immigrants	0.0176**	0.00754**	0.00219	0.0273**
per SNF Res. (Weighted)	(0.00826)	(0.00327)	(0.00202)	(0.0106)
Effect in Percentage Terms	0.73	0.86	0.43	0.72
Likely Non-Black Immigrants	0.0119**	0.00323	0.00511**	0.0202**
per SNF Res. (Weighted)	(0.00497)	(0.00350)	(0.00209)	(0.00800)
Effect in Percentage Terms	0.49	0.37	1.00	0.53
Likely Hispanic Immigrants	0.0226***	-0.00111	0.0142***	0.0358**
per SNF Res. (Weighted)	(0.00835)	(0.00697)	(0.00396)	(0.0150)
Effect in Percentage Terms	0.94	-0.13	2.80	0.94
Likely Non-Hispanic Immigrants	0.0111**	0.00561**	0.00187	0.0186***
per SNF Res. (Weighted)	(0.00471)	(0.00235)	(0.00140)	(0.00652)
Effect in Percentage Terms	0.46	0.64	0.37	0.49
Observations	126,901	126,901	126,901	126,901
Sample Mean	2.41	0.87	0.51	3.80

Immigration data are from the 2000-2018 ACS while cleaned staffing is from Casper. Our "concordance" instruments are built like the overall instruments for female immigration, weighted by the relative probability of being a CNA, except that we split the list of birthplaces into two groups for each sub-group (English, black, Hispanic). To split the sample by race/ethnicity, we calculate the national share of immigrants from each birthplace who reported being black or Hispanic in 2005. We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each category. For the English versus non-English instruments, we calculate the national share of people in each broader birthplace category in 2005 that are from countries where English is an official or recognized language (using the more detailed ACS birthplace variable). We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each language category. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 5: Effect of Immigration on Nursing Home Outcomes – Concordance

	Quality Composite									
	Short-Stay Resident Groups					*Long-Stay Resident Groups*				
VARIABLES	White	Black	Hispanic	ADRD	Not ADRD	White	Black	Hispanic	ADRD	Not ADRD
Likely English-Speaking Female	-0.00462***	-0.00779***	-0.00373	-0.00635***	-0.00346***	-0.00304**	-0.00572***	-0.00340*	-0.00374***	-0.00187
Immigrants per SNF Res. (Weighted)	(0.00140)	(0.00224)	(0.00248)	(0.00215)	(0.00115)	(0.00138)	(0.00181)	(0.00201)	(0.00134)	(0.00127)
Effect in Standard Deviations	-0.010	-0.015	-0.007	-0.012	-0.008	-0.007	-0.012	-0.007	-0.009	-0.004
Likely Not English-Speaking	-0.00399***	-0.00678***	-0.00409***	-0.00710***	-0.00375***	-0.00323**	-0.00449***	-0.00445**	-0.00441***	-0.00295
Immigrants per SNF Res. (Weighted)	(0.000962)	(0.00137)	(0.00105)	(0.00141)	(0.000691)	(0.00127)	(0.00141)	(0.00201)	(0.00122)	(0.00183)
Effect in Standard Deviations	-0.009	-0.013	-0.008	-0.013	-0.009	-0.007	-0.009	-0.009	-0.010	-0.006
Likely Black Female Immigrants	-0.00353***	-0.00687***	-0.00240	-0.00648***	-0.00315***	-0.00215**	-0.00393***	-0.00205	-0.00345***	-0.00126
per SNF Res. (Weighted)	(0.00122)	(0.00129)	(0.00238)	(0.00127)	(0.000997)	(0.000990)	(0.00116)	(0.00138)	(0.000934)	(0.00113)
Effect in Standard Deviations	-0.008	-0.013	-0.004	-0.012	-0.007	-0.005	-0.008	-0.004	-0.008	-0.003
Likely Non-Black Immigrants	-0.00435***	-0.00709***	-0.00435***	-0.00652***	-0.00361***	-0.00372***	-0.00567***	-0.00503***	-0.00434***	-0.00308**
per SNF Res. (Weighted)	(0.00108)	(0.00213)	(0.00115)	(0.00178)	(0.000830)	(0.00131)	(0.00159)	(0.00186)	(0.00125)	(0.00149)
Effect in Standard Deviations	-0.010	-0.014	-0.008	-0.012	-0.008	-0.009	-0.012	-0.010	-0.010	-0.007
Likely Hispanic Immigrants	-0.00787***	-0.0132***	-0.00612***	-0.0133***	-0.00695***	-0.00735***	-0.00961***	-0.00801**	-0.00924***	-0.00656*
per SNF Res. (Weighted)	(0.00204)	(0.00321)	(0.00186)	(0.00304)	(0.00135)	(0.00260)	(0.00302)	(0.00310)	(0.00232)	(0.00357)
Effect in Standard Deviations	-0.018	-0.025	-0.011	-0.025	-0.016	-0.017	-0.020	-0.017	-0.021	-0.014
Likely Non-Hispanic Immigrants	-0.00284***	-0.00486***	-0.00265*	-0.00448***	-0.00244***	-0.00190**	-0.00331***	-0.00233*	-0.00258***	-0.00138
per SNF Res. (Weighted)	(0.000832)	(0.00122)	(0.00141)	(0.00109)	(0.000648)	(0.000865)	(0.00101)	(0.00136)	(0.000779)	(0.000950)
Effect in Standard Deviations	-0.006	-0.009	-0.005	-0.008	-0.006	-0.004	-0.007	-0.005	-0.006	-0.003

Immigration data are from the 2000-2018 ACS, data on resident characteristics are from the 2008-2018 Master Beneficiary Summary File, and data for the components of the quality composite are from MDS 2008-2018. Our "concordance" instruments are built like the overall instruments for female immigration, weighted by the relative probability of being a CNA, except that we split the list of birthplaces into two groups for each sub-group (English, black, Hispanic). To split the sample by race/ethnicity, we calculate the national share of immigrants from each birthplace who reported being black or Hispanic in 2005. We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each category. For the English versus non-English instruments, we calculate the national share of people in each broader birthplace category in 2005 that are from countries where English is an official or recognized language (using the more detailed ACS birthplace variable). We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each language category. Short-stay analyses restrict to day 14 assessments of those in skilled nursing facilities (SNFs) while long-stay analyses restrict to either quarterly/annual scheduled assessments or change in status assessments within 20 days of when the next scheduled assessment should have been, where there are no other assessments within 20 days of the expected assessment date. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 5: Continued, Hospitalizations

	Hospitalizations									
	Short-Stay					*Long-Stay*				
VARIABLES	White	Black	Hispanic	ADRD	Not ADRD	White	Black	Hispanic	ADRD	Not ADRD
Likely English-Speaking Female	-0.000547	-0.00172***	-0.000306	-0.000926	-0.000729	0.000768	-1.71e-05	0.000529	0.00115**	0.000279
Immigrants per SNF Res. (Weighted)	(0.000721)	(0.000560)	(0.000720)	(0.00166)	(0.000542)	(0.000528)	(0.00125)	(0.000561)	(0.000565)	(0.000428)
Percent Change	-0.47	-1.12	-0.22	-1.36	-0.58	0.33	-0.01	0.20	0.86	0.10
Likely Not English-Speaking	-0.000669	-0.00124**	-0.000307	-0.000196	-0.000823*	0.000246	0.000345	0.000121	0.000807**	4.13e-05
Immigrants per SNF Res. (Weighted)	(0.000523)	(0.000503)	(0.000528)	(0.00119)	(0.000418)	(0.000516)	(0.000714)	(0.000346)	(0.000374)	(0.000472)
Percent Change	-0.57	-0.81	-0.22	-0.29	-0.65	0.10	0.12	0.05	0.61	0.01
Likely Black Female Immigrants	-0.000535	-0.00122**	-0.000748	-0.000743	-0.000792*	0.000905*	0.000603	0.000809*	0.00127***	0.000660
per SNF Res. (Weighted)	(0.000610)	(0.000472)	(0.000628)	(0.00142)	(0.000442)	(0.000511)	(0.000796)	(0.000447)	(0.000340)	(0.000465)
Percent Change	-0.45	-0.80	-0.55	-1.09	-0.63	0.39	0.21	0.31	0.96	0.23
Likely Non-Black Immigrants	-0.000656	-0.00148**	-9.38e-05	-0.000163	-0.000730	5.93e-05	-7.78e-05	-4.38e-05	0.000662	-0.000188
per SNF Res. (Weighted)	(0.000581)	(0.000623)	(0.000564)	(0.00122)	(0.000470)	(0.000533)	(0.000890)	(0.000357)	(0.000454)	(0.000438)
Percent Change	-0.56	-0.97	-0.07	-0.24	-0.58	0.03	-0.03	-0.02	0.50	-0.07
Likely Hispanic Immigrants	-0.00206**	-0.00267***	-0.000406	-0.000295	-0.00196***	-0.000929	0.000240	6.44e-05	0.00149**	-0.00115
per SNF Res. (Weighted)	(0.000831)	(0.000942)	(0.000866)	(0.00223)	(0.000694)	(0.00132)	(0.00152)	(0.000546)	(0.000670)	(0.00111)
Percent Change	-1.75	-1.75	-0.30	-0.43	-1.55	-0.40	0.08	0.02	1.12	-0.41
Likely Non-Hispanic Immigrants	-0.000235	-0.000940**	-0.000241	-0.000414	-0.000423	0.000659**	0.000192	0.000307	0.000679**	0.000408
per SNF Res. (Weighted)	(0.000501)	(0.000390)	(0.000446)	(0.00100)	(0.000378)	(0.000332)	(0.000656)	(0.000336)	(0.000341)	(0.000290)
Percent Change	-0.20	-0.61	-0.18	-0.61	-0.34	0.28	0.07	0.12	0.51	0.14

Immigration data are from the 2000-2018 ACS, data on resident characteristics are from the 2008-2018 Master Beneficiary Summary File, and data for hospitalizations are from the 2008-2018 Medpar. Our "concordance" instruments are built like the overall instruments for female immigration, weighted by the relative probability of being a CNA, except that we split the list of birthplaces into two groups for each sub-group (English, black, Hispanic). To split the sample by race/ethnicity, we calculate the national share of immigrants from each birthplace who reported being black or Hispanic in 2005. We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each category. For the English versus non-English instruments, we calculate the national share of people in each broader birthplace category in 2005 that are from countries where English is an official or recognized language (using the more detailed ACS birthplace variable). We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each language category. Short-stay analyses look for hospitalizations within 14 days of each admission to a skilled nursing facility (SNF), while long-stay analyses pool observations for each quarter, starting at admission and counting ahead 90 days from the beginning of each stay to discharge or mortality, and look for hospitalizations in each quarter. All analyses exclude Medicare Advantage beneficiaries as we have incomplete hospitalization data for them. Effect sizes are represented as percent changes. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 5: Continued, Mortality

	Mortality									
	Short-Stay					*Long-Stay*				
VARIABLES	White	Black	Hispanic	ADRD	Not ADRD	White	Black	Hispanic	ADRD	Not ADRD
Likely English-Speaking Female	9.86e-05	0.000376*	0.000347	0.00134	4.79e-05	8.73e-05	0.000814**	0.000441	0.000831***	-1.10e-05
Immigrants per SNF Res. (Weighted)	(0.000367)	(0.000199)	(0.000365)	(0.00134)	(0.000222)	(0.000372)	(0.000359)	(0.000269)	(0.000240)	(0.000250)
Percent Change	0.22	1.03	0.92	6.24	0.11	0.07	0.73	0.39	0.85	-0.01
Likely Not English-Speaking	0.000140	0.000229*	0.000320	0.000746	0.000142	-0.000117	0.000301	0.000380*	0.000416	6.16e-06
Immigrants per SNF Res. (Weighted)	(0.000309)	(0.000127)	(0.000227)	(0.000836)	(0.000252)	(0.000220)	(0.000246)	(0.000226)	(0.000301)	(0.000286)
Percent Change	0.32	0.63	0.85	3.49	0.32	-0.09	0.27	0.34	0.42	0.00
Likely Black Female Immigrants	-0.000125	0.000157	0.000438**	0.00109	-6.69e-05	-0.000244	0.000377	0.000247	0.000639***	-0.000217
per SNF Res. (Weighted)	(0.000255)	(0.000145)	(0.000181)	(0.00130)	(0.000189)	(0.000185)	(0.000274)	(0.000216)	(0.000235)	(0.000194)
Percent Change	-0.28	0.43	1.16	5.10	-0.15	-0.18	0.34	0.22	0.65	-0.15
Likely Non-Black Immigrants	0.000282	0.000362**	0.000244	0.000770	0.000195	8.83e-05	0.000535*	0.000444*	0.000501*	0.000117
per SNF Res. (Weighted)	(0.000329)	(0.000172)	(0.000280)	(0.000827)	(0.000233)	(0.000305)	(0.000275)	(0.000244)	(0.000299)	(0.000284)
Percent Change	0.64	0.99	0.65	3.60	0.44	0.07	0.48	0.40	0.51	0.08
Likely Hispanic Immigrants	0.000436	0.000539**	0.000281	0.000959	0.000386	-0.000204	0.000383	0.000695*	0.000600	0.000148
per SNF Res. (Weighted)	(0.000617)	(0.000249)	(0.000461)	(0.00145)	(0.000476)	(0.000449)	(0.000540)	(0.000355)	(0.000683)	(0.000571)
Percent Change	0.99	1.47	0.74	4.48	0.88	-0.15	0.34	0.62	0.61	0.11
Likely Non-Hispanic Immigrants	4.23e-05	0.000186*	0.000331*	0.000849	3.16e-05	-8.05e-06	0.000427**	0.000247	0.000497***	-3.24e-05
per SNF Res. (Weighted)	(0.000224)	(0.000112)	(0.000184)	(0.000877)	(0.000157)	(0.000205)	(0.000201)	(0.000175)	(0.000154)	(0.000179)
Percent Change	0.10	0.51	0.88	3.97	0.07	-0.01	0.38	0.22	0.51	-0.02

Immigration data are from the 2000-2018 ACS while data on resident characteristics and mortality are from the 2008-2018 Master Beneficiary Summary File. Our "concordance" instruments are built like the overall instruments for female immigration, weighted by the relative probability of being a CNA, except that we split the list of birthplaces into two groups for each sub-group (English, black, Hispanic). To split the sample by race/ethnicity, we calculate the national share of immigrants from each birthplace who reported being black or Hispanic in 2005. We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each category. For the English versus non-English instruments, we calculate the national share of people in each broader birthplace category in 2005 that are from countries where English is an official or recognized language (using the more detailed ACS birthplace variable). We then rescale each year's instrument by this share (or 1-this share) to predict the number of by immigrants likely to be in each language category. Short-stay analyses look for mortality within 14 days of each admission to a skilled nursing facility (SNF), while long-stay analyses pool observations for each quarter, starting at admission and counting ahead 90 days from the beginning of each stay to discharge or mortality, and look for mortality in each quarter. Effect sizes are represented as percent changes. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 6: Effect of Immigration on Nursing Home Outcomes – Short-Stay Concordance, Quality Components

	Restraints			Feeding Tube			Catheter		
VARIABLES	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
Likely English-Speaking Female	-0.000696***	-0.00127***	-0.00156***	-0.000136	-0.000865	0.00178***	-0.00126	-0.00165	-0.000824
Immigrants per NH Res. (Weighted)	(0.000141)	(0.000218)	(0.000435)	(0.000216)	(0.000685)	(0.000538)	(0.00102)	(0.00108)	(0.000851)
Percent Change	-13.44	-19.37	-16.53	-0.36	-0.91	2.08	-1.11	-1.55	-0.76
Likely Not English-Speaking	-0.000572***	-0.00104***	-0.000933***	-0.000154	-0.000484	0.00126***	-0.00105	-0.00139	-0.000940**
Immigrants per NH Res. (Weighted)	(0.000150)	(0.000271)	(0.000262)	(0.000196)	(0.000562)	(0.000414)	(0.000733)	(0.000850)	(0.000476)
Percent Change	-11.06	-15.76	-9.89	-0.41	-0.51	1.47	-0.92	-1.30	-0.87
Likely Black Female Immigrants	-0.000635***	-0.000950***	-0.00138***	4.56e-05	-0.000690	0.00183***	-0.000929	-0.00190***	-0.000445
per NH Res. (Weighted)	(0.000118)	(0.000136)	(0.000478)	(0.000132)	(0.000440)	(0.000552)	(0.000916)	(0.000634)	(0.000670)
Percent Change	-12.27	-14.46	-14.66	0.12	-0.73	2.14	-0.82	-1.79	-0.41
Likely Non-Black Immigrants	-0.000554***	-0.00121***	-0.000875***	-0.000269	-0.000529	0.00108**	-0.00117	-0.00109	-0.00104*
per NH Res. (Weighted)	(0.000163)	(0.000304)	(0.000238)	(0.000224)	(0.000726)	(0.000427)	(0.000815)	(0.00116)	(0.000546)
Percent Change	-10.70	-18.39	-9.27	-0.71	-0.56	1.26	-1.03	-1.02	-0.96
Likely Hispanic Immigrants	-0.00105***	-0.00199***	-0.00119***	-0.000403	-0.000770	0.00174**	-0.00186	-0.00217	-0.00134*
per NH Res. (Weighted)	(0.000326)	(0.000598)	(0.000457)	(0.000440)	(0.00127)	(0.000706)	(0.00147)	(0.00194)	(0.000778)
Percent Change	-20.35	-30.31	-12.58	-1.07	-0.81	2.04	-1.64	-2.04	-1.24
Likely Non-Hispanic Immigrants	-0.000436***	-0.000776***	-0.000992***	-7.35e-05	-0.000491	0.00114***	-0.000809	-0.00112*	-0.000632
per NH Res. (Weighted)	(8.58e-05)	(0.000144)	(0.000290)	(0.000128)	(0.000388)	(0.000364)	(0.000626)	(0.000617)	(0.000492)
Percent Change	-8.42	-11.82	-10.52	-0.20	-0.52	1.33	-0.71	-1.05	-0.58

	Inappropriate Anti-Psychotic Meds			Pressure Ulcers			UTI		
VARIABLES	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
Likely English-Speaking Female	-0.00130*	-0.00181	0.000613	0.00112	-0.000387	-0.000881	-0.00302***	-0.00290**	-0.00147
Immigrants per NH Res. (Weighted)	(0.000769)	(0.00127)	(0.00255)	(0.000690)	(0.00119)	(0.000781)	(0.00101)	(0.00142)	(0.00145)
Percent Change	-2.18	-2.99	0.78	0.83	-0.19	-0.54	-1.60	-1.91	-0.91
Likely Not English-Speaking	-0.00122	-0.00166	-0.00154**	0.000640	-0.000905	-0.000905*	-0.00244***	-0.00290***	-0.00172**
Immigrants per NH Res. (Weighted)	(0.000745)	(0.00106)	(0.000659)	(0.000552)	(0.000946)	(0.000524)	(0.000778)	(0.000766)	(0.000837)
Percent Change	-2.05	-2.75	-1.95	0.47	-0.45	-0.55	-1.29	-1.92	-1.07
Likely Black Female Immigrants	-0.00102*	-0.00144*	0.00109	0.00146***	-0.000662	-0.000560	-0.00229***	-0.00269***	-0.00105
per NH Res. (Weighted)	(0.000535)	(0.000750)	(0.00289)	(0.000494)	(0.000826)	(0.000775)	(0.000770)	(0.000893)	(0.00129)
Percent Change	-1.70	-2.39	1.39	1.08	-0.33	-0.34	-1.21	-1.78	-0.65
Likely Non-Black Immigrants	-0.00132	-0.00187	-0.00179***	0.000300	-0.000763	-0.000966*	-0.00267***	-0.00298***	-0.00178**
per NH Res. (Weighted)	(0.000909)	(0.00146)	(0.000561)	(0.000633)	(0.00118)	(0.000575)	(0.000894)	(0.00114)	(0.000894)
Percent Change	-2.21	-3.10	-2.27	0.22	-0.38	-0.59	-1.41	-1.97	-1.11
Likely Hispanic Immigrants	-0.00266	-0.00355	-0.00298***	0.00102	-0.00216	-0.00171**	-0.00498***	-0.00614***	-0.00233
per NH Res. (Weighted)	(0.00172)	(0.00241)	(0.000826)	(0.00119)	(0.00200)	(0.000754)	(0.00170)	(0.00151)	(0.00148)
Percent Change	-4.45	-5.87	-3.78	0.76	-1.08	-1.04	-2.63	-4.06	-1.45
Likely Non-Hispanic Immigrants	-0.000777	-0.00109	0.000172	0.000643	-0.000339	-0.000416	-0.00177***	-0.00183**	-0.00121
per NH Res. (Weighted)	(0.000474)	(0.000741)	(0.00151)	(0.000397)	(0.000711)	(0.000526)	(0.000604)	(0.000787)	(0.000808)
Percent Change	-1.30	-1.81	0.22	0.48	-0.17	-0.25	-0.94	-1.21	-0.75

Immigration data are from the 2000-2018 American Community Survey, outcomes are from the 2008-2018 Minimum Data Set, and skilled nursing facility (SNF) resident characteristics are from the 2008-2018 Master Beneficiary Summary File. Regressions restrict to all 14-day assessments. See Table 1 for outcome definitions. Effect sizes are represented as percent changes. See Appendix Table 5 Notes for description of concordance instruments. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 7: Effect of Immigration on Nursing Home Outcomes – Long-Stay Concordance, Quality Components

	Restraints			Feeding Tube			Catheter		
VARIABLES	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
Likely English-Speaking Female	-0.00118***	-0.00178***	-0.00212***	0.000367**	0.000262	0.000522	0.000492***	0.000107	0.000508**
Immigrants per NH Res. (Weighted)	(0.000271)	(0.000379)	(0.000410)	(0.000145)	(0.000669)	(0.000682)	(0.000186)	(0.000230)	(0.000235)
Percent Change	-6.63	-11.74	-9.74	1.29	0.26	0.60	1.16	0.29	1.42
Likely Not English-Speaking	-0.00126***	-0.00156***	-0.00159***	0.000240*	0.000570*	-0.000288	0.000308**	0.000159	-5.49e-05
Immigrants per NH Res. (Weighted)	(0.000307)	(0.000469)	(0.000453)	(0.000133)	(0.000333)	(0.000752)	(0.000145)	(0.000199)	(0.000273)
Percent Change	-7.07	-10.29	-7.28	0.84	0.56	-0.33	0.73	0.43	-0.15
Likely Black Female Immigrants	-0.00105***	-0.00132***	-0.00163***	0.000230**	0.000395	0.000732*	0.000401***	8.88e-05	0.000296
per NH Res. (Weighted)	(0.000174)	(0.000228)	(0.000309)	(0.000102)	(0.000389)	(0.000410)	(0.000152)	(0.000158)	(0.000195)
Percent Change	-5.90	-8.70	-7.46	0.81	0.39	0.84	0.94	0.24	0.83
Likely Non-Black Immigrants	-0.00130***	-0.00188***	-0.00169***	0.000306*	0.000523	-0.000487	0.000327*	0.000185	1.60e-06
per NH Res. (Weighted)	(0.000305)	(0.000545)	(0.000485)	(0.000166)	(0.000511)	(0.000709)	(0.000169)	(0.000263)	(0.000254)
Percent Change	-7.26	-12.41	-7.76	1.07	0.52	-0.56	0.77	0.50	0.00
Likely Hispanic Immigrants	-0.00277***	-0.00333***	-0.00236**	0.000591*	0.00160**	-0.000947	0.000754***	0.000367	-0.000292
per NH Res. (Weighted)	(0.000741)	(0.00115)	(0.000945)	(0.000328)	(0.000711)	(0.00119)	(0.000260)	(0.000458)	(0.000418)
Percent Change	-15.51	-21.95	-10.84	2.08	1.58	-1.08	1.77	0.99	-0.82
Likely Non-Hispanic Immigrants	-0.000759***	-0.00108***	-0.00136***	0.000182**	0.000186	0.000293	0.000243*	7.82e-05	0.000255*
per NH Res. (Weighted)	(0.000150)	(0.000229)	(0.000296)	(8.74e-05)	(0.000367)	(0.000435)	(0.000125)	(0.000137)	(0.000150)
Percent Change	-4.25	-7.12	-6.26	0.64	0.18	0.34	0.57	0.21	0.71

	Inappropriate Anti-Psychotic Meds			Pressure Ulcers			UTI		
VARIABLES	White	Black	Hispanic	White	Black	Hispanic	White	Black	Hispanic
Likely English-Speaking Female	-0.00406*	-0.00535**	-0.00421*	-9.82e-05	-0.000839***	0.000399	-0.000550	-0.000748***	-2.38e-05
Immigrants per NH Res. (Weighted)	(0.00208)	(0.00270)	(0.00254)	(0.000264)	(0.000306)	(0.000306)	(0.000536)	(0.000233)	(0.000371)
Percent Change	-4.07	-5.99	-3.48	-0.23	-1.42	0.89	-1.15	-2.54	-0.07
Likely Not English-Speaking	-0.00396**	-0.00490**	-0.00430**	-0.000124	-0.000646***	-1.74e-06	-0.000429	-0.000497***	-0.000455
Immigrants per NH Res. (Weighted)	(0.00191)	(0.00243)	(0.00196)	(0.000199)	(0.000239)	(0.000292)	(0.000438)	(0.000178)	(0.000296)
Percent Change	-3.97	-5.48	-3.56	-0.29	-1.10	0.00	-0.89	-1.69	-1.31
Likely Black Female Immigrants	-0.00233	-0.00347**	-0.00201	-5.17e-05	-0.000653***	0.000311	-0.000280	-0.000530***	-4.52e-05
per NH Res. (Weighted)	(0.00146)	(0.00163)	(0.00220)	(0.000193)	(0.000200)	(0.000234)	(0.000392)	(0.000166)	(0.000293)
Percent Change	-2.34	-3.89	-1.67	-0.12	-1.11	0.70	-0.58	-1.80	-0.13
Likely Non-Black Immigrants	-0.00499**	-0.00636**	-0.00523**	-0.000155	-0.000748**	-3.54e-07	-0.000582	-0.000616***	-0.000462
per NH Res. (Weighted)	(0.00205)	(0.00291)	(0.00203)	(0.000233)	(0.000337)	(0.000314)	(0.000495)	(0.000230)	(0.000288)
Percent Change	-5.00	-7.13	-4.32	-0.36	-1.27	0.00	-1.21	-2.09	-1.33
Likely Hispanic Immigrants	-0.00894**	-0.0112**	-0.00746**	-0.000401	-0.00143***	-0.000108	-0.000924	-0.00119***	-0.000989**
per NH Res. (Weighted)	(0.00394)	(0.00534)	(0.00357)	(0.000412)	(0.000551)	(0.000459)	(0.000848)	(0.000401)	(0.000451)
Percent Change	-8.96	-12.51	-6.17	-0.93	-2.43	-0.24	-1.92	-4.04	-2.84
Likely Non-Hispanic Immigrants	-0.00246*	-0.00317**	-0.00270*	-4.35e-05	-0.000472***	0.000192	-0.000314	-0.000383***	-5.02e-05
per NH Res. (Weighted)	(0.00132)	(0.00160)	(0.00156)	(0.000157)	(0.000180)	(0.000200)	(0.000335)	(0.000137)	(0.000234)
Percent Change	-2.47	-3.55	-2.23	-0.10	-0.80	0.43	-0.65	-1.30	-0.14

Immigration data are from the 2000-2018 American Community Survey, outcomes are from the 2008-2018 Minimum Data Set, and resident characteristics are from the 2008-2018 Master Beneficiary Summary File. The sample is restricted to quarterly/annual scheduled assessments or change in status assessments within 20 days of when the next scheduled assessment should have been, where there are no other assessments within 20 days of the expected assessment date. See Table 1 for outcome definitions. Effect sizes are represented as percent changes. See Appendix Table 5 notes for description of concordance instruments. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Comparison with Furtado and Ortega (2022)

Our main finding, that increases in immigration improve the quality of nursing home care, are directionally similar to those of Furtado and Ortega (FO). However, there are several key deficiencies in this earlier work that raise concerns about the validity of their findings and may contribute to several notable differences in other findings between the two papers.

Quality Outcomes Data

The patient outcome data used in FO has a number of limitations. First, several of the outcome measures examined are only available in years 2005 and later (i.e., pressure ulcers, ADL decline, and pain). Because the analytic approach of FO focuses on 5-year changes between 2000 and 2010 (to avoid the transition between MDS 2.0 and MDS 3.0 data) this means that analyses of these outcomes are essentially pre/post comparisons (2010 vs. 2005) with limited ability to account for secular trends.

Second, the outcomes data are subject to frequent missingness due to stringent data censoring requirements in the LTCFocus data. To address this issue, FO use county-level, rather than facility-level, data and impute remaining censored values as 0, arguing that the effects of this imputation are likely small because censoring occurs when a given cell size would refer to fewer than 10 nursing home patients/or events. This imputation procedure is, however, unlikely to be non-trivial. As an illustrative example, consider the pressure ulcer outcome. FO report that in 2010, the average commuting zone (their primary unit of analysis) had 40 residents with pressure sores. On average, there are 4.4 counties in a commuting zone, meaning that the average number of new pressure ulcers in each county (the level at which the outcome data are reported in LTCFocus) for that year was 9.1. This means that even the average county would have their pressure ulcers outcome imputed as 0, creating the potential for a sizeable undercounting of

pressure ulcers at the commuting zone level. This undercounting is particularly problematic if the frequency of county-level censoring and imputation varies over time and by commuting zone and is correlated with immigrant flows.

In addition, there are two key limitations to the actual quality measures used in the study, which come from nursing home compare rather than from the underlying MDS data used in our study. First, measures obtained from nursing home compare pertain to only a portion of the nursing home population. The pain and ADL measures are assessed only among long-stay residents, while the pressure sore measure is assessed only among long-stay residents deemed low-risk (based on whether the resident has impaired bed mobility, transfer ability, is comatose, and/or malnourished). These measures are silent on the care provided to the more acute short-stay residents and, in the case of pressure ulcers, residents who are most at risk of the outcome of interest.

Second, as discussed in the paper, falls are difficult to normatively interpret because better staffing may lead to improve mobilization of patients which inherently increases the risk of falls. Moreover, prior literature has concluded that even these events are often underreported, so that the "gold standard" for measuring falls that are more clearly attributable to deficient care is a claims-based measure of hospitalizations resulting from a fall as determined by diagnostic and external cause codes (Sanghavi et al., 2020). To further explore this issue, we compare results when using the FO measure of falls (analyzed separately for MDS 2 and MDS 3 assessments due to a change in the look-back period between the two instruments) vs. the hospitalization due to falls measure in the context of our primary analytic model (Appendix Table 8). For the non-specific falls, we find consistently positive estimates that are significant at the 10% level for long-stay residents using the measure available in MDS 3, indicating an

increased risk of falls with more immigrants for this group. In contrast, we find a non-significant reduction in hospitalizations due to falls. This pattern of results is consistent with increased risk of falls of all types, potentially attributable to reduced restraint use and greater resident mobility, but no change in the risk of serious injuries from falls as immigration increases.

Appendix Table 8 – Comparison of Falls Outcomes

VARIABLES	(1) Any Fall in last 30 days (MDS 2)	(2) Any fall since last admission (MDS 3)	(3) Hospitalization due to Fall
Panel 1: Long-stay			
Immigrants per SNF Resident	0.000249	0.000452*	-1.01e-06
(Weighted, Female)	(0.000424)	(0.000236)	(6.71e-05)
Observations	*8,522,125*	*28,754,540*	*45,965,932*
Sample Mean	0.11	*0.21*	0.02
Percent Change	0.23	*0.22*	-0.01
Panel 2: Short Stay			
Immigrants per SNF Resident	0.000445	0.000112	-3.39e-05
(Weighted, Female)	(0.000724)	(0.000101)	(2.66e-05)
Observations	*3,585,115*	*9,893,706*	*23,860,705*
Sample Mean	0.36	0.06	0.01
Percent Change	0.12	0.17	-0.62

Long-stay results keep all scheduled or probable scheduled assessments for residents of skilled nursing facilities (SNFs), while short-stay results are for day 14 assessments. Standard errors clustered at the state-MSA level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Denominator Measurement

For measures derived from Nursing Home Compare (i.e., pain, ADL decline, pressure sore), rates are calculated only for eligible residents in the facility during the 2nd quarter of the relevant year. As mentioned in the prior section on Outcome Data, the rates of residents with daily pain and ADL declines is measured only among long-stay residents, while the rate of pressure sores is measured only among long-stay residents deemed low-risk. This means that the FO approach of multiplying the rates by the total census at the time of the OSCAR/CASPER survey significantly overstates the number of events that actually occurred. What's more, this inflation is applied differentially depending on the number of counties with missing data in a commuting zone as missing data is imputed consistently as 0 events. The magnitude of

misspecification for the relevant census is sizeable—short-stay residents represent about 14% of the daily census the facility level, with an interquartile range of 6-17%,[31] while long-stay, low-risk residents represent only about 17% of nursing home census. This inflation is likely to be particularly problematic for effect estimates if the share of short-stay or long-stay low-risk residents in nursing homes varies with immigrant flows.

Implausibility of Labor Supply Effects

FO lack a measure of realized staffing levels and instead use census and ACS data to produce counts of individuals who report working as a direct care staff member in a nursing home. In their preferred model, they estimate that every 1,000 additional immigrants resulted in 21 additional direct care staff within a commuting zone, 13 of which would be nurse aides. This suggests that 2.0% of new immigrants convert into nursing home direct care staff, a very high conversion rate given that their measure of immigration and their instrument include all immigrants, regardless of their gender or propensity to work in LTC. For comparison, we estimate using the ACS data from 2007-2018 that just 0.5% of all working age immigrants work in these positions in nursing homes. When we restrict this calculation to female immigrants only (who comprise the vast majority of immigrants working in nursing homes), this rate increases to 0.9%. Among females in the ethnic group we identified as most likely to work in a nursing home (African), the share is 4%. In this context, estimating that 2% of all new immigrants end up working in a nursing home seems implausible. The reasons for this very large estimated effect are unclear, but could be related to measurement error in the outcome measure, a relatively weak instrument (F-stat = 27 in the preferred specification), or model misspecification. The latter two

[31] Based on the percent of residents whose stayed were covered by Medicare in the 2017 LTCFocus data

of these issues would have clear implications for the validity of quality outcome estimates, as well.

Strengths of the Current Paper

Our paper has a number of notable strengths relative to the prior literature in this space. We have rich patient-level data that is not subject to censoring and allows us to construct detailed outcome measures that encompass both self-reported MDS outcomes and claims-based outcomes. Our quality outcomes are calculated on a per-assessment basis (in the case of MDS-based measures) that account both for changes in the size of the nursing home population and any changes in the frequency of patient evaluations (potentially due to changes in health status, for example). The richness of our data also allows us to explore potential mechanisms through which quality improvements occur and heterogenous treatment effects along a number of dimensions include short- vs. long-stay status and patient race/ethnicity. Our advances on the standard shift-share IV to better isolate immigrant flows that are likely to affect nursing home staffing produced strong instrument (F-stat = 147). Finally, our use of more recent years of data help improve the applicability of our findings to current policy debates.