The Effect of Immigration on the Living Arrangements of Elderly Natives[1]

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ABSTRACT

The elderly overwhelmingly desire to age in place (not live in a nursing home), and the workforce supporting aging in place has a relatively high share of low-skill immigrants. This paper examines the impact of low-skill immigration on elderly living arrangements using individual-level data from the 1980-2000 Censuses. Exploiting the tendency of new immigrants to migrate to existing settlements of immigrants from the same birthplace, I use a two-stage least squares (2SLS) strategy to identify the causal effect of immigration on the living arrangements of native elderly. A 1 percentage-point increase in low-skilled immigration increases the probability that an elderly native will age in place by 0.04 percentage points and increases the probability of supported aging in place (aging in place with assistance from someone other than a spouse) by 0.30 percentage points. Consistent with a migration-induced cost reduction in aging in place, a 1 percentage point increase in low-skilled immigration also reduces the wages of all low-skilled workers in private households by 1.03%. My results suggest that low-skilled immigration is an effective way to increase aging in place which may improve quality of life and lower total healthcare costs.

Keywords: Aging in place, home- and community-based services (HCBS), caregiving, aging, elderly, immigration

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I. Introduction

Two out of three elderly persons in the U.S. have functional limitations and need help with daily activities (National Center for Health Statistics 2021). According to the national 2018 Home and Community Preferences by AARP, 75% of adults age 50 and older want to stay in their homes and communities as they age (Binette and Vasold 2018). Home care use among older adults with disabilities was increasing between 2004 – 2016 (Van Houtven et al. 2020). *FIGURE 1* indicates that the demand for services supporting aging in place will only increase as the American population ages: By 2060, the elderly population will increase from 50 million to 95 million and the elderly share of the total population will increase from 15% to 23%.

This paper estimates the effect of immigration on the likelihood that elderly natives age in place (i.e., avoid living in a nursing home), either independently or with support from others. There are empirical challenges to uncovering the effect of immigration on elderly living arrangements. OLS estimation of a linear model relating the probability of aging in place to low-skilled immigration may be biased. The foremost identification problem is that immigrants do not choose locations randomly. For example, immigrants might migrate to economically prosperous locations. At the same time, economically prosperous locations may attract healthier and wealthier natives who are better able to age in place regardless of immigration. To overcome potential endogeneity concerns, this paper exploits the fact that immigrants consistently tend to move to locations where members of their own ethnic groups are already located (Card 2001).

This paper first documents that low-skilled immigrants, both documented and undocumented, comprise an important part of the workforce in private households providing personal and household services that support aging in place, suggesting that low-skilled immigration is likely to affect elderly living arrangements. I then employ a two-stage least squares (2SLS) research design based on the immigrant enclave instrument to estimate that an exogenous increase in low-skilled immigration to an area increases the probability of aging in place. In addition, the paper finds evidence of compositional effects within those who age in place, with increased immigration increasing the share of elderly natives who live in supported arrangements. The results then provide evidence that a low-skilled immigration shock also reduces the labor costs of personal and household services that support aging in place.

The "immigrant enclave" 2SLS strategy constructs the expected number of immigrants that a location should have in the current period absent local economic shocks that may affect migration

decisions (Jaeger, Ruist, and Stuhler 2018; Card 2001). The expectation is based on the historic location decisions of immigrants and the current number of low-skilled immigrants. By predicting the location of incoming immigrants based on the historical distribution of immigrants, the instrument is not correlated with current local economic shocks that may affect elderly living arrangements. Identification is based on the exogeneity of the baseline year's immigrant location decisions (Goldsmith-Pinkham, Sorkin, & Swift, 2020).

Using data from the 2019 5-year American Community Survey (ACS), this paper first shows that 68% of workers in private households are low-skilled and that of these workers, 55% are immigrants. Using individual-level data from the 1980 through 2000 Censuses, this paper finds that a 1 percentage-point (6.20% of the mean) increase in the immigrant share of the low-skilled labor force increases both the probability of aging in place by 0.04 percentage-points (0.04% of the mean) and the probability of supported aging in place by 0.30 percentage-points (1.20% of the mean) among elderly natives. Consistent with a mechanism of lower costs, a 1 percentage-point low-skilled immigration shock lowers the wages of all low-skilled workers in private households by 1.03% (0.54% of the mean) but only lowers the wages for all low-skilled workers in nursing homes by 0.52% (0.24% of the mean).

The results are robust to using a winsorized instrument, two alternative specifications, and an aggregate level for the analysis. Additionally, the living arrangement results are unchanged when analyzing subsamples based on age, race/ethnicity, sex, education, marital status, and labor force participation. The wage results hold for the subsample of low-skilled native and long-term immigrant workers, and the wage effects disappear in a falsification test running the analysis on a sample of college-educated workers.

Previous papers have tried to determine what lowers institutionalization rates, a long-standing question of interest (Applebaum 2012). Evaluations of programs that transition residents from nursing homes back into their home or community have found improved quality-of-life and lower overall expenditures (Coughlin et al. 2017; Hargan 2017; Schaefer and Eiken 2003; Eiken 2003), but such programs are for residents already in nursing homes. A few studies have evaluated programs that dedicated funding toward preventing institutionalization, but they largely fail to find effects on nursing home admission rates (Kemper 1988; Kemper, Applebaum, and Harrigan 1987; Hoerger, Picone, and Sloan 1996; Applebaum 2012).

This paper finds that low-skilled immigration lowers institutionalization rates. Butcher, Moran, and Watson (2021) also find that low-skilled immigration decreases institutionalization rates. This paper finds similar results using a different main endogenous variable (the immigrant share of the low-skilled workforce versus the low-skilled immigrant share of the working-age population) and geographic unit of analysis (metropolitan area versus commuting zone).

To the best of my knowledge, this paper is the first to consider the impact of immigration on aging in place with support.

Next, this paper contributes to the literature on the effects of immigration on natives' health via quality-of-life improvements proxied by aging in place. Giuntella and Mazzonna (2015) consider the impact of immigration on native and immigrant health, and Gunadi (2020) examines the effect of immigration on natives' health. Escarce and Rocco (2021) find that immigration has a beneficial effect on the mental health of elderly natives in Europe. Furtado and Ortega (2020) find that immigration improves nursing home quality. Again, this paper finds that low-skilled immigration increases the probability of aging in place, likely increasing elderly natives' health.

Finally, this paper contributes to the literature on the effect of immigration on wages by examining the wage effect of immigration on a low-skilled immigrant-intensive industry. Borjas (2003) finds that an immigrant shock lowers the wages of native workers. Cortés (2008) finds that an increase in the share of low-skilled immigrants in the labor force decreases the prices for immigrant intensive services. Furtado and Ortega (2020) find that an increase in the foreign-born share of the population lowers wages for all low-skilled nurses in nursing homes. Butcher, Moran, and Watson (2021) find that low-skilled immigration lowers the wages of health aides, nurses, housekeepers and gardeners, construction workers, and other low-skilled workers. This paper finds that low-skilled immigration lowers the wages of all low-skilled workers in private households and nursing homes, with a stronger effect for low-skilled workers in private households.

The next section provides some background and institutional information. Section III details the data and outcomes of interest, and section IV presents the empirical model, including the immigrant enclave instrument. Section V first shows that low-skilled immigration increases the probability of aging in place and supported aging in place among elderly natives, and then shows that low-skilled immigration lowers the wages of workers in private households. Section VI concludes.

II. Background

Along with an aging population, the majority of elderly persons have at least some functional limitations for which they receive help. *FIGURE 1* presents the Census Bureau's projections for the size of the elderly (aged 65 and older) population. By 2060, the size of the elderly population is expected to nearly double from 50 million to 95 million. Over the past decade, 60-70% of elderly persons had functional limitations, and about 20% reported that they have a lot of difficulty or cannot do at least one functioning domain (National Center for Health Statistics 2021). *FIGURE 2* displays estimates for Health and Retirement Study (HRS) respondents who report some difficulty with an ADL or an IADL on whether a respondent receives help with any ADLs, IADLs, or finances. The HRS is a nationally representative survey of Americans age 50 and older. The average number of helpers, including informal caregivers, who provided help last month was slightly increasing from 2000 to 2016 and fluctuated between 0.9 and 1.0. Following the dashed gray trendline on the right axis, the share of HRS respondents who received helped was also slightly increasing over the same period, fluctuating between 55-58%.

To obtain needed help and care, the elderly person simultaneously chooses their living arrangements and combination of care providers based on their health, wealth, and social supports. Care providers include informal, "gray market", and formal caregivers. Informal care is provided by family and friends and is usually unpaid, although Medicaid, the federal health insurance program for the low-income and disabled, may sometimes pay an informal or gray market caregiver. Gray market care is provided by someone that the elderly person employs directly for pay, and formal care is provided by an agency that an elderly person contracts with.

The demand for formal and gray market caregivers will continue to increase as there are less informal caregivers to care for them. One way to look at the potential informal caregiver supply is to consider the elderly share of the total population as a rough approximation for the number of children available to take care of their elderly parents. *FIGURE 1* shows that by 2060, the elderly share of the total population is expected to increase by more than 50% from 15% to 23%. Another way to look at the potential informal caregiver supply is to look at the number of children who keep connections with their elderly parents. *FIGURE 3* presents data from the HRS on the average number of living, in-contact children per HRS household. There has been a decreasing trend in the number of living, in-contact children over the past two decades, from an average of 3.1 for the 1998 to 2002 waves to an average of 2.9 for the 2010 to 2014 waves. These

waves represent the same sample over those periods, as a new cohort is added every three waves (every six years). A final method of looking at potential informal caregiver supply is to consider the caregiver support ratio, defined as the number of potential family caregivers aged 45 – 64 for each person aged 80 and older. According to data from the AARP, the caregiver support ratio will more than halve between 2010 and 2050, from 7 in 2010, to 4 in 2030, to 3 in 2050 (Redfoot, Fienberg, and Houser 2013).

Despite their functional limitations and care needs, there is a strong desire among the elderly to stay out of nursing homes and age in place. According to the national 2018 Home and Community Preferences by AARP, 75% of adults age 50 and older want to stay in their homes and communities as they age (Binette and Vasold 2018). According to recent data from the Morning Consult, 86% of adults would prefer to receive post-hospital short-term health care at home instead of a nursing home; this statistic increases to 94% for Medicare beneficiaries (Morning Consult 2021). According to a recent survey from the American Advisors Group, 92% of homeowners aged 60 to 75 prefer to live their later years in their current home and 82% want to live in their home for the rest of their lives if they could (American Advisors Group n.d.). Reflecting this desire to age in place, the housing market for people age 75 and older has significantly grown and evolved over the past 40 years. The level of care provided outside of nursing homes has also increased over time such that higher acuity patients can now be cared for in home- and community-based settings (Pearson et al. 2019).

Nursing home utilization has also declined over time. According to the National Center for Health Statistics, per capita nursing home bed supply fell by almost 40% between 1977 and 2014, from 59.7 to 36.0 nursing home beds per 1,000 resident population aged 65 years and older. The occupancy rate in nursing homes has also decreased by more than 10% between 1977 and 2014, from 92.9% to 82.3%. The share of the elderly population in nursing homes has also decreased by more than 45%, from 47.1 to 25.2 nursing home residents aged 65 and over per 1,000 resident population aged 65 years and older (National Center for Health Statistics 2016).

Health insurers and policymakers share this desire for aging in place. Health insurers believe that home-based care might lower wasteful spending in healthcare.[3] Policymakers and

[3] See, for example, https://homehealthcarenews.com/2020/08/humanas-bruce-broussard-consumer-demand-for-home-based-care-models-will-continue-to-increase/, https://homehealthcarenews.com/2020/09/vermas-comments-signal-turning-point-for-in-home-care/, and https://www.forbes.com/sites/johnosborn/2015/04/15/humanas-bruce-broussard-himss15-confab-healthcare-is-a-mess-and-we-are-all-to-blame/

insurers are supportive of aging in place based on evidence that shows that transitioning residents from the nursing home to the community improves quality of life and lowers costs (Coughlin et al. 2017; Hargan 2017; Schaefer and Eiken 2003; Eiken 2003). For decades, government expenditures on long-term supports and services (LTSS) have been shifting toward HCBS (Scales 2019). The Biden administration was the first to devote significant funds for home- and community-based services (HCBS) to help people age in place, allocating $12.7 billion of the recent $1.9 trillion American Rescue Plan to HCBS. The bipartisan Choose Home Care Act of 2021 that would increase access to home health care for Medicare beneficiaries has been introduced in both the U.S. Senate and the U.S. House of Representatives. Seema Veerma, former Center for Medicare and Medicaid Services (CMS) Administrator during the Trump Administration, summed up the climate surrounding home-based care in what was arguably CMS's "largest backing of home-based care ever" (Holly 2020):

> The tragic devastation wrought by the Coronavirus on nursing home residents exposes America's over-reliance on institutional long-term care facilities. Residential care will always be an essential part of the care continuum, but our goal must always be to give residents options that help keep our loved ones in their own homes and communities for as long as possible.

This quote confirms that interest in home- and community-based services (HCBS) stems from the fact that the elderly prefer to age in place over living in a nursing home because it increases their quality of life and gives them greater autonomy. Additionally, HCBS seems to be cost-effective (Howard et al. 2019). The Choose Home Care Act of 2021 is projected to save up to $247 million annually (Holly 2021).

The elderly person may be healthy and have few functional limitations, in which case they may choose to live alone or with a spouse who is able to take care of them as an informal caregiver. Their family and friends might also provide some informal care. As their health declines and their informal caregiver(s) need(s) help, an elderly person might hire outside help, either formally or on the "gray market." Eventually, the care needs may become high enough that the elderly person might consider moving into noninstitutional group quarters, such as an independent or assisted

living facility; moving in with their children; or hiring a live-in caregiver. Finally, if the care needs increase enough, the elderly person might need to move into a nursing home.

"Gray market" and formal caregivers who provide non-medical assistance to the elderly with ADLs (Activities of Daily Living) and IADLs (Instrumental Activities of Daily Living) are known as "direct care workers." Activities of Daily Livings (ADLs) are "essential activities performed every day, including bathing, dressing, eating, toilet care, and transferring/mobility" (Scales 2020). Instrumental activities of daily livings (IADLs) are "tasks associated with living independently, such as preparing meals, shopping, housekeeping, managing medications, and attending appointments" (Scales 2020). Direct care workers are comprised of three Bureau of Labor Statistics (BLS) Standard Occupational Characteristic (SOC) system codes: personal care assistants, home health aides, and nursing assistants. Personal care assistants have SOC code 39-9021, home health aides have SOC code 31-1011, and nursing assistants have SOC code 31-1014.

A simpler classification of direct care workers is by their setting. Home care workers work in private homes; residential care aides work in community-based residential settings, including adult day centers and activity centers, adult family homes, and assisted living centers; and, as their name suggests, nursing assistants in nursing homes work in skilled nursing facilities (SNFs) and nursing homes. While only nursing assistants can work in nursing homes, any SOC classification can work in home care and residential care.

While direct care workers in homes and communities are employed specifically to assist with ADLs and IADLs, workers such as maids and housekeepers also indirectly assist with aging in place by helping to maintain the household by providing personal and household services (Escarce and Rocco 2021; Butcher, Moran, and Watson 2021).

Low-skilled workers, defined as those with a high-school education or less, make up an important component both of the direct care workforce and of the workforce in private households. The black bars in *FIGURE 4* represent the low-skilled share of the workforce for certain occupations (direct care workers and all occupations) and industries (all direct care industries, home care, nursing homes, private households, and other health services). The vertical dashed black line represents the low-skilled share of the workforce across all occupations and industries. 42% of the overall labor force is low-skilled. In contrast, 65% of direct care workers and 68% of workers in private households are low-skilled, compared to 48% of workers in nursing homes and 24% in other health services. Low-skilled workers are relatively more important to the direct care

workforce in nursing homes than to the workforce in nursing homes in general because the workforce in nursing homes also includes high-skill nurses.

These national statistics hide rich variation by place in the low-skilled share of the workforce. *FIGURE 5* displays the top and bottom five states in terms of the low-skilled share of the workforce for direct care workers in home care, direct care workers in nursing homes, workers in private households, and workers in nursing homes. For example, the low-skilled share of the direct care workforce in home care varies between 38% in Hawaii and 79% in West Virginia and the low-skilled share of the total workforce in private households varies between 44% in Wyoming and 79% in Nevada.

Immigrants are an important component of the low-skilled workforce that supports aging in place. The gray bars in *FIGURE 4* represent the immigrant share of the workforce for the same occupation-industry combinations as before. 32% of low-skilled direct care workers in home care and 18% of low-skilled direct care workers in nursing homes are immigrants. 55% of low-skilled workers in private households are immigrants, compared to 17% of low-skilled workers in either nursing homes or other health services. The vertical dashed gray line represents the immigrant share of the low-skilled workforce across all occupations and industries (22%). As before, these national statistics hide rich variation by place in the immigrant share of the low-skilled workforce. *FIGURE 6* displays the top and bottom five states in terms of the immigrant share of the low-skilled workforce for direct care workers in home care, direct care workers in nursing homes, workers in private households, and workers in nursing homes, showing that there is a lot of cross-state variation. For example, the immigrant share of the low-skilled direct care workforce in home care varies between 0% in Mississippi and 70% in New York and the immigrant share of the low-skilled total workforce in private households varies between 0% in South Dakota and 83% in Washington, D.C. Other studies have also found very low rates of immigrants in these workforces in certain states. For example, only 5% of the direct care workforce in Michigan is immigrants (Turner et al. 2020).

The marginal patient that may be affected by a low-skilled immigration shock is on the threshold of entering a nursing home. She is sicker and poorer relative to others aging in place but healthier and wealthier relative to those in nursing homes. She is someone who requires many hours of care per day and is price-sensitive but does not have enough wealth to hire outside help or move into appropriate noninstitutional group quarters. She may be eligible for Medicaid, which

pays for nursing home care but often not for help at home, or Medicare, which sometimes pays for short-term home health care but again not nonmedical help at home. Her spouse may already be gone, and her children may have other commitments or live too far away. Immigration may affect her in two ways: Directly, by lowering the cost of help at home and easing her financial constraint; or, indirectly, by lowering the cost of care borne by her children such that they can afford to hire help and so move her into their own home.

Immigration may affect elderly living arrangements for other reasons. First, a low-skilled immigration shock is a supply shock to an understaffed workforce.[4] Recently, more and more press is devoted to the role that immigration may play in solving the workforce shortage affecting long-term care (Reiland 2021). Second, low-skilled immigration may lower the wages of low-skilled workers in private households, decreasing costs for a household, whether for the elderly person themselves or for their co-residential children. Finally, immigrants may be better caretakers since they may come from cultures where eldercare is the social norm. For example, in Kenya, there are no senior living homes, so younger Kenyans co-reside with older relatives (Scales 2020).[5]

While immigrants might also affect the nursing home market in similar ways, this is unlikely to counteract any effect on aging in place for three reasons. First, the immigrant share of the low-skilled workforce in nursing homes is a third of the immigrant share of low-skilled workers in private households, so a low-skilled immigration shock would have a greater impact on the low-skilled workforce in private households. Second, even if low-skilled immigration lowered the wages of low-skilled workers in nursing homes, cost savings in nursing homes may not be passed through to the consumer. 62% of patients in nursing home are on Medicaid (Kaiser Family Foundation 2017) and are not charged directly by a nursing home, so the nursing home does not have an incentive to pass-through the cost-savings to most of their patients. Finally, undocumented

[4] For the staffing shortage in long-term care, see, for example, https://www.mcknightsseniorliving.com/home/news/workforce-issues-pandemic-relief-funding-and-vaccine-access-are-priorities-for-new-ncal-executive-director/, https://www.marketwatch.com/story/im-taking-care-of-everybody-and-now-i-want-somebody-to-take-care-of-me-how-the-care-worker-crisis-threatens-the-u-s-economy-11632942611, https://www.nytimes.com/2021/07/24/health/coronavirus-elderly-home-care.html, https://www.npr.org/sections/health-shots/2021/06/30/1010328071/with-workers-in-short-supply-seniors-often-wait-months-for-home-health-care, https://skillednursingnews.com/2021/01/a-circular-nightmare-nursing-home-staffing-shortages-only-worsened-as-2020-came-to-a-close/, and https://www.mcknightsseniorliving.com/home/columns/editors-columns/an-active-way-to-reduce-staffing-headaches/

[5] Culix Wibonele, a Kenyan immigrant and certified nurse assistant (CNA), remarks, "Coming [to the US], it is such a different culture to take your loved ones somewhere to get taken care of until they pass…. I thought, '[Working as a CNA] is like being home, but you get paid for giving care.' It felt natural." (Scales 2020)

immigrants might be more likely to both work in private households than nursing homes due to the lower risk of immigration enforcement, and be willing to work for lower wages. These facts together imply that the largest potential cost-savings would be in private households rather than in nursing homes.

III. Data

The data come from the Public Use Microdata Samples (PUMS) from the 1970, 1980, 1990, and 2000 Decennial Censuses as processed by IPUMS (Ruggles et al. 2021). Specifically, this paper uses the 1970 1% Form 2 Metro sample, the 1980 5% State sample, the 1990 5% State sample, and the 2000 5% sample.

The Census is a powerful dataset to look at basic classifications of elderly living arrangements over large periods of time and at the metropolitan area-level. Aging in place is defined as not living in a nursing home, and supported aging in place is defined as either living in noninstitutional group quarters, such as an independent or assisted living facility; or living in a household with someone other a spouse, such as an adult child or a live-in caregiver. Only a single variable denoting whether a person is in institutional group quarters is required to classify whether an elderly person is aging in place.[6] Virtually all the elderly who are in institutional group quarters are in nursing homes. Those in supported aging in place are further identified by two extra variables, one denoting the presence of a spouse in the household and another denoting the number of people in a household. The related American Community Survey (ACS) has been used before to examine elderly living arrangements (Mommaerts 2018). While the Health and Retirement Study (HRS) has more information related to aging and is another commonly used dataset for aging-related research in economics (Mommaerts 2020; Van Houtven and Norton 2004; Van Houtven, Coe, and Skira 2013; Van Houtven et al. 2020), it only covers the years from 1992 and is only representative at the national level. While the National Health and Aging Trends Study (NHATS) has more detail about functional limitations and living arrangements, it was only begun in 2011 and is only representative at the national level.

The Census/ACS is also the workhorse data for immigration in the American context (Borjas 2003; 2017; Card 2001; 2009; Card and Peri 2016; Cortés 2008; Cortés and Tessada 2011; Furtado and Ortega 2020; Gunadi 2020; Albouy, Cho, and Shappo 2020; Butcher, Moran,

[6] This classification is also made by Butcher, Moran, and Watson (2021).

and Watson 2021). The Census identifies immigration status, although not documentation status; when people immigrated to the US; and where they were born.

The Census data provide large samples that allow for analysis at fine geographic levels. This paper performs the main analysis at the metropolitan area-level. A metropolitan area consists of a large urban core and its economically and socially integrated surrounding communities.[7] All data used in the analysis are limited to those 116 metropolitan areas that are identified in each of the Censuses. Previous studies use varying levels of geography, including 116 metropolitan areas (Cortés and Tessada 2011), the 125 largest metropolitan statistical areas (MSAs) or primary metropolitan statistical areas (PMSAs) (Card 2009), the 175 largest cities (Card 2001), or 741 commuting zones (Furtado and Ortega 2020).

The main endogenous variable is the immigrant share of the low-skilled labor force. Immigrants report that they are either a naturalized citizen or not a citizen and are not born in the United States. In practice, the latter foreign-born restriction only reclassifies less than 0.01% of US-born individuals in 1970 who would otherwise be immigrants. No US-born individuals in 1980, 1990, or 2000 report that they are either a naturalized citizen or not a citizen. Some papers define immigrants simply as foreign-born (Furtado and Ortega 2020; Butcher, Moran, and Watson 2021), whereas others define immigrants as those who report that they are either a naturalized citizen or not a citizen (Cortés and Tessada 2011). Low-skilled workers are those with a high school education or less. This is in keeping with the tradition of two broad skill groups (Freeman 1976; Katz and Murphy 1992; Card 2012; Ottaviano and Peri 2012; Card 2009). The size of the low-skilled labor force for metropolitan area l in decade t is defined as the weighted number of low-skilled working-age (16-64) individuals in the labor force. The labor force restriction also drops those in school and in group quarters.

The instrument is the predicted immigrant share of the low-skilled labor force. Briefly, the numerator of the instrument is comprised of two parts, the "shift" and the "share". The "shift" is the national number of immigrants from a particular birth country. The "share" is the number of immigrants of a particular birthplace in a particular metropolitan area in 1970 divided by the national number of immigrants of that particular birthplace in 1970. The product of the shift and the share is then summed over the various birthplaces and divided by the size of the low-skilled workforce.

[7] https://usa.ipums.org/usa-action/variables/METAREA#description_section

The share term requires data from a pre-shock year. This paper uses 1970 data because 1970 data is commonly used in similar settings (Cortés 2008; Cortés and Tessada 2011; Furtado and Ortega 2020; Furtado 2016; Butcher, Moran, and Watson 2021). Earlier years would also work. However, data from 1980 or later would not work. The main identification issue that leads to the use of the instrument is the fact that immigrants do not choose locations randomly. To this end, the instrument exploits the tendency of immigrants locate near *previous* immigrants from the same country of origin (Jaeger, Ruist, and Stuhler 2018; Card 2001). Because of this, the number of immigrants arriving in a city over time is predictable based on the *past* share of immigrants from a certain country locating in a certain city (Card 2009), so it would be inconsistent with the idea of the instrument to use the 1980 or later data.

There is a slight adjustment that must be made to the share using the 1970 data. Because this paper uses the metropolitan area as the geographic unit, there are two potential IPUMS datasets that could be used, the 1970 1% Form 1 Metro sample and the 1970 1% Form 2 Metro sample. While both the number of low-skilled workers in the labor force and the number of low-skilled immigrants in the labor force cannot be identified within one dataset, both datasets identify birthplace, a useful variable for identifying immigrants. School attendance is needed to identify labor force participation, and citizenship status is needed to identify immigrants. It could be that few people who would otherwise be in the labor force are in school: In the 1970 1% Form 2 Metro sample, which has school attendance but not citizenship status, among those who would otherwise be in the labor force, 7.43% are in school. Since the definition for immigrant is very close to simply foreign born, it could also be that few people who would otherwise be classified as immigrants are citizens: In the 1970 1% Form 1 Metro sample, which has citizenship status but not school attendance, 3.24% of those born outside the US would be classified as natives. Since no US-born individuals are immigrants and since the share of foreign-born individuals who are natives is less than the share of school attendees in the labor force, I define immigrants in 1970 based on birthplace and use the Form 2 sample to have the variable for school attendance to identify who is in the labor force. This paper adjusts the number of low-skilled immigrants to reflect the share of natives who are foreign born by multiplying the number foreign-born by 0.9676.

To keep the universe of individuals used for both the main endogenous variable and the instrument the same, all birthplaces that correspond to the “other” category are dropped and only

those birthplaces that appear in 1970, 1980, 1990, and 2000 Censuses are kept. This leaves 65 "sending countries." Previous papers in the literature have tried to control for consistency in the sending countries in varied ways, ranging from 9 sending countries (Gunadi 2020), 17 sending countries (Card 2001), 38 sending countries (Card 2009), 39 countries of origin (Jaeger, Ruist, and Stuhler 2018; Butcher, Moran, and Watson 2021), and 65 sending countries (Albouy, Cho, and Shappo 2020).

TABLE 1 presents summary statistics for the actual and predicted immigrant share of the low-skilled labor force for metropolitan area *l* in decade *t*. The mean immigrant share of the low-skilled labor force across all 116 metropolitan areas and three decades is 16%, ranging from 0% to 67%. The mean of the instrument is the same. The number of observations (348) is the number of metropolitan areas (116) multiplied by the number of decades (3). Two values, El Paso in 1990 and 2000, have predicted immigrant shares above 100%. This reflects that migration patterns have substantially changed and while, for example, 7% of all Mexican immigrants in the US lived in El Paso, TX in 1970, only 2% of all Mexican immigrants in the US lived in El Paso, TX in 2000. The instrument still "remembers" the large proportion of Mexicans locating in El Paso and overpredicts the number of Mexican immigrants in El Paso in future years.

The main outcome of interest is elderly living arrangements. I consider two living arrangements: Aging in place and supported aging in place. Aging in place is defined as not living in a nursing home. "Supported aging in place," a subset of aging in place, also referred to as "aging in place with support," is defined as either living in non-institutional group quarters, such as independent or assisted living facilities; or living in a household with someone other than a spouse/partner, such as an adult child or a live-in caregiver. The sample for the elderly living arrangements consists of elderly (age 65 and older) natives.

In the Census years that I use, a group quarter is defined as a "household" containing 10 or more individuals unrelated to the household head. All nursing homes are classified as *institutional* group quarters, but the converse is not true: in addition to nursing homes, institutional group quarters also include correctional institutions. In 1970 and 1980, the only years of data that distinguish the type of institutional group quarters, <0.5% of elderly natives in

institutional group quarters lived in correctional institutions. The rest lived in institutions for the elderly and handicapped or in mental institutions.[8]

TABLE 2 presents the summary statistics for this sample of elderly natives. 95% of elderly natives are not living in a nursing home and aging in place. This is consistent with other sources (National Center for Health Statistics 2016; Butcher, Moran, and Watson 2021; Institute of Medicine (US) Food Forum 2010; Wang and Youderian 2021). A quarter of the elderly natives are in supported aging in place. The average age is 74. Consistent with the phenomenon that women outlive men, 60% are female. 11% are Black, 3% are Hispanic, 52% are married, and 73% have a high school education or less.

To check consistency with a proposed mechanism through which immigration affects elderly living arrangements, the next outcomes of interest are the wages of low-skilled working-age individuals in the labor force in three industries: private households, nursing homes, and other health services. As in Cortés and Tessada (2011), workers who report no annual income, hours worked, or weeks worked are dropped. Workers in the top and bottom percentile of hourly wage earners by industry-year are also dropped. The relevant industries are private households; nursing homes; and "other health services": all the other health-related professional and other services (offices and clinics of physicians, dentists, chiropractors, optometrists, and other health practitioners; hospitals; and other health services). Real hourly wages are constructed as the annual income divided by the product of hours worked per week and weeks worked per year, multiplied by the CPI-U adjustment factor to 1999 dollars.

TABLE 3 presents the summary statistics for low-skilled workers in various industries. The first column presents the summary statistics for low-skilled workers in private households. The real hourly wage (in 1999 dollars) of low-skilled workers in private households is $8.69 (the minimum wage in 1999 was $5.15) The mean age for these workers is about 43. 92% are female, 35% are Black, 31% are Hispanic, 42% are married, 45% graduated from high school, and 38% are immigrants.

The middle column presents summary statistics for low-skilled workers in nursing homes. The mean wage for these workers is $10.07, which is $1.38 more than in private households. This workforce is slightly younger, has a smaller share of females and Hispanics,

[8] Author's own calculation based on data from the 1970 1% Form 1 Metro sample and the 1980 5% State sample from IPUMS (Ruggles et al. 2021).

but has a larger share of high school graduates. Importantly, in line with the motivating facts, only 14% are immigrants, less than in private households.

The third column presents summary statistics for low-skilled workers in other health services. This workforce has the highest wages at $11.80, the highest marriage rate, and the highest education. This workforce also employs the fewest women and Blacks. The mean age and the Hispanic and immigrant share of low-skilled workers in other health services is similar to that in nursing homes.

IV. Empirical Methods

This paper is interested in the effect of a low-skilled immigrant supply shock on the living arrangements of elderly persons. This paper estimates the following linear probability model:

$$LA_{ilt} = \beta_0 + \beta_1 ISLS_{lt} + \mathbf{X}_i'\boldsymbol{\Theta}_i + \phi_l + \phi_t + \epsilon_{ilt} \quad (1)$$

where LA_{ilt} is an indicator that elderly (age 65+) native *i* in location *l* in year *t* is living in a certain ***L***iving ***A***rrangement (either aging in place or supported aging in place), and $ISLS_{lt} = \frac{\text{Low-Skilled Immigrants}_{lt}}{\text{Low-Skilled Labor Force}_{lt}}$, the ***I***mmigrant ***S***hare of the ***L***ow-***S***killed labor force in location *l* at time *t*, is number of low-skilled immigrants in location *l* at time *t* divided by the size of the low-skilled labor force in location *l* at time *t*. $\mathbf{X}_i'$ is a vector of individual *i*'s characteristics, ϕ_l and ϕ_t are location *l* and time *t* fixed effects, respectively, and ϵ_{ilt} is an idiosyncratic error term. The labor force of interest is the low-skilled labor force because it is the most likely to affect elderly living arrangements. The immigrant share of the relevant labor force is used as the main endogenous variable of interest in Borjas (2003). Cortés (2008) and Cortés and Tessada (2011) use the low-skilled share of the labor force as their main endogenous variable. Escarce and Rocco (2021), Furtado and Ortega (2020), and Giuntella and Mazzonna (2015) use the immigrant share of the population as their main endogenous variable. Butcher, Moran, and Watson (2021) use the low-skilled immigrant share of the working-age population as their main endogenous variable.

The debate in the economics of immigration literature centers around the appropriate specification. In particular, using the *post-shock* low-skilled labor force in the denominator might create spurious correlation since the change in the immigrant share is a weighted average of both

immigration and native migration (Card and Peri 2016). Instead, Card and Peri (2016) propose using the *pre-shock* low-skilled labor force as the denominator (Edo 2020; Borjas and Edo 2021; Borjas and Monras 2017). The alternative specification would be:

$$LA_{ilt} = \beta_0 + \beta_1 ISLS_{lt-10}^{lt} + \mathbf{X}_i'\boldsymbol{\Theta}_i + \phi_l + \phi_t + \epsilon_{ilt} \quad (2)$$

where $ISLS_{lt-10}^{lt} = \frac{\text{Low-Skilled Immigrants}_{lt}}{\text{Low-Skilled Labor Force}_{lt-10}}$ is number of low-skilled immigrants in location *l* at time *t* divided by the size of the low-skilled labor force in location *l* at time *t-10*. The results are robust to this alternative specification. This specification is also similar to the one used in Escarce and Rocco (2021) and Giuntella and Mazzonna (2015), although they use the lagged population in their denominator.

Importantly, $ISLS_{lt}$ and $ISLS_{lt-10}^{lt}$ reflect two different concepts. The estimated parameter on $ISLS_{lt-10}$ represents for the direct effect of immigration holding local native labor supply fixed, while the estimated parameter on $ISLS_{lt}$ allows for the local native labor supply to respond to immigration (Edo 2020). While the idea of the immigrant enclave instrument is broadly accepted, the actual specification varies across papers, and the nature of the shock, whether due to immigrants moving in or natives moving out, is irrelevant to this paper – what matters is that there is a supply shock.

OLS estimation of equation (1) or (2) may be biased due to the endogenous location decisions of both immigrants and the elderly. Since mobility is correlated with both health and wealth, the relatively healthier and wealthier elderly are disproportionately able to move to areas such as Florida, Arizona, or Texas. These areas also have historically attracted a high fraction of immigrants for very different reasons. The independent living generated by in-migration of seniors may therefore be incidentally correlated with immigration, generating an omitted variables bias. Fortunately, Butcher, Moran, and Watson (2021) show that elderly migration is not a problem in this context. The eldercare jobs created by the elderly may also attract immigrants, resulting in reverse causality. As a final example, it could be that the warm climate of Florida is the driver of both immigration and the migration of the relatively healthier and wealthier elderly who are more likely to age in place, resulting in omitted variable bias.

In home care, documentation status is checked less and there is less immigration enforcement. A location that employs a large number of undocumented immigrants in private

households may be correlated with less immigration enforcement in general. Undocumented immigrants might be willing to take lower wages because undocumented immigrants do not have a lot of outside options. Since nursing home costs are unlikely to decrease by as much, undocumented immigration lowers the cost of aging in place relative to nursing homes. Any of these reasons would induce a positive correlation between immigration and aging in place and bias the estimated effect of immigration upward.

To address potential endogeneity, the analysis uses the immigrant enclave/shift-share instrument common in the economics of immigration literature (Card 2001; Jaeger, Ruist, and Stuhler 2018) to predict the immigrant share of the low-skilled labor force in metropolitan area *l* in decade *t*. The immigrant enclave instrument exploits the fact that immigrants from birthplace *b* tend to migrate to where existing immigrants of birthplace *b* already live. The *predicted* immigrant share of the low-skilled labor is given by:

$$\frac{\sum_b (\frac{\text{Immigrants}_{l,1970}^{b}}{\text{Immigrants}_{1970}^{b}} \times LSI_b^t)}{LSLF_{lt}} \tag{3}$$

where $\frac{\text{Immigrants}_{l,1970}^{b}}{\text{Immigrants}_{1970}^{b}}$ is the proportion of all immigrants of birthplace *b* in 1970 who are living in location *l* the "share"), LSI_b^t is the national number of ***L***ow-***S***killed ***I***mmigrants of birthplace *b* in decade *t* (the "shift") and $LSLF_{lt}$ is the size of the ***L***ow-***S***killed ***L***abor ***F***orce in metropolitan area *l* in decade *t*.

For every birthplace, the instrument multiplies the actual share of low-skilled immigrants of birthplace *b* in 1970 who are in location *l* (the share) by the actual national population of low-skilled immigrants of birthplace *b* in the current decade *t* (the shift) in order to predict the number of low-skilled immigrants of birthplace *b* in location *l* in decade *t*. The instrument then sums the predicted number of low-skilled immigrants of birthplace *b* in location *l* in decade *t* over all birthplaces *b* in order to predict the number of immigrants in location *l* in decade *t*. Finally, the instrument divides the predicted number of immigrants in location *l* in decade *t* by the actual size of the low-skilled labor force in location *l* in decade *t* to predict the immigrant share of the low-skilled labor force in location *l* in time *t*.

For example, suppose that location *l* and decade *t* was South Bend, IN in 2020 and *b* was Lithuania. Then $\frac{\text{Immigrants}_{l,1970}^{b}}{\text{Immigrants}_{1970}^{b}}$ is the number of Lithuanian immigrants in 1970 who are living in South Bend in 1970 divided by the national number of Lithuanian immigrants in 1970 (the share), and LSI_b^t is the national number of low-skilled Lithuanians in America in 2020 (the shift). Assuming a uniform skill distribution for Lithuanians in each city, the number of low-skilled Lithuanians in South Bend in 2020 is the proportion of Lithuanians living in South Bend in 2020 multiplied by the national number of low-skilled Lithuanians in 2020 (the shift). Further assuming that the percentage of Lithuanians who are coming to the US and are choosing to locate in South Bend is the same over time, the product above is equivalent to the proportion of Lithuanians living in South Bend in 1970 (the share) multiplied by the national number of low-skilled Lithuanians in 2020 (the shift again). The instrument then does this for Poles and Russians and all the other ethnicities (i.e., all *b*) and sums all the products together to get the *predicted* number of low-skilled immigrants in South Bend in 2021. Dividing this by the low-skilled labor force in South Bend in 2020 gives the *predicted* immigrant share of the low-skilled labor force in South Bend in 2021.

For the alternative specification using the pre-shock denominator, the corresponding instrument is:

$$\frac{\sum_b (\frac{\text{Immigrants}_{l,1970}^{b}}{\text{Immigrants}_{1970}^{b}} \times LSI_t^b)}{LSLF_{\text{lt}-10}} \tag{4}$$

Instrumental variables estimation requires that the instrument be relevant and exogenous. Relevance means that the *predicted* immigrant share of the low-skilled labor force predicts the *actual* immigrant share of the low-skilled labor force reasonably well. *FIGURE 7* presents a scatterplot of the actual immigrant share of the labor force for metropolitan area *l* in decade *t* on the predicted immigrant share of the low-skilled labor force for metropolitan area *l* in decade *t*. The slope is positive, in keeping with the idea of the immigrant enclave instrument. There are two predicted shares that are greater than 100%. Both are for El Paso, TX and one is for 1990 and one is for 2000.

As confirmed in column (1) of *TABLE 4*, the actual and predicted immigrant shares of the low-skilled labor force are highly correlated. With metropolitan area and year fixed effects, a 1 percentage-point increase in the predicted immigrant share of the low-skilled labor force is associated with a statistically significant 0.29 percentage-point increase in the actual immigrant share of the low-skilled labor force. The R^2 is 0.95, and the *F*-statistic of 12.67 is above the rule-of-thumb threshold of 10 (Staiger and Stock 1997; Stock and Yogo 2005; Andrews, Stock, and Sun 2019). The literature has found similarly low aggregate first-stage *F*-statistics (Cortés and Tessada 2011).

The rest of the columns of *TABLE 4* show the robustness of the aggregate first-stage using three other specifications. Column (2) drops El Paso, TX to remove the problematic instruments that have a larger than 100% share. Column (3) uses the alternative specification using the pre-shock denominator in equation (4). Finally, column (4) uses the low-skilled *female* immigrant share of the labor force as the main endogenous variable. In all these specifications, the aggregate first-stage results remain largely the same in term of magnitude and *F*-statistics, with the exception of dropping El Paso, TX significantly improving the *F*-statistic to 43.

The untestable assumption for identification using instrumental variables is the exogeneity assumption. This assumption asserts that elderly living arrangements are uncorrelated with the error term. Recent work in the econometrics literature related to shift-share instruments has reevaluated the necessary exogeneity assumptions (Jaeger, Ruist, and Stuhler 2018; Goldsmith-Pinkham, Sorkin, and Swift 2020; Borusyak, Hull, and Jaravel 2020). Identification is based on the exogeneity of the shares while allowing for an endogenous shock (Goldsmith-Pinkham, Sorkin, and Swift 2020). I assume exogeneity in the shares because the migration decisions of immigrants in 1970 are plausibly uncorrelated with any local economic shocks affecting elderly living arrangements in the future.

V. Results

A. MAIN RESULTS

Columns (2) and (4) of *TABLE 5* present the estimated coefficients from OLS estimation of equation (1) and columns (3) and (5) present the estimated coefficients from 2SLS estimation using the instrument in equation (3). The outcome for columns (2) and (3) is an indicator for aging in place and the outcome in columns (4) and (5) is an indicator for supported aging in

place. Column (1) presents the first-stage results. Recall that aging in place is defined as not living in a nursing home and supported aging in place is a subset of aging in place. Elderly natives who are aging in place but not supported aging in place live alone or with their spouses in their own houses that are not part of noninstitutional group quarters such as an independent or assisted living community.

Starting with the estimated OLS coefficient on aging in place in column (2), a 1 percentage-point (6.2% of the mean) low-skilled immigrant supply shock is associated with an increased probability of aging in place among elderly natives by a statistically insignificant 0.02 percentage points (0.02% of the mean). As discussed in Section IV, immigration and elderly living arrangements may be positively correlated. The estimated 2SLS coefficient in column (3) supports this correlation. A 1 percentage-point increase in the low-skilled immigrant share of the labor force increases the probability of aging in place among elderly natives by a statistically significant 0.04 percentage points (0.04% of the mean).

These elderly natives could be aging in place instead of going into a nursing home due to the lower cost of aging in place both in absolute terms and relative to nursing homes. If these elderly natives would have truly gone to nursing homes absent aging in place, the marginal elderly natives who are induced to age in place should require more care relative to those already aging in place. In other words, a low-skilled immigration should result in a greater probability of supported aging in place.

The 2SLS estimate in column (2) of *TABLE 5* reports that a 1 percentage-point low-skilled immigrant supply shock increases the probability of supported aging in place among elderly natives by a statistically significant 0.30 percentage points (1.20% of the mean).

Interpreting the result holding everything else fixed, a 1 percentage-point increase in the immigrant share of the low-skilled labor force across the nation would induce about 18,000 elderly natives to age in place and 34,000 elderly natives to age in place with support. In other words, while immigration keeps the elderly out of nursing home, it also increases the number of elderly aging in place with support who would have been aging in place without support otherwise. There are two reasons for this. First, immigration might lower the cost of personal and household services. Financially constrained elderly natives are then able to hire a live-in caregiver instead of moving into a nursing home, or children are more likely to co-reside with their parents since the cost of caring for their parent is now lower. Both represent a transition

from aging in place to supported aging in place. Second, it could be the true underlying effect of immigration on aging in place and immigration on supported aging in place is the same, but the estimates just happened to be estimated such that the size of the effect on the probability of supported aging in place in terms of the number of elderly moved is higher than the size of the effect on the probability of aging in place. The 95% confidence intervals for the two effects, in terms of the number of elderly induced to shift into a particular living arrangements, overlap between 23,000 and 35,000.

There are two mechanisms that are proposed: As a result of immigration, costs for aging in place could be lower both in absolute terms relative to costs of nursing homes. In regards to the first proposed mechanism, the first column of *TABLE 6* presents the estimated coefficient from OLS estimation of OLS estimation of equation (1) but changing the outcome to the natural log of the real hourly wage (in 1999 dollars) of a low-skilled worker in a private household. This is a different and smaller sample, not of elderly natives, but of all low-skilled workers in an industry. A 1 percentage-point low-skilled immigration shock is associated with a 0.65% decrease in wages (0.34% of the mean). However, OLS estimates may be biased because immigrants might migrate to high-wage areas, inducing a positive correlation between immigration and wages and potentially biasing the estimated effect upwards. To that end, the second column in *TABLE 6* presents the estimated 2SLS coefficient using the instrument as in equation (3). A 1 percentage-point low-skilled immigration shock lowers the wages of all low-skilled workers in private households by a statistically significant 1.03% (0.54% of the mean), consistent with the estimated direction of the potential bias.

The second proposed mechanism is that immigration affects elderly living arrangements by lowering the costs of aging in place relative to the cost of nursing homes. Since the low-skilled workforce in private households has more than twice the share of immigrants than the low-skilled workforce in nursing homes or in other health services, a low-skilled immigration shock should affect the wages for all low-skilled workers in private households more than the wages of all low-skilled workers in either nursing homes or other health services. This could also be because nursing home and other health service workers are “protected” from recent low-skilled immigrants, especially undocumented immigrants, by greater immigration enforcement and licensing rules and regulations required for workers at nursing homes. For example, low

skilled nurses in nursing homes, also known as certified nurse assistants (CNAs), typically spend 4-12 weeks taking courses getting their license (CNA Training Institute 2019).

The final four columns in *TABLE 6* report the estimated coefficients from OLS and 2SLS estimation of equation (1) using the instrument in (3) with an outcome of the natural log of the real hourly wage in 1999 dollars. Interpreting the estimated 2SLS coefficients in the fourth and sixth columns, a 1 percentage-point low-skilled immigration shock causes a statistically significant 0.52% decrease in wages for low-skilled workers in nursing homes (0.18% of the mean), and a statistically insignificant 0.21% decrease in wages for low-skilled workers in other health services (0.09% of the mean). This is consistent with immigrants lowering the price of aging in place relative to the cost of nursing homes.

B. ROBUSTNESS AND FALSIFICATION

TABLE 7 presents the estimated 2SLS results from four alternative model specifications for the probability of aging in place and the probability of supported aging in place. Model (1) drops observations in El Paso, TX. Model (2) uses the pre-shock denominator as in Equations (2) and (4). Model (3) uses the immigrant share of the low-skilled *female* labor force as the main endogenous variable, and model (4) aggregates the outcome up to the metropolitan area-year level, so the outcome is the share of elderly natives aging in place. Interpreting the estimated 2SLS coefficients in Panel A, a 1 percentage-point increase in the immigrant share of the low-skilled workforce increases the probability of aging in place among elderly natives by a marginally statistically significant 0.03-0.04 percentage points. Interpreting the estimated 2SLS coefficients in Panel B, a 1 percentage-point increase in the immigrant share of the low-skilled workforce increases the probability of supported aging in place among elderly natives by a statistically significant 0.25-0.30 percentage-points.

The main wage results vary more by model but are mostly quantitatively unchanged by estimating alternate models. These results are presented in *TABLE 8* for the same four models as before. For the first three models, a 1 percentage-point low-skilled immigration shock causes a statistically significant 0.95 to 1.13% decrease in wages for low-skilled workers in private households, a 0.33 to 0.55% decrease in wages for low-skilled workers in nursing homes, and a statistically insignificant 0.15 to 0.20% decrease in wages for low-skilled workers in other health

services. At the aggregate level, these statistics are 0.67%, 0.66%, and 0.31%, respectively, for private households, nursing homes, and other health services.

These effect sizes hold even when considering the impact of low-skilled immigration on wages for the subsample of low-skilled native and long-term immigrants. The length of stay in the US might be a form of human capital accumulation, potentially removing any wage effects for long-term immigrants since they are "farther away" from newly arriving low-skilled immigrants. However, this does not appear to the case. Panel A of *TABLE 9* displays the estimated IV coefficients on the subsample of natives and long-term immigrants. A 1 percentage-point increase in the immigrant share of the low-skilled labor force lowers wages for low-skilled natives and long-term immigrant workers in private households by a statistically significant 1.25%, in nursing homes by a marginally statistically significant 0.41%, and in other health services by a statistically insignificant 0.18%.

Low-skilled immigration does not affect the wages for college-educated workers. Panel B of *TABLE 9* displays the estimated 2SLS coefficient on the immigrant share of the low-skilled workforce for a different sample of college-educated workers. A 1 percentage-point increase in the immigrant share of the low-skilled labor force lowers wages for college-educated workers in private households by a statistically insignificant 0.17%, raises wages for college-educated workers in nursing homes by a statistically insignificant 0.19%, and in other health services by a statistically insignificant 0.11%.

C. HETEROGENEITY

The main results largely hold when considering different subsamples of the elderly natives. *FIGURE 8* presents the estimated 2SLS coefficients on aging in place when splitting up the sample based on sex, age, race/ethnicity, spousal living status, and labor force status. The results are all statistically indistinguishable from the main estimated 2SLS coefficient of 0.04.

The apparent heterogeneity follows expectations. For example, women tend to outlive men and so are more likely to benefit from a caregiver who is not a spouse. The estimated 2SLS coefficient on aging in place is 0.05 for women and 0.02 for men. Age is negatively correlated with health, and the estimated coefficient is 0.18 for those aged 85 and over and 0.02 for those aged 65-84. Hispanics or Non-Whites may me more likely to live in multigenerational housing or have stronger informal care support and so benefit less from immigration. The estimated

coefficient is 0.06 for Hispanics or Non-Whites and 0.02 for Non-Hispanic Whites. Those with a high school education or less may be more financially constrained than those with more education and so would benefit more from immigration. The estimated coefficient is 0.04 for those with a high school education or less and 0.03 for those with more education. Those not living with a spouse or partner may need more help to age in place than their peers living with a spouse or partner, and so immigration may benefit them more. The estimated coefficient is 0.06 for those not living with a spouse or partner (100% of those living with their spouse or partner are aging in place). Finally, those not in the labor force may again be more financially constrained than those in the labor force. The estimated coefficient is 0.05 for those not in the labor force (100% of those in the labor force are aging in place).

FIGURE 9 presents the estimated 2SLS coefficients on supported aging in place when splitting up the sample as before. Again, none of the estimated IV coefficients from the subsamples are statistically distinguishable from the main effect of 0.30, and the results follow expectations. For example, since women are more likely to outlive men, they would be more likely need supported aging in place. The estimated 2SLS coefficient on supported aging in place is 0.28 for women and 0.32 for men. The older elderly need more supports than the younger do. The estimated coefficient on supported aging in place ais 0.39 for the older elderly and 0.29 for the younger elderly. Non-Hispanic Whites may be healthier than Hispanics or Non-Whites. The estimated coefficient on supported aging in place is 0.28 for non-Hispanic whites and 0.35 for other races.

D. COMPARISON TO THE LITERATURE

Butcher, Moran, and Watson (2021) also consider the effect of low-skilled immigration on aging in place and find qualitatively similar results. They find that a 1 percentage-point increase in the low-skilled immigrant share of the working-age population increases the probability of aging in place by a statistically significant 0.151 percentage points. There could be a few reasons that their results are twice the magnitude of my results. Butcher, Moran, and Watson (2021) use the low-skilled immigrant share of the working-age population as their main endogenous variable, while this paper uses the immigrant share of the low-skilled labor force.[9] Butcher, Moran, and Watson (2021) also use commuting zones as their unit of geography,

[9] Recall that the labor force in this paper is defined as a subset of the working-age population.

whereas this paper uses metropolitan areas. However, it is interesting to note that for both of our papers, the OLS point estimates are roughly half of the size of the 2SLS estimates.

To the best of my knowledge, previous literature has not examined the effect of immigration on supported aging in place. Prior work has also evaluated the response to immigrant-induced price decreases. Cortés and Tessada (2011) find that high-skill native women increase their working time in response to low-skilled immigration. Furtado and Ortega (2020) find that nursing homes increase employment of low-skilled nurses in response to the immigrant-induced lower wages for low-skilled nurses in nursing homes. Engelhardt et al. (2005) find that each $1,000 increase in annual Social Security income decreases the probability of living with others by 0.9 percentage-points among the noninstitutionalized elderly (living with others is roughly comparable to supported aging in place for those not in group quarters). Recall that this paper finds that a 1 percentage-point low-skilled immigrant shock increases the probability of aging in place by 0.04 percentage-points and increases the probability of supported aging in place by 0.30 percentage-points.

The 2SLS point estimates for the wage outcomes can be converted to wage elasticities using equation (4) of Borjas (2003) for a better comparison to the literature:

$$\frac{\partial \ln w_{lt}}{\partial \overline{ISLS}_{lt}} = \frac{\beta_1}{(1 + \overline{ISLS}_{lt})^2} \tag{5}$$

At the mean level of the immigrant share of the low-skilled labor force, the results in *TABLE 6* imply that a 10% increase in the immigrant share of the low-skilled labor force reduces wages by 8% for all low-skilled workers in private households, 4% for all low-skilled workers in nursing homes, and 2% for all low-skilled workers in private households.

Borjas (2003) finds that a 10% immigrant-induced supply shock lowers weekly earnings for native men by about 4%. Cortés (2008) finds that a 10% increase in the share of low-skilled immigrants in the labor force decreases the price of immigrant-intensive services, including housekeeping and gardening, by 2%. Unlike most of the previous literature that just focuses on the effects of immigration on *native* workers in a workforce, this paper consider the effects of immigration on *all* workers in a workforce. Furtado and Ortega (2020) find that a 10% increase in the immigrant share of the population decreases the wages of low-skilled nurses in nursing homes by about 4%. Butcher, Moran, and Watson (2021) find that a 10% increase in the low-

skilled immigrant share of the working-age population decreases the wages of all health aides, housekeepers, and gardeners by about 2%.

VI. CONCLUSION

The aging American population will increase the need for long-term care. The elderly strongly desire home- and community-based services (HCBS) due to their beliefs about a better quality of life and lower costs. Because low-skilled immigrants comprise an important part of the workforce supporting aging in place, this paper addresses the question of the effect of immigration on elderly living arrangements. Two living arrangements in particular are considered. Aging in place is not living in a nursing home, and supported aging in place is aging in place but with support in the form of living in noninstitutional group quarters, such as independent or assisted living facilities; or living in a household with someone other than a spouse, such as an adult child or a live-in caregiver.

Using the immigrant enclave instrument and data from the 1980, 1990, and 2000 Censuses, this paper finds that a 1 percentage point low-skilled immigrant shock increases the probability of aging in place for elderly natives by 0.04 percentage points and increases the probability of supported aging in place by 0.30 percentage points. Consistent with a proposed mechanism that immigration lowers the cost of aging in place both in absolute terms and relative to the cost of nursing home, this paper finds that a 10% increase in low-skilled immigration lowers wages for all workers in private households by 8% but lowers wages for all workers in nursing homes by only 4%. These results are largely consistent with the literature.

The results of this paper provide evidence that immigration can effectively increase aging in place which may improve quality of life and lower government expenditures.

VII. TABLES

TABLE 1
SUMMARY STATISTICS FOR THE SAMPLE OF 348 METROPOLITAN AREA-YEARS

	Mean	Std. Dev.
Actual Immigrant Share of the Low-Skilled Labor Force	0.16	0.15
Synthetic Immigrant Share of the Low-Skilled Labor Force	0.16	0.19

Notes: The unit of observation is a metropolitan area-year combination. The number of observations (348) is the number of identified metropolitan areas (116) times three years. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. The data come from the1970 1% Form 1 Metro sample (used to construct the predicted immigrant share of the low-skilled labor force), the 1980 5% State sample, the 1990 5% State sample, and the 2000 5% sample from IPUMS (Ruggles et al. 2021).

TABLE 2
SUMMARY STATISTICS FOR THE SAMPLE OF ELDERLY NATIVES

	Mean	Standard Deviation
Aging in Place	0.95	0.22
Supported Aging in Place	0.25	0.43
Age	74.10	6.83
Female	0.60	0.49
Black	0.11	0.31
Hispanic	0.03	0.16
Married	0.52	0.50
Low-Skilled	0.73	0.45

Notes: The unit of observation is the individual. There are 2,168,966 observations. Aging in place is not living in a nursing home. Supported aging in place is living in non-institutional group quarters or in a household with someone other than a spouse. Elderly natives are individuals aged 65+ who do not report being a naturalized citizen or not a citizen. Low-skilled is defined as having a high school education or less. The data come from the 1980 5% State sample, the 1990 5% State sample, and the 2000 5% sample from IPUMS (Ruggles et al. 2021).

TABLE 3

SUMMARY STATISTICS FOR THE SAMPLE OF LOW-SKILLED WORKERS

MEAN (STANDARD DEVIATION)

	Private Households	Nursing Homes	Other Health Services
Real Hourly Wage (1999$)	8.69	10.07	11.80
	(7.77)	(6.09)	(6.44)
Age	43.38	39.39	40.10
	(13.08)	(12.64)	(12.33)
Female	0.92	0.86	0.82
	(0.27)	(0.35)	(0.38)
Black	0.35	0.36	0.28
	(0.48)	(0.48)	(0.45)
Hispanic	0.31	0.08	0.11
	(0.46)	(0.28)	(0.31)
Married	0.42	0.48	0.54
	(0.49)	(0.50)	(0.50)
High School Graduate	0.45	0.69	0.79
	(0.50)	(0.46)	(0.41)
Immigrant	0.38	0.14	0.13
	(0.49)	(0.35)	(0.33)
Observations	27,682	47,150	244,499

Notes: The observation is the individual. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Industries are classified according to 1990 Census Bureau industrial classification scheme. "Nursing homes" are "nursing and personal care facilities." "Other health services" are all the other health-related "professional and other services": offices and clinics of physicians, dentists, chiropractors, optometrists, and health practitioners, n.e.c.; hospitals; and health services, n.e.c. The data come from the 1980 5% State sample, the 1990 5% State sample, and the 2000 5% sample from IPUMS (Ruggles et al. 2021).

TABLE 4

FIRST STAGE REGRESSIONS RESULTS AT THE AGGREGATE LEVEL

	Main Analysis	Dropping El Paso	Pre-Shock Denominator	Females
	(1)	(2)	(3)	(4)
Synthetic immigrant share of the low-skilled labor force	0.29	0.35	0.25	0.36
	(0.08)	(0.05)	(0.08)	(0.09)
Observations	348	345	348	348
R^2	0.95	0.96	0.93	0.96
F-statistic	12.67	43.49	10.41	15.46

Notes: The outcome is the actual immigrant share of the low-skilled (female) labor force. This table presents the estimated OLS coefficient on the predicted immigrant share of the labor force ("the instrument") from a regression of the actual immigrant share of the low-skilled labor force in metropolitan area *l* and time *t* on the instrument in metropolitan area *l* and time *t*. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. Standard errors in parenthesis clustered by metropolitan area. Regressions include metropolitan area and year fixed effects. The data come from the 1970 1% Form 1 Metro sample, the 1980 5% State sample, the 1990 5% State sample, and the 2000 5% sample from IPUMS (Ruggles et al. 2021).

TABLE 5

OLS AND 2SLS ESTIMATES OF THE EFFECT OF LOW-SKILLED IMMIGRATION ON ELDERLY NATIVES' LIVING ARRANGEMENTS, SAMPLE OF ELDERLY NATIVES

	Immigrant Share of the Low-Skilled Labor Force	Aging in Place		Supported Aging in Place	
	OLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)
Synthetic Immigrant Share of the Low-Skilled Labor Force	0.324				
	(0.058)				
Immigrant Share of Low-Skilled Labor Force		0.017	0.042	0.211	0.300
		(0.013)	(0.020)	(0.027)	(0.049)
First-Stage *F*-Statistic	31.595				
Dependent Variable Mean	0.143	0.951	0.951	0.250	0.250

Notes: There are 2,168,966 observations. Aging in place is not living in a nursing home. Supported aging in place is either living in noninstitutional group quarters or living in a household with someone besides a spouse/partner. Elderly natives are nonimmigrants aged 65+. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. Standard errors in parenthesis clustered by metropolitan area. The data are from the 1970 1% Form 1 Metro sample, the 1980 5% State sample, the 1990 5% State sample, and the 2000 5% sample from IPUMS (Ruggles et al. 2021).

TABLE 6

EFFECT OF LOW-SKILLED IMMIGRATION ON THE WAGES OF LOW-SKILLED WORKERS

	Private Households		Nursing Homes		Other Health Services	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
$\frac{\text{Low-Skilled Immigrants}_{lt}}{\text{Low-Skilled Labor Force}_{lt}}$	-0.65	-1.04	-0.15	-0.52	0.12	-0.21
	(0.095)	(0.220)	(0.137)	(0.173)	(0.083)	(0.133)
Observations	27,728	27,728	47,377	47,377	245,343	245,343
First Stage *F*-statistic	-	11.93	-	22.85	-	20.87
Dependent Variable Mean	1.92	1.92	2.17	2.17	2.35	2.35

Notes: The outcome is the natural log of real hourly wages in 1999 dollars. This table presents the estimated coefficient on the immigrant share of the low-skilled labor force ("the main endogenous variable") from a regression of the natural log of the real hourly wage for individual *i* in metropolitan area *l* and year *t* on the main endogenous variable in metropolitan area *l* and year *t*. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. Industries are classified according to 1990 Census Bureau industrial classification scheme. "Nursing homes" are "nursing and personal care facilities." "Other health services" are all the other health-related "professional and other services": offices and clinics of physicians, dentists, chiropractors, optometrists, and health practitioners, n.e.c.; hospitals; and health services, n.e.c. Standard errors in parenthesis clustered by metropolitan area. The data come from the 1970 Form 1 Metro 1% sample, 1980 5% State sample, 1990 5% State sample, and 2000 5% sample from IPUMS (Ruggles et al. 2021).

TABLE 7

2SLS ESTIMATES OF THE EFFECT OF LOW-SKILLED IMMIGRATION ON THE LIVING ARRANGEMENTS OF ELDERLY NATIVES (ROBUSTNESS)

	(1)	(2)	(3)	(4)
Panel A. Probability of Aging in Place				
Immigrant share of the low-skilled labor force	0.04	0.03	0.04	0.04
	(0.020)	(0.022)	(0.023)	(0.024)
Panel B. Probability of Aging in Place with Support				
Immigrant share of the low-skilled labor force	0.04	0.03	0.04	0.04
	(0.020)	(0.022)	(0.023)	(0.024)
Observations	2,164,589	2,169,072	2,168,966	348
First Stage *F*-statistic	60.24	27.75	28.50	12.67

Notes: The outcome variable is an indicator variable denoting aging in place. This table presents the estimated coefficient on the immigrant share of the low-skilled labor force ("the main endogenous variable") from a regression of an indicator for (supported) aging in place for elderly native i in metropolitan area l and year t on the main endogenous variable in metropolitan area l and year t. Aging in place is not living in a nursing home. Supported aging in place is either living in noninstitutional group quarters or living at home with someone besides a spouse/partner. Elderly natives are nonimmigrants aged 65+. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. The dependent variable mean is 0.95. Standard errors clustered by metropolitan area in parenthesis. Standard errors in parenthesis clustered by metropolitan area. The data come from the 1970 1% Form 1 Metro sample, the 1980 5% State sample, the 1990 5% State sample, and the 2000 5% sample from IPUMS (Ruggles et al. 2021).

TABLE 8

2SLS ESTIMATES OF THE EFFECT OF A LOW-SKILLED IMMIGRATION ON THE WAGES OF LOW-SKILLED WORKERS (ROBUSTNESS)

	(1)	(2)	(3)	(4)
Panel A. Wages for Low-Skilled Workers in Private Households				
Immigrant share of the low-skilled labor force	-0.96	-1.14	-0.97	-0.67
	(0.173)	(0.022)	(0.186)	(0.232)
Observations	27,527	27,682	27,682	348
First Stage *F*-statistic	42.37	8.34	13.88	12.67
Panel B. Wages for Low-Skilled Workers in Nursing Homes				
Immigrant share of the low-skilled labor force	-0.55	-0.34	-0.55	-0.66
	(0.172)	(0.022)	(0.191)	(0.236)
Observations	47,071	47,150	47,150	348
First Stage *F*-statistic	47.88	20.07	38.21	12.67
Panel C. Wages for Low-Skilled Workers in Other Health Services				
Immigrant share of the low-skilled labor force	-0.18	-0.15	-0.20	-0.31
	(0.123)	(0.125)	(0.137)	(0.148)
Observations	243,816	244,499	244,499	348
First Stage *F*-statistic	64.00	17.49	27.71	12.67

Notes: The outcome is the natural log of real hourly wages in 1999 dollars. This table presents the estimated coefficient on the immigrant share of the low-skilled labor force ("the main endogenous variable") from a regression of the natural log of the real hourly wage for individual i in metropolitan area l and year t on the main endogenous variable in metropolitan area l and year t. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. Industries are classified according to 1990 Census Bureau industrial classification scheme. "Nursing homes" are "nursing and personal care facilities." "Other health services" are all the other health-related "professional and other services": offices and clinics of physicians, dentists, chiropractors, optometrists, and health practitioners, n.e.c.; hospitals; and health services, n.e.c. Standard errors in parenthesis clustered by metropolitan area. The data come from the 1970 Form 1 Metro 1% sample, the 1980 5% State sample, the 1990 5% State sample, and the 2000 5% sample from IPUMS (Ruggles et al. 2021).

TABLE 9

EFFECT OF LOW-SKILLED IMMIGRATION ON WAGES FOR VARIOUS TYPES OF WORKERS

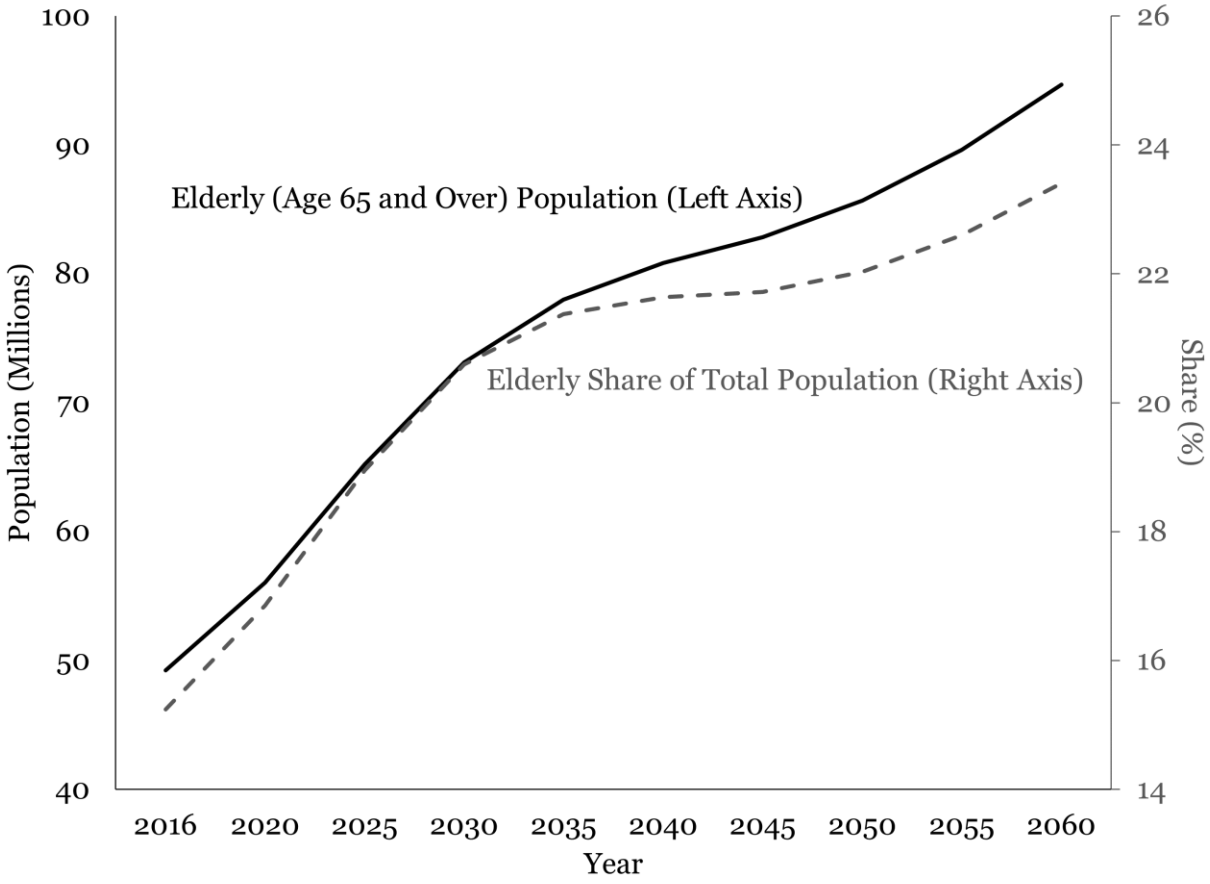
	Private Households	Nursing Homes	Other Health Services
Panel A. Effect on Low-Skilled Native and Long-Term Immigrant Workers			
$\frac{\text{Low-Skilled Immigrants}_{lt}}{\text{Low-Skilled Labor Force}_{lt}}$	-1.26	-0.41	-0.18
	(0.233)	(0.196)	(0.132)
Observations	22,140	44,819	234,869
First Stage *F*-statistic	15.49	20.87	20.71
Panel B. Effect on College-Educated Workers			
$\frac{\text{Low-Skilled Immigrants}_{lt}}{\text{Low-Skilled Labor Force}_{lt}}$	-0.17	0.19	0.11
	(1.227)	(0.230)	(0.136)
Observations	1,819	11,675	223,719
First Stage *F*-statistic	44.42	32.39	39.59

Notes: The outcome is the natural log of real hourly wages in 1999 dollars. This table presents the estimated coefficient on the immigrant share of the low-skilled labor force ("the main endogenous variable"). The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. Long-term industries have been in the US for more than 10 years. Industries are classified according to 1990 Census Bureau industrial classification scheme. "Nursing homes" are "nursing and personal care facilities." "Other health services" are all the other health-related "professional and other services": offices and clinics of physicians, dentists, chiropractors, optometrists, and health practitioners, n.e.c.; hospitals; and health services, n.e.c. Standard errors in parenthesis are clustered by metropolitan area. The data come from the 1970 Form 1 Metro 1% sample, 1980 5% State sample, 1990 5% State sample, and the 2000 5% sample from IPUMS (Ruggles et al. 2021).

VIII. FIGURES

FIGURE 1

THE ELDERLY POPULATION AND THE ELDERLY SHARE OF THE TOTAL POPULATION

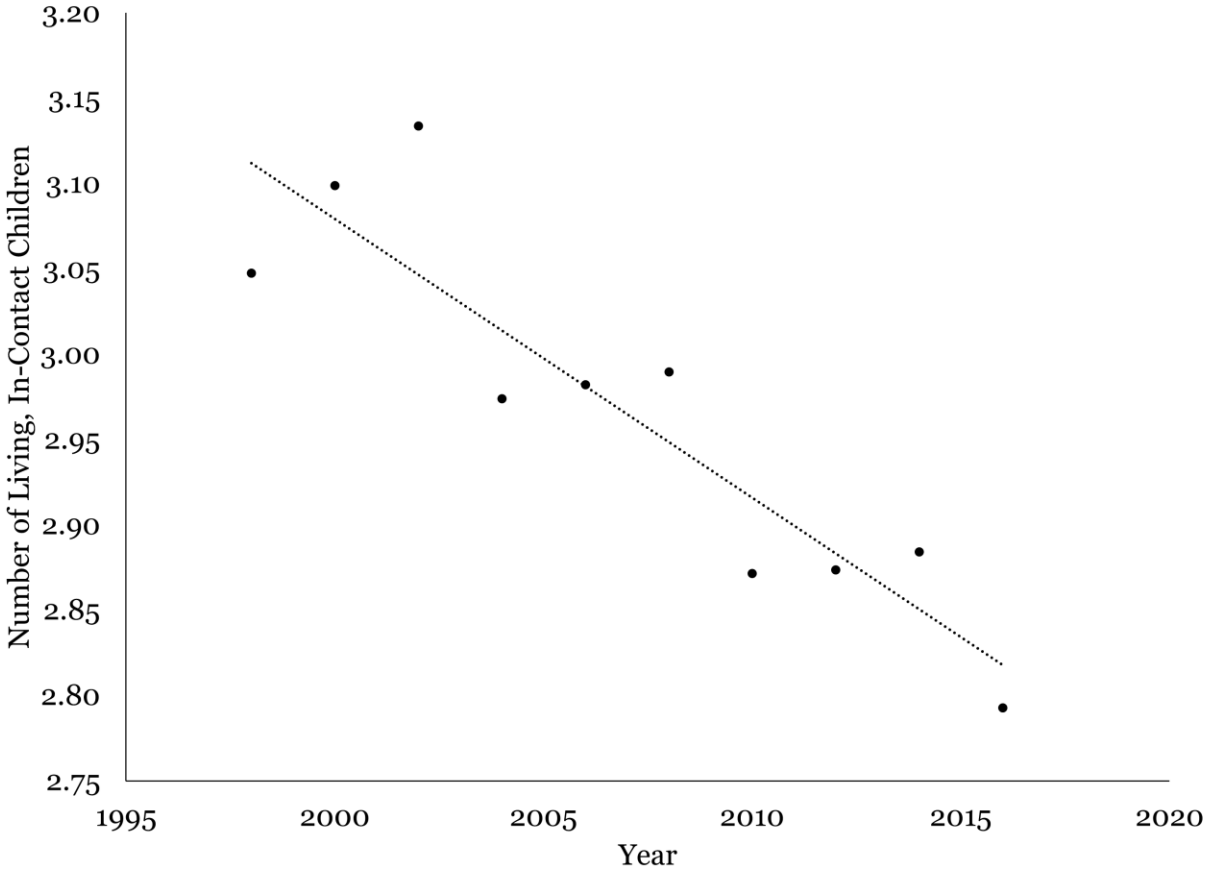


Notes: The solid black line represents the projected elderly (age 65 and older) population. The dashed gray line represents the projected elderly share of the total population. *Data Source:* Projected Age Groups and Sex Composition of the Population: Main Projections Series for the United States, 2017-2060. U.S. Census Bureau, Population Division: Washington, DC.

FIGURE 2
AVERAGE NUMBER OF HELPERS AND SHARE WHO HAVE HELP

Notes: The blue squares represent the weighted average number of helpers per HRS respondent in a household. "Helpers" includes informal, "gray market", and formal caregivers. The solid black line is an estimated trendline. The gray triangles represent the weighted share of HRS respondents who have at least one helper. The dashed gray line is an estimated trendline. The large jumps every six years reflect the addition of a new cohort into the survey data in 2004, 2010, and 2016. *Data Source*: Health and Retirement Study, (RAND HRS Longitudinal File 2018 (V1)) public use dataset. Produced and distributed by the University of Michigan with funding from the National Institute on Aging (grant number NIA U01AG009740). Ann Arbor, MI, (2021). RAND HRS Longitudinal File 2018 (V1). Produced by the RAND Center for the Study of Aging, with funding from the National Institute on Aging and the Social Security Administration. Santa Monica, CA (2021).

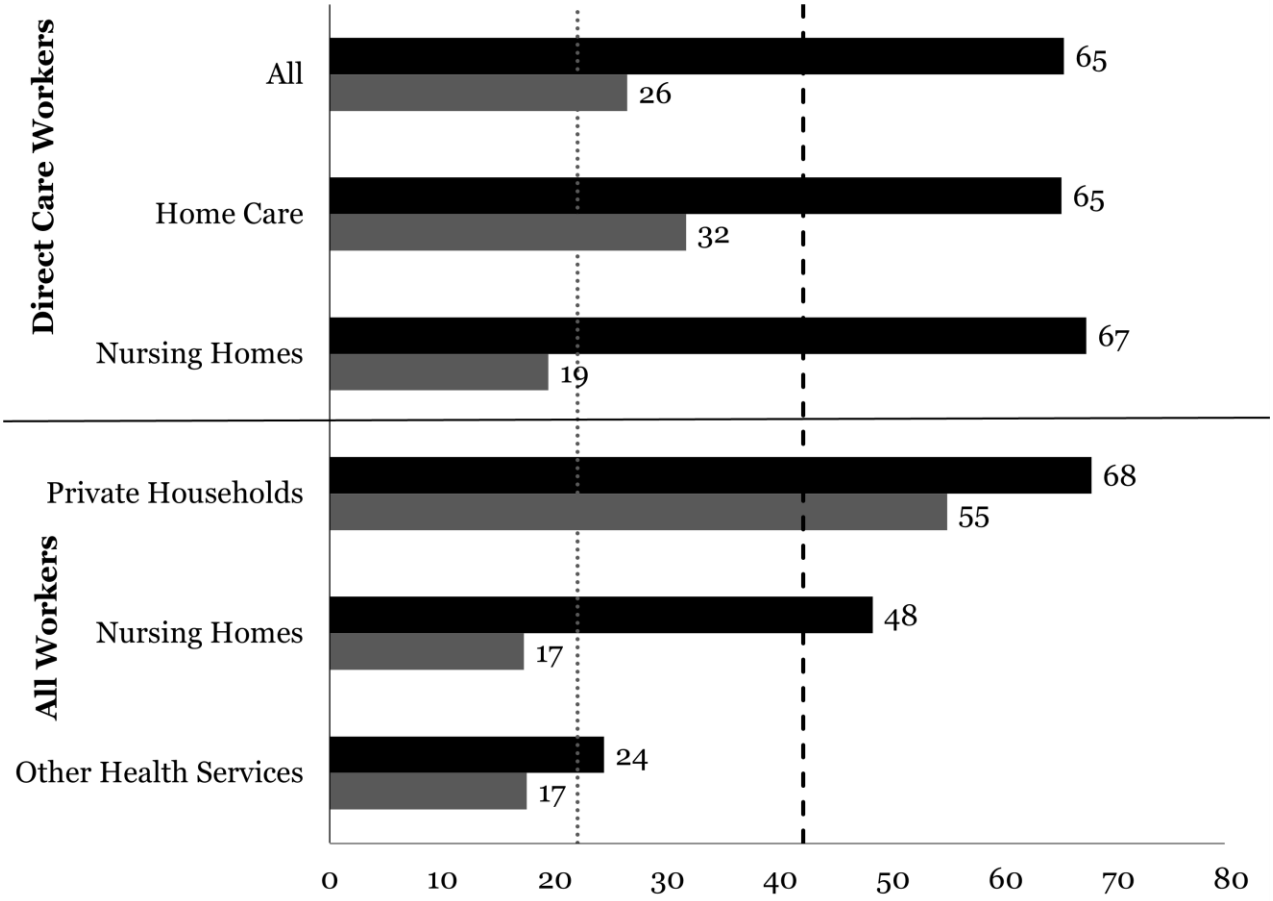
FIGURE 3
AVERAGE NUMBER OF LIVING, IN-CONTACT CHILDREN PER HOUSEHOLD



Notes: The dots represent the weighted average number of living, in-contact children per HRS household. The dashed black line is an estimated trendline. The large jumps every six years reflect the addition of a new cohort into the survey data in 1998, 2004, 2010, and 2016. *Data Source*: Health and Retirement Study, (RAND HRS Longitudinal File 2018 (V1)) public use dataset. Produced and distributed by the University of Michigan with funding from the National Institute on Aging (grant number NIA U01AG009740). Ann Arbor, MI, (2021). RAND HRS Longitudinal File 2018 (V1). Produced by the RAND Center for the Study of Aging, with funding from the National Institute on Aging and the Social Security Administration. Santa Monica, CA (2021).

FIGURE 4

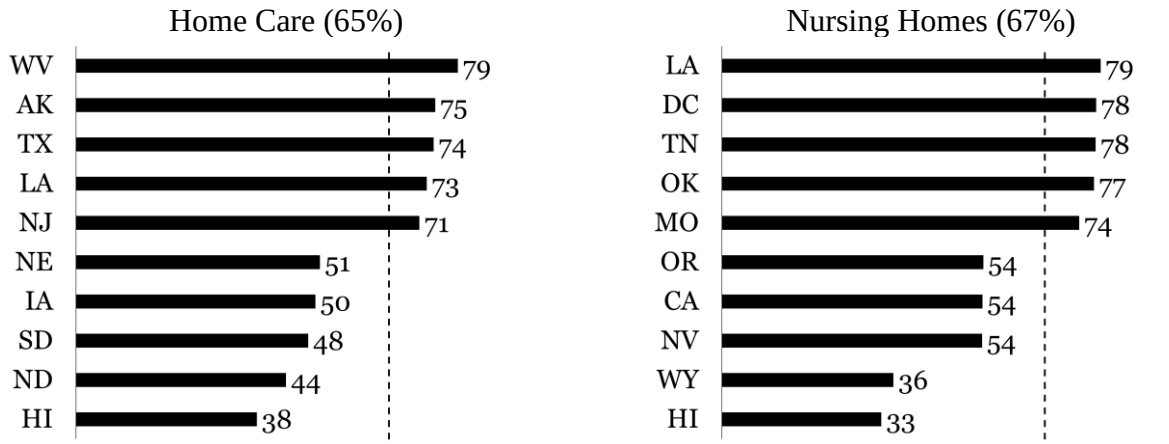
LOW-SKILLED SHARE OF THE WORKFORCE AND THE IMMIGRANT SHARE OF THE LOW-SKILLED WORKFORCE (%)



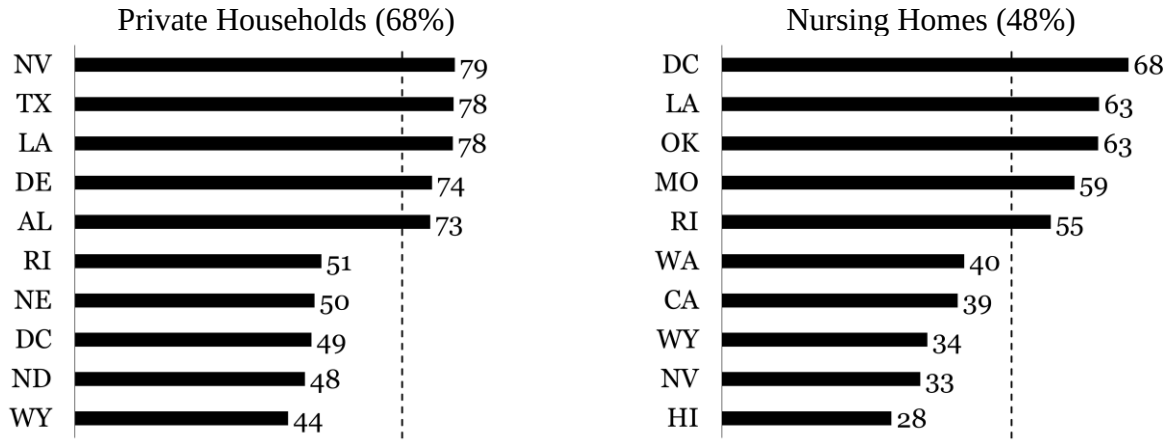
Notes: The low-skilled share of the labor force across all occupations and industries, represented by the vertical dashed black line, is 42%. The immigrant share of the low-skilled labor force across all occupations and industries, represented by the vertical dashed gray line, is 22%. Direct care workers are those who assist the elderly with (instrumental) activities of daily living. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants are either a naturalized citizen or not a citizen. Industries are classified according to 1990 Census Bureau industrial classification scheme. "Nursing homes" are "nursing and personal care facilities." "Other health services" are all the other health-related "professional and other services": offices and clinics of physicians, dentists, chiropractors, optometrists, and health practitioners, n.e.c.; hospitals; and health services, n.e.c. *Data*: 2019 5-year ACS (Ruggles et al. 2021).

FIGURE 5
TOP AND BOTTOM FIVE STATES IN TERMS OF THE LOW-SKILLED SHARE OF THE WORKFORCE (%)

Panel A. Direct Care Workers



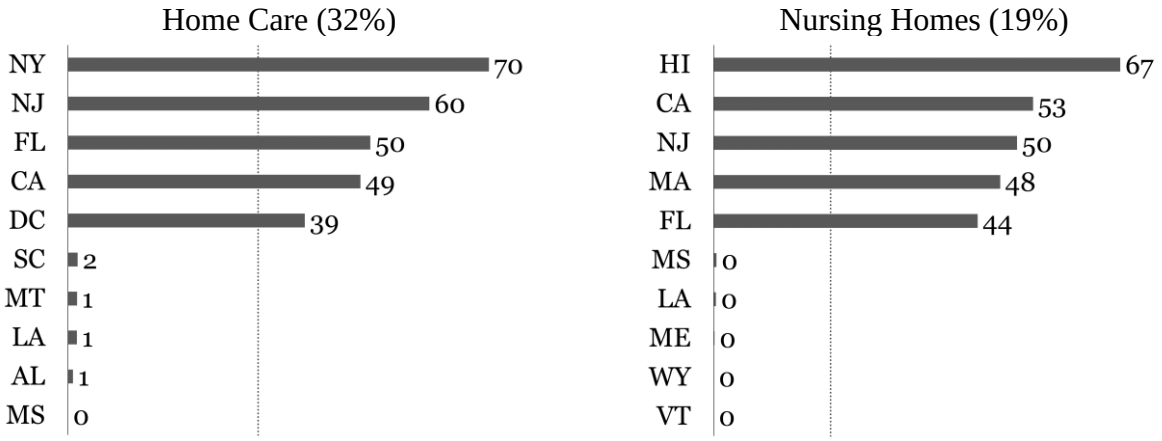
Panel B. All Workers



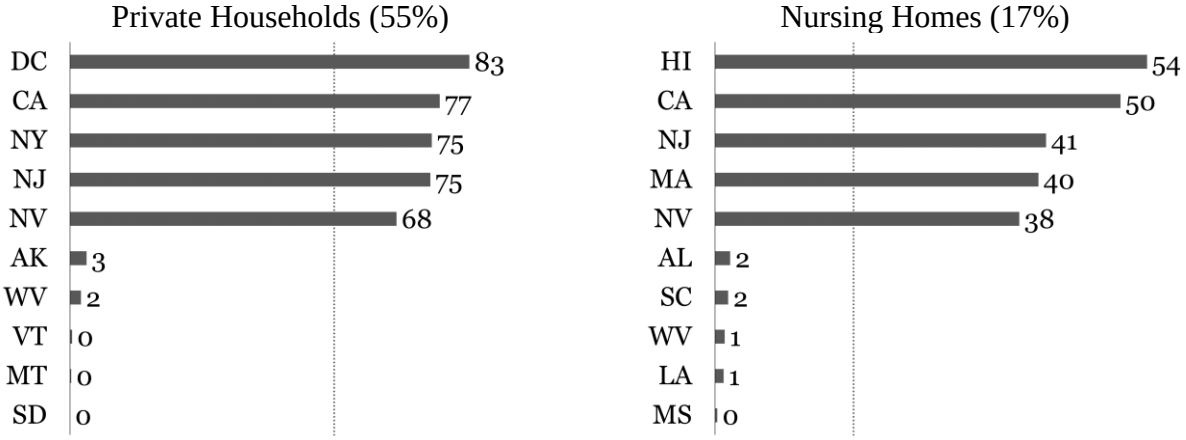
Notes: The vertical dashed black line represents the national average (displayed in parenthesis above each graph). The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Industries are classified according to 1990 Census Bureau industrial classification scheme. "Nursing homes" are "nursing and personal care facilities." *Data*: 2019 5-year ACS from IPUMS (Ruggles et al. 2021).

FIGURE 6
TOP AND BOTTOM FIVE STATES IN TERMS OF IMMIGRANT SHARE OF THE LOW-SKILLED WORKFORCE (%)

Panel A. Direct Care Workers



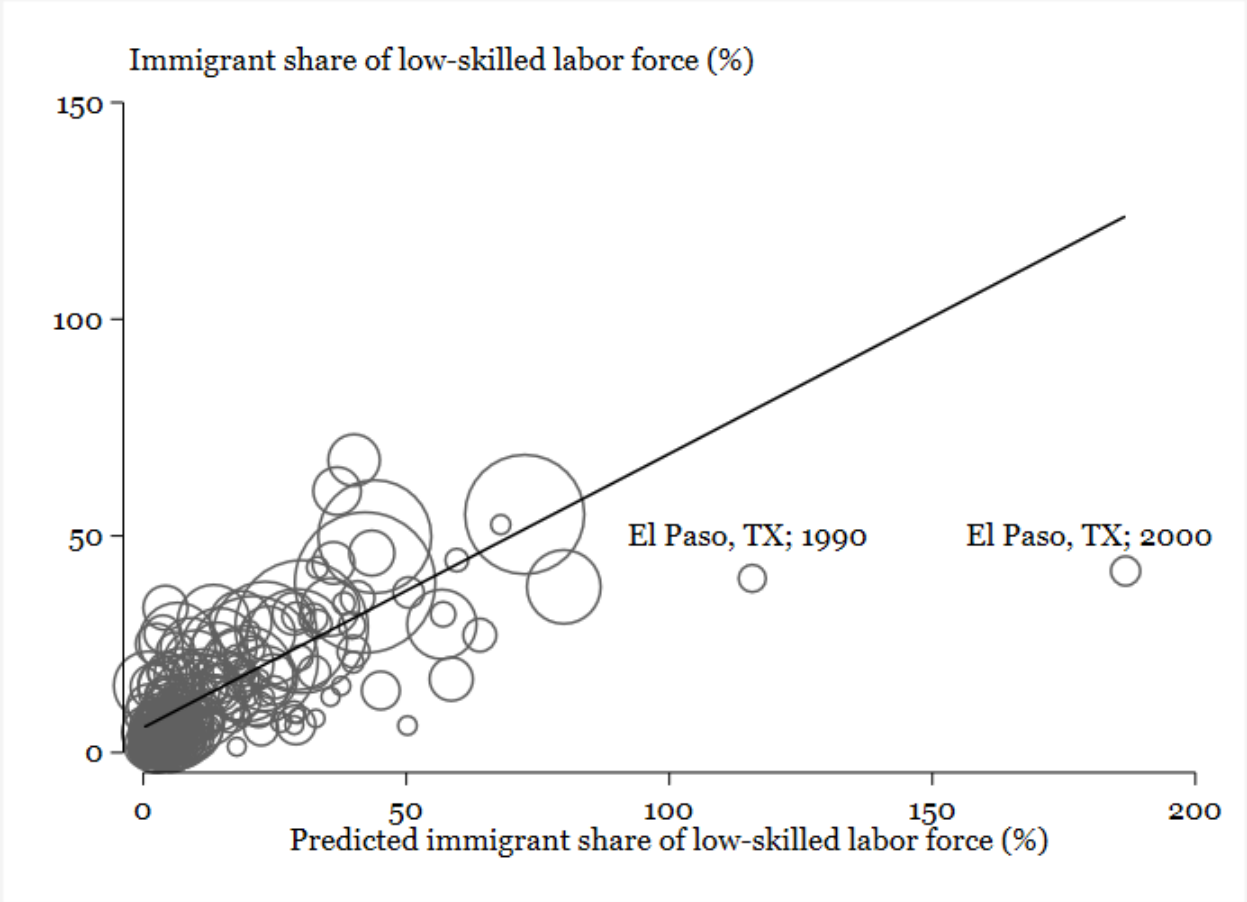
Panel B. All Workers



Notes: The vertical dashed black line represents the national average (displayed in parenthesis above each graph). The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. Industries are classified according to 1990 Census Bureau industrial classification scheme. "Nursing homes" are "nursing and personal care facilities." *Data*: 2019 5-year ACS from IPUMS (Ruggles et al. 2021).

FIGURE 7

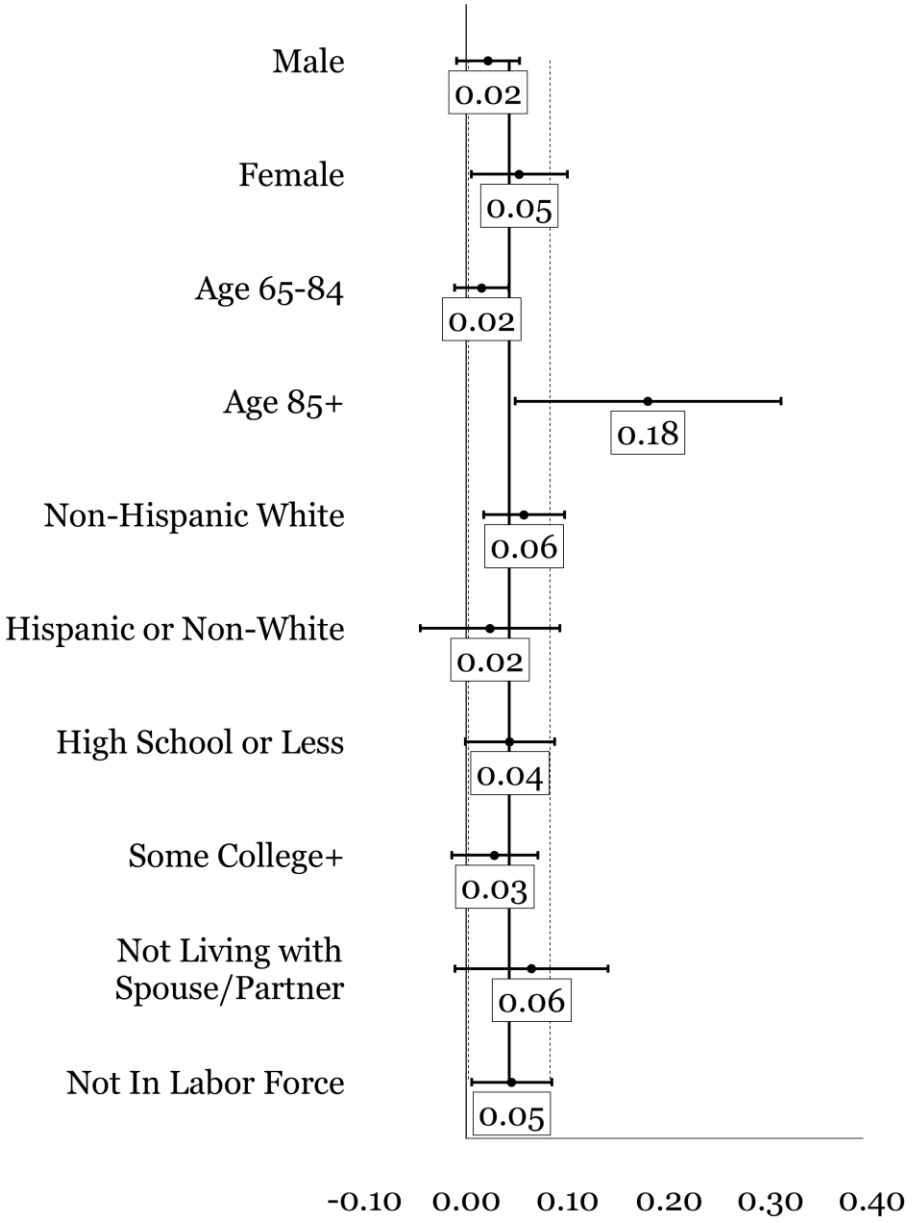
CORRELATION BETWEEN THE ACTUAL AND PREDICTED IMMIGRANT SHARE OF THE LOW-SKILLED LABOR FORCE



Notes: This figure plots the actual immigrant share of the low-skilled labor force for metropolitan area *l* and time *t* on the predicted immigrant share of the low-skilled labor force for metropolitan area *l* and time *t*. The circle size represents the metropolitan area-year population. The solid line is the result of an OLS regression with no other covariates and weighted by the metropolitan area-year population. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants are either a naturalized citizen or not a citizen. *Data*: 1970 1% Form 1 Metro sample, 1980 5% State sample, 1990 5% State sample, and 2000 5% sample from IPUMS (Ruggles et al. 2021).

FIGURE 8

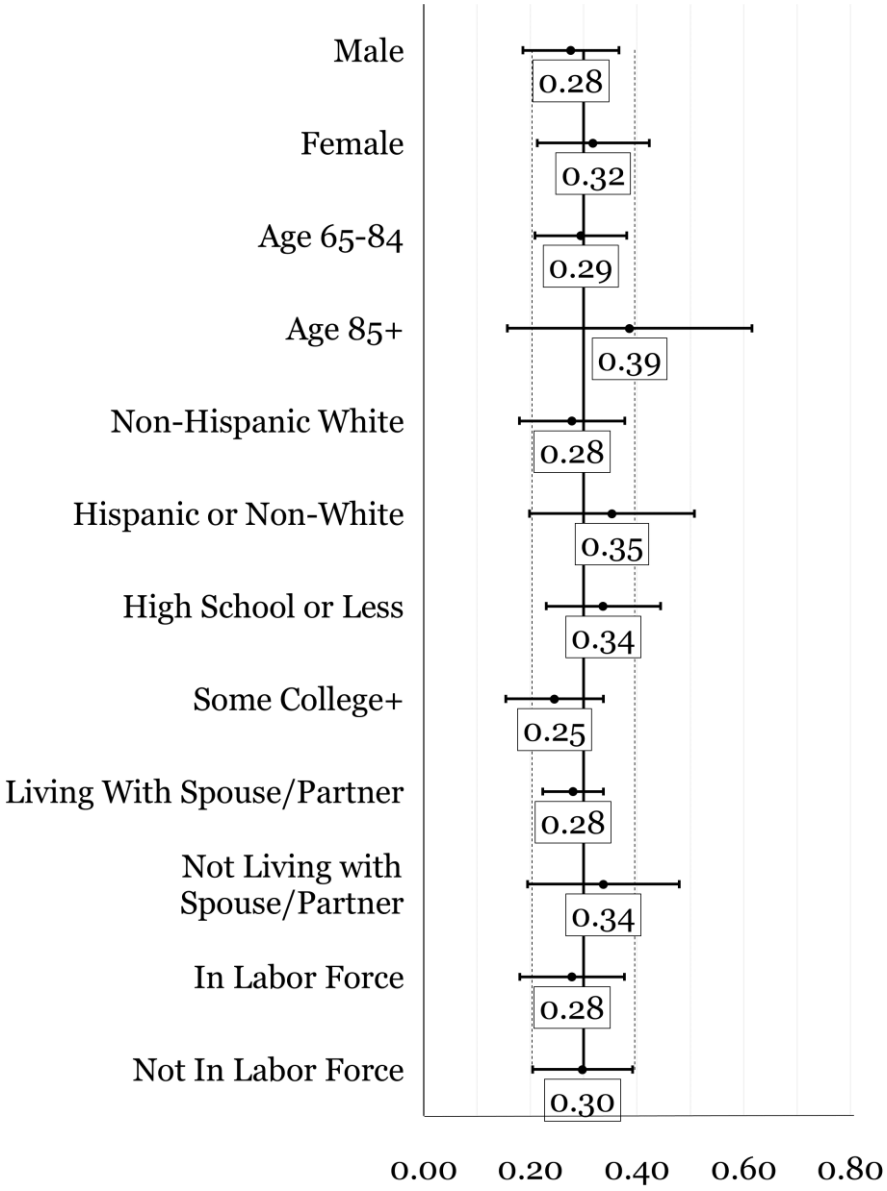
EFFECT OF LOW-SKILLED IMMIGRATION ON THE PROBABILITY OF AGING IN PLACE FOR VARIOUS SUBSAMPLES OF ELDERLY NATIVES



Notes: This figure plots the estimated IV coefficient on the immigrant share of the low-skilled labor force ("the main endogenous variable") from a regression of an indicator for aging in place for elderly native *i* in metropolitan area *l* and year *t* on the main endogenous variable in metropolitan area *l* and year *t* for various elderly native subsamples. Aging in place is not living in a nursing home. Elderly natives are nonimmigrants aged 65+. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. The error bars represent 95% confidence intervals. *Data*: 1970 1% Form 1 Metro sample, 1980 5% State sample, 1990 5% State sample, and 2000 5% sample from IPUMS (Ruggles et al. 2021).

FIGURE 9

EFFECT OF LOW-SKILLED IMMIGRATION ON THE PROBABILITY OF AGING IN PLACE FOR VARIOUS SUBSAMPLES OF ELDERLY NATIVES



Notes: This figure plots the estimated IV coefficient on the immigrant share of the low-skilled labor force ("the main endogenous variable") from a regression of an indicator for supported aging in place for elderly native *i* in metropolitan area *l* and year *t* on the main endogenous variable in metropolitan area *l* and year *t* for various elderly native subsamples. Supported aging in place is either living in noninstitutional group quarters or living at home with someone besides a spouse/partner. Elderly natives are nonimmigrants aged 65+. The low-skilled labor force is all low-skilled (high school education or less) working-age (16-64) individuals who are in the labor force, not in school, and do not live in group quarters. Immigrants report being either a naturalized citizen or not a citizen. The error bars represent 95% confidence intervals. *Data*: 1970 1% Form 1 Metro sample, 1980 5% State sample, 1990 5% State sample, and 2000 5% sample from IPUMS (Ruggles et al. 2021).

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